FIBROCYSTIC DISEASE OF THE PANCREAS

A Histological Study of the Pancreas in Childhood with a Survey of the Clinical Epidemiological and Genetic Features of the Disease

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by

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FIBROCYSTIC DISEASE

OF THE PANCREAS

VOLUME I

G. B. S. Roberts

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FIBROCYSTIC DISEASE OF PANCREAS

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CHAPTER I

INTRODUCTION AND REVIEW OF LITERATURE

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GENERAL INTRODUCTION

The present investigation has been under way since 1952, and in the years which have elapsed the reasons which stimulated me to commence this work have to some extent been forgotten. Nevertheless, it seems worth while trying to recollect these reasons if only to see to what extent they were fulfilled.

In 1952 I was engaged on an investigation on muco-proteins and mucopolysacchorides. The periodic-Acid-Schiff method had recently been introduced and its potentialities realised by Hotchkiss (1944). The use of this precise histochemical method coupled with selective enzymatic digestion of tissue components had opened a whole new field of study and it seemed probable (to the author) that it would be possible to study and elucidate the histochemistry of mucus formation and secretion.

At this time I was transferred for a period from the Pathology Department, Western Infirmary, Glasgow, to the Royal Hospital for Sick Children, Glasgow. Fibrocystic disease of the pancreas at once presented itself as a most unusual and interesting condition and appeared to offer an excellent type of material on which to try out these new histochemical methods especially as the mucoviscidosis concept of the disease which had been formulated recently suggested that the primary cause of the lesions and of the condition was an abnormality in the formation and secretion of mucus. However, as work proceeded

it became apparent that histochemical method did not in itself hold the key to the problem of fibrocystic disease.

As I encountered a substantial number of cases I became interested in the wider aspects of the condition and attempted to study not only the pathology but the general clinical features of this systematised disease. This then led me forward to review the epidemiological and genetic aspects of the disease and to carry out a relatively complete survey of this condition in the West of Scotland.

The results of this investigation are now presented along with a report on the clinical and pathological features of the disease as seen by me in the present series of cases. From a consideration of these histological features certain conclusions have been drawn and a new theory of the aetiology of the condition is advanced. Some attempts to prove this hypothesis are briefly outlined.

NOMENCLATURE

Throughout this thesis the term, "fibrocystic disease" is used to indicate both the lesions of the pancreas and the clinical syndrome characterised by failure to thrive, respiratory infection, and steatorrhoea. This name is not altogether satisfactory but has the merit of describing the pancreatic lesions which appear to be a constant finding in this disease. Many other names have been proposed, the most descriptive of them being the term, "dysporia entero-broncho-pancreatica congenita familiaris", which was suggested by Glanzmann (1946) and has the merit of being descriptive but the demerit of verbosity.

More recently the term, "mucoviscidosis" has been advocated by Shwachman (1951) and this has the advantage of not only describing the abnormality in mucus secretion which is present but also suggests or infers that it is widespread. Unfortunately many other conditions, for example, whooping cough and chronic bronchitis are associated with the production of excessive amounts of viscid mucus and so the term, "muco-viscidosis" can be criticised for lack of specifity as can the term, "mucosis" suggested by Bodian (1952).

I have, therefore, retained the term, "fibrocystic disease" for general use as it has the advantage of long usage.

HISTORICAL REVIEW

The pancreatic lesion, which is the constant and characteristic feature in fibrocystic disease of the pancreas, was first described by Landsteiner in 1905, when he presented a case of meconium ileus in which the small intestine was blocked by a mass of inspissated green mucus. Histological examination of the pancreas showed cystic dilatation of ducts and acini with fibrosis of the connective tissue stroma and the author thought that absence of the pancreatic ferments was responsible for failure of liquefaction of the meconium and that this in turn caused obstruction of the bowel.

This excellent initial report was not followed up and appears to have been forgotten. Many years elapsed before a further case of fibrocystic disease was presented.

About the time of Landsteiner's description, Bramwell (1902, 1904, 1906) reported a study of several patients who developed steatorrhoea in infancy. Although he considered that this was due to disease of the pancreas, he did not substantiate his claim either by biochemical examination of the pancreatic secretion or by histological examination of the gland itself.

Garrod and Hurtley (1913) presented what is probably the first clinical description of a case of fibrocystic disease when they reported a case of steatorrhoea in a child aged eight years who had passed abnormal fatty motions from the age of 7 months. Two siblings of this child had died under the age of

one year, and one of them had shown a similar abnormality of the stools. The authors noted the familial nature of the condition and in view of the fact that the parents were cousins suggested that it might have an inherited basis.

The first adequate clinical and pathological description of fibrocystic disease was given by Passini (1918)+ who demonstrated the characteristic abnormality of the pancreas and suggested that it was the cause of steatorrhoea. He described three children who all suffered from steatorrhoea and eventually died with broncho-pneumonia between one and two years of age. Histological examination of the pancreas of these three cases showed atrophy of the exocrine tissue with fibrosis and dilatation of the ducts. Two of his patients were siblings and he also suggested that this was a familial congenital pancreatic disorder.

Reports on similar cases were published by Harper (1930), Daffinee (1931), Blackfan and Wolbach (1933), Parmelee (1935), Hess and Saphir (1935), Harper (1938) and Thomas and Schlutz (1938). Harper (1930) suggested that the condition of the pancreas caused defective exocrine secretion which interfered with fat absorption and so accounted for the clinical condition; all subsequent authors have agreed with this assumption.

+ In a letter (Browne, 1955) suggested that credit for the original description of fibrocystic disease should go to Harper. I do not agree and consider that the description given by Passini was, in fact, the first.

Andersen (1938) published a paper which focussed attention on this condition by demonstrating that fibrocystic disease, as she now called it, was not a rarity but a relatively common cause of morbidity and death in childhood. Her own interest in the condition was aroused when she noted that a patient with coeliac disease, who had a high percentage of split fat in the stools and who had apparently responded favourably to treatment was found at autopsy to have cystic fibrosis of the pancreas. She was able to present forty-nine cases of fibrocystic disease, twenty-two of which had been observed personally, the remainder collected from the literature. She noted that the cases could be divided into three clinical groups.

1. Patients who died in the first week of life from some form of intestinal obstruction (meconium ileus).

2. Patients who died under six months of age, with purulent bronchitis, broncho-pneumonia, or bronchiectasis as the main cause of death. Most of these children had presented feeding problems and the main clinical features were hunger, failure to gain weight on an adequate diet, and the passage of foul, bulky stools.

3. Patients who survived beyond the age of six months. All of these patients presented symptoms which were regarded as evidence of coeliac disease. The main pathological changes were as follows:-

In the pancreas the acinar tissue was largely destroyed and replaced by epithelial-lined cysts, many of which contained eosinophilic concretions. Although there appeared to be a great

increase in the amount of fibrous tissue in the gland, the islets of Langerhans appeared to be normal. The lungs showed bronchitis, bronchiectasis or pulmonary abscesses, and cultures made from them almost always gave a growth of staphylococcus aureus. There was histological evidence of vitamin A deficiency, especially in children who died under the age of one year. Atresia of the small intestine and of the pancreatic duct was frequently noted.

While unable to ascertain the cause of the lesion, Andersen considered that it was usually, if not always, present at birth. As well as discussing the relationship of the pancreatic lesion to the other clinical and pathological features she commented on the familial association of the disease. Thirty-two cases of coeliac disease were also examined by her but in none of them was any lesion of the pancreas found, nor was pulmonary infection a common cause of death.

Blackfan and May (1938) reported that on examination of the pancreas in 2,800 necropsies they found thirty-five examples of fibrocystic disease. They described histological lesions which were similar to those seen by Andersen and considered, "that the pathogenesis of this striking pancreatic affection resides in the production of an abnormal secretion which inspissates and leads to the distension and atrophy of ducts and acini".

Pneumonia was present in the majority of these cases

and in seven histological evidence of vitamin A deficiency was found. In two families both children of twin pregnancies were affected by the disease. These authors considered that, "the clinical and laboratory manifestations, together with so characteristic a lesion in the pancreas were similar to reports which have appeared in the literature for many years."

Further cases were reported by:-
Rausch Litvak and Steiner (1939), Gamble (1940), Rasor and Stevenson (1941), Jeffrey (1941), Deem and McGeorge (1941), Wallace and Ashworth (1941), Daniel (1942), Robbin and Bernard (1942), Attwood and Sargent (1942), Wolman (1942), Farber (1943), Kennedy and Baggenstoss (1943), Kohlbry and Wells (1944), Wissler and Zollinger (1945), Farber (1945), Pugh (1945), Paterson (1946), Hellerstein (1946), Schlessinger (1946), Wigglesworth (1946), Tremblath (1947), Barr (1947), Pitt (1948), Kohl (1948), Sinclair (1948), May and Lowe (1949), Harper (1949), Jones (1949), Pugsley and Spence (1949), and Lelong Petit and Borniche (1950).

Thus it can be seen that the number of cases of fibrocystic disease reported in the literature grew very rapidly, providing ample confirmation of Andersen's original suggestion that this was not a rare disease.

Menten and Middleton (1947) reported eighteen cases of fibrocystic disease of the pancreas in a series of six hundred and forty post-mortems, an incidence of 2.8%. They commented that although obstruction of the pancreatic ducts which had been reported by Kornblith and Otani (1929) and seemed to

offer tangible evidence of the pathogenesis of the disease, they thought it probable that the pancreatic lesion preceded the atresia and was the cause and not the result of this abnormality.

Up to this time histological investigations had been centred mainly on the pancreas. Although the almost constant association of purulent bronchiolitis had been noted, little attention had been paid to the underlying abnormality of the respiratory tract which was the cause of this infection. Indeed, Andersen (1945c and 1946) had been fairly certain that dietary deficiency was the cause of the respiratory infection. In a review (1948a) she stated that, "there is no morphological evidence that a specific congenital anomaly exists in the bronchi or their secretion", and (1949c) she again emphasised the importance of nutritional deficiency in respiratory infection.

Farber (1944) showed clearly that practically any mucus secreting gland in the body could be affected in fibrocystic disease and that characteristically the gland itself or its ducts showed over-filling with mucus.

Histological examination of material obtained at post-mortem examination of 87 children with fibrocystic disease of the pancreas revealed changes in the lungs, upper respiratory tract, liver, gall bladder and upper alimentary tract which were, he thought, essentially the same as those of the pancreas and

appeared to depend on a primary alteration in the character of secretion within the glandular structures, leading to obstruction and loss of function. Fibrocystic disease of the pancreas he regarded as a systemic disease which presented a variety of clinical appearances. An investigation into the nervous control of the pancreas and mucous glands appeared to him the logical approach to a study of the nature of this systemic disease.

Baggenstoss and Kennedy (1945) and Bodian (1946) also described a series of cases with the same widespread abnormality in the mucous glands. Bodian (1952) expressed the opinion that the disease was a mucosis affecting all mucus-secreting glands. Zuelzer and Newtom (1949) presented twenty-eight cases which survived past the neonatal period and found that twenty-four had symptoms referable to the respiratory system. Histological examination showed the bronchi frequently were full of stringy mucus, and secondary infection of this caused bronchiolitis and broncho-pneumonia. It is interesting to note that the salivary glands in 18 cases appeared normal.

It would seem obvious that the precise conditions of fixation of material and the nature and p^H of the fixative employed be studied and carefully controlled in view of the well-known fact that acid fixatives may cause marked swelling of mucus. It is quite conceivable that artefact produced by this means would closely simulate an excessive production of mucus and would obscure any pathological changes. Although

no critical work on this fundamental point seems to have been done most of the illustrations do indicate that an excessive amount of mucus is present not only in cells but also in the ducts and collecting tubules.

Meconium ileus

After the original description of meconium ileus by Landsteiner in 1905 a long interval elapsed before any further reports were published. Kornblith and Otani (1929) published details of a case of meconium ileus in which they carried out extensive histological examination of the pancreas and the pancreatic ducts. Further cases were reported by Dodd (1936) and Bromaugh and Lattimer (1940), while Sobel (1941) reported the first case in which the intestinal obstruction was relieved by enterostomy and the patient survived for three weeks; post-mortem examination, however, revealed typical fibrocystic disease of the pancreas.

Denzer (1941) commented that the pancreatic lesions seemed relatively slight in meconium ileus compared to fibrocystic disease, but Hiatt and Wilson (1948) reported eight patients with meconium ileus who survived for a considerable period of time after the obstruction was relieved by operation. These patients died up to two years after operation and histological examination of the pancreas revealed severe fibrocystic change with almost complete destruction of the pancreatic acini.

It is now generally accepted that meconium ileus and

fibrocystic disease are different manifestations of the same disease and that the pancreatic lesion is fundamentally the same. In cases of meconium ileus only slight fibrosis and cystic change is usually found in the pancreas, whereas patients with fibrocystic disease, who live longer, generally show more severe fibrosis, more marked cystic change and much greater destruction of the pancreatic acini.

Farber (1944) produced further evidence that meconium ileus and fibrocystic disease were essentially the same condition when he examined the duodenal juice in cases of meconium ileus and found no pancreatic enzymes to be present. All subsequent authors have accepted that meconium ileus is merely a special manifestation of fibrocystic disease of the pancreas.

Lesions in other organs

Changes are present in the mucus secreting glands throughout the body and it has long been appreciated that the gall bladder is affected in fibrocystic disease. Diffuse changes in the entire hepatic biliary system was first observed by Riniker (1946) who reported two cases of fibrocystic disease in which he found occlusions in the larger bile ducts . The formation of multiple accessory bile ducts was also observed by him. Di Sant Agnese (1956) has estimated that about 25% of cases show focal biliary cirrhosis and this change has even been described in neonates by Clair eoux(1956). Although these lesions in the liver usually produce no clinical effects, Webster and William (1953) have described cases in which

splenomegaly, haemorrhage and ascites resulted from the biliary cirrhosis. These changes in the biliary system are most interesting especially as there is no evidence that they are in any way associated with the widespread mucus gland abnormality.

EXAMINATION OF THE DUODENAL JUICE

Since one of the main clinical features of fibrocystic disease is steatorrhoea, and since histological studies showed the exocrine tissue of the pancreas was largely destroyed, it seemed reasonable to assume that some abnormality would be found in the pancreatic secretions. Consequently, examination of the duodenal juice was undertaken by Andersen (1942). Earlier work by Hess (1912) indicated that the three pancreatic ferments, amylase, lipase, and trypsin, were present in normal children immediately after birth. Klumpp and Neale (1930) had also carried out duodenal intubation of seventy-four children. Quantitative analysis of the duodenal juice indicated that although amylase and lipase levels were rather low in infancy, and rose in later childhood, trypsin was always present in large amounts. Andersen (1942) investigated the enzyme content of duodenal juice in fibrocystic disease and found the assay of trypsin in the duodenal juice a reliable method for the diagnosis of pancreatic deficiency. She found a complete absence of trypsin in all her cases of fibrocystic disease but noted that normal amounts were present in the duodenal juice in coeliac disease. The assay of amylase did not appear to be reliable as it is often low normally in early childhood and may also be

reduced in amount when diarrhoea is present. Although lipase was constantly reduced in amount in fibrocystic disease its determination presented several technical difficulties, and quantitative assessment of lipase was not found to be a practical diagnostic procedure. Andersen and Early (1942) described a simple quantitative method for the determination of trypsin in duodenal juice and found that this simplified test was adequate for the diagnosis of fibrocystic disease. Shwachman, Farber and Maddock (1943) and Farber, Shwachman and Maddock (1943) also found pancreatic achylia was a constant and characteristic feature in fibrocystic disease and they regarded this as a satisfactory method of differentiation from cases of the coeliac syndrome. Philipsborn, Lawrence and Lewis (1944) and Gibbs (1950) showed that the administration of secretin produced a substantial increase in the flow of duodenal juice in normal controls but found that cases of fibrocystic disease had a secretin-fast pancreatic achylia. Baggenstoss, Power and Grindlay (1948a, 1948b and 1951) showed that secretin was present in normal amount in the bowel in fibrocystic disease of the pancreas.

Up to this time all observations had indicated that pancreatic achylia was complete in all cases of fibrocystic disease and existed from birth, but improved techniques of quantitative assessment showed that this is not always so. Gibbs, Bostick and Smith (1950) described two cases; in one trypsin was present in the duodenum at the age of ten months

and a normal vitamin A absorption curve was obtained; in the other the duodenal juice showed a normal trypsin concentration at fourteen months. Both children died with respiratory infection and histological examination of the pancreas showed typical fibrocystic disease.

Shwachman (1951) also described two cases in which the duodenal juice appeared normal and contained trypsin in high concentration. Examination at intervals over a period showed a gradual fall in the concentration of enzymes in the duodenal juice and post-mortem examination showed typical fibrocystic disease of the pancreas.

When it had been established that pancreatic achylia was an almost constant feature in fibrocystic disease it seemed rational to attempt to determine if the pancreatic ferments were normally passed in the faeces and this proved to be so. It was, of course, hoped that the examination of faeces would save children the upset associated with duodenal intubation.

Shwachman, Patterson and Laguna (1949) described a simple test which estimated roughly the proteolytic activity of faeces by determining their ability to liquefy gelatine. They examined faeces from 220 children with fibrocystic disease and found no tryptic activity in 209 of these. They noted that oral administration of pancreatin made the test positive, but the administration of laxatives did not. Horsfield (1952) carried out this test quantitatively and this has reduced the proportion of false positive results. Although used as a screening test, it is known that examination of proleolytic enzymes in faeces has

not done away with the need for duodenal intubation in the investigation and diagnosis of fibrocystic disease.

Fat metabolism

Several studies on fat metabolism in fibrocystic disease have been undertaken. Shohl, May and Shwachman (1943) and Shohl (1948) studied the fat metabolism in children with fibrocystic disease and found that it was the same type as that found in dogs with blocked pancreatic ducts and was characterised by the passage of faeces with a large nitrogen content and a moderately increased fat content. Andersen (1945a) and Andersen and Early (1945) studied the excretion of faecal fat in very young children and showed that a satisfactory fat balance test could be carried out. Andersen (1945b) noted that reduction in the amount of the dietary fat usually produced a corresponding fall in the faecal fat and, further, that administration of pancreatin usually produced a fall in the amount of faecal fat. Consequently she advised that cases of fibrocystic disease should be given a diet with a low fat content but with a high vitamin A content, and should be given an active preparation of pancreatin. These suggestions are still the basis of the dietary regime followed in the treatment of fibrocystic disease.

Other biochemical investigations

Although examination of the duodenal juice affords a reliable method of diagnosing fibrocystic disease, duodenal

intubation is both time-consuming and difficult to do in very young children, and is not to be undertaken lightly in a seriously ill child. Because of this, many attempts have been made to find a reliable diagnostic test which does not require intubation of the duodenum. Pancreatic dysfunction impairs the absorption of a variety of substances from the alimentary tract, causing low blood levels and most of the tests suggested have been based on this observation. While some success has been achieved, in general these tests are non-specific and do not differentiate between fibrocystic disease and the coeliac syndrome.

One of the earliest of the absorption tests attempted was the blood sugar curve which May and McCreary (1940) had already shown to be low in coeliac disease. Similar flat types of absorption curves have been demonstrated in fibrocystic disease but are not characteristic of the condition. Another form of absorption test was investigated by West, Wilson and Eyles (1946), Howard and Hesselwik (1949), Angfanger and Heavenrich (1949), Woiski (1952) and Shwachman and Christensen (1949) who all studied the blood amino-acid levels following ingestion of gelatine, glycine and a variety of other proteins and amino-acids. All these authors have attempted to lay down standards but in general they found that whereas at least a four-fold rise occurred in normal control patients the blood level of these various substances was never raised higher than double the fasting blood level in fibrocystic disease

of the pancreas. Very similar results were found in coeliac disease. In fibrocystic disease the administration of pancreatin greatly improved absorption and resulted in normal blood levels, whereas in coeliac disease it had no effect.

May and McCreany studied the absorption of vitamin A in patients with coeliac disease and showed that it was only absorbed slowly. Flax, Barnes and Reichert (1942), May and Lowe (1948) and Gibbs (1949) studied vitamin A absorption in fibrocystic disease and found that its absorption was poor but could be improved by giving it in an emulsified oily preparation or by administering pancreatin. Lewis et al (1947) showed that vitamin A in aqueous solution was absorbed better in fibrocystic disease than in coeliac disease. Although a great deal of information has been obtained on the absorption of a variety of substances in fibrocystic disease and many minor differences between absorption in this condition and in coeliac disease have been pointed out, it seems reasonable to conclude by saying that these studied have all failed to find a simple, diagnostic test to separate the two conditons.

Recently a rather different type of test has been suggested by McFarlane, (1952) who estimated the anti-thrombin level in a series of cases and found it was abnormally high in fibrocystic disease. He obtained very consistent results, but has been unable to suggest why this change in the anti-thrombin level should be present.

Sweat electrolyte secretion

The most recent diagnostic test employed is the estimation of the electrolytes secreted in sweat. Darling et al (1953) and Di Sant' Agnese et al (1953a and b) noted that children with fibrocystic disease were often greatly distressed in warm weather and examined the sweat produced by these children. They found that patients with fibrocystic disease produced sweat and saliva which contained an increased amount of sodium and potassium chloride. They concluded that if the patient's renal function was normal this increase in sodium and potassium in the sweat was diagnostic of fibrocystic disease. These investigators were unable to determine if the total volume of sweat excreted was increased.

Examination of patients' relatives showed that some showed a minor abnormality in sweat secretion which the authors thought might indicate that these people were heterozygous carriers of the fibrocystic gene.

Familial incidence

Garrod and Hurtley (1913) reported a case of congenital steatorrhoea and although the pancreas was not examined the general clinical features of the case suggested that it was an example of fibrocystic disease. Since two other children in the family were affected, the authors naturally commented on the family incidence, and suggested that the disease might

be hereditary as the parents were cousins.

Harper (1930), Flax, Barnes, Reichart (1942), Felson, Wolarsky and Rosen (1943) and Howard (1944) all described patients who had brothers or sisters suffering from the same disease.

Fanconi and Botsztejn (1944) were the first to carry out a statistical investigation of the familial incidence of fibrocystic disease and they published the family trees of twenty-five patients. They found consanguinity of parents only in three instances and the proportion of siblings affected in their series was over 30%. Consequently they considered that the causation might be similar to that of haemolytic disease of the newborn or due to some toxic effect in early intra-uterine life.

Andersen and Hodges (1946) published forty-eight cases of fibrocystic disease in which the history of the siblings was known, and 22.4% of the siblings of the patients were found to be affected after allowance was made for the statistical error inherent in the methods used for dealing with data from small families (the method of Hogben (1934) was used). They also computed the expected number of instances of the disease in their series and found it on theoretical grounds to be 55.8 which they considered corresponded fairly closely with the observed number of cases which was 60. They determined the corresponding figures from the available published material and found they corresponded with the figures which would be

expected if the disease occurred in the proportion of one in four of the affected families. From this they concluded that the disease was hereditary and was transmitted by a mendelian recessive trait.

Lowe, May and Reed (1949) carried out a similar statistical analysis on one hundred and thirty four patients with fibrocystic disease and showed by the "percentage affected method" of Macklin(1938) that the hereditary background for fibrosis of the pancreas is a single mendelian recessive gene. Although unable to calculate the frequency of the disease they assessed the incidence of affected persons in the general population to be between one in one hundred and one in ten thousand, and that between two and eighteen of every one hundred persons carry the gene for fibrosis of the pancreas in the concealed heterozygous condition. Mathieson (1948) suggested that the disease was hereditary and was transmitted by an incomplete gene.

Bodian (1952) presented seventy-seven cases in which he was able to obtain details of the family history. A statistical analysis was made of the number of cases found and the results corresponded closely with the expected number calculated on the assumption that the disease was transmitted by mendelian inheritance.

Although the familial nature of the disease was well-known it is interesting to note that it was not until 1948 that MacGregor and Rhamey were able to present the histological findings

in two children of the same family in which the first child died at the age of six months and the second died in the neonatal period with meconium ileus.

Goodman and Reid (1952) started by assuming that the disease was hereditary and speculated on how it was continued when all cases were fatal. They estimated that one in every one thousand births was affected. If the assumption is made that the genes, lost by death, are replaced by mutation from the normal to the abnormal alelle then the mutation rate per chromosome per generation is equivalent to the frequency of the disease and is $0.7^{1} \times 10^{-3}$, which is a very high mutation rate. The authors felt that this high mutation rate is to be preferred as the probable cause of the continuance of the disease rather than the superiority of the heterozygote and they felt justified in concluding that fibrocystic disease is a simple recessive trait which is fully penetrant.

An investigation of cases occurring in twins has been made by several authors but the results so far have been inconclusive. In the cases reported in the literature there are ten families into which twins were born. Of these twins, sometimes only one child has been affected and sometimes both. In the only example of identical twins described by Diamand and Constad (1946) both children were affected.

Thus it will be seen that the weight of evidence gathered and presented in the literature strongly supports the idea that the disease is hereditary and is transmitted

by a mendelian recessive gene. The only report which does not fall in line with this general concept is that of Fanconi and Botsztejn (1944) who found that the proportion of siblings affected in their series was too high to be explained by a mendelian factor. They suggested that the causation might be similar to that of haemolytic disease of the newborn, and that an intra-uterine toxic factor was responsible. Penrose (1956) has expressed the opinion that the family histories on which much of the genetic analyses have been performed are rather poor and feels that the conclusions reached are not necessarily correct. He considers that the whole question of the genetical aspects of fibrocystic disease could usefully be re-examined.

Suggested aetiology

In concluding this introduction I should like to outline briefly some of the attempts which have been made to explain the cause of the disease. It is probably true to say that most authors who have published papers on fibrocystic disease have felt compelled to speculate either on the transmission of the disease or on its aetiology or on both subjects and consequently many suggestions have been made.

The earliest attempt to explain the cause of the disease was a simple one. Kornblith and Otani (1929) saw, or thought they saw, stenosis of the pancreatic duct just before it entered the duodenum and they suggested that duct stenosis was the cause of the disease.

A much more subtle explanation was suggested by Baggenstoss, Power and Grindlay who failed to extract secretin from the small intestine of a case of meconium ileus. On this basis they suggested that absence of secretin was the cause of fibrocystic disease. Subsequently, the same authors were able to show that secretin was present in normal quantities in the bowel in meconium ileus and fibrocystic disease and finding that their previous result was due to technical errors, they completely withdrew their suggestion.

Observations have been made showing that diet may produce lesions in the pancreas. Davies (1948) pointed out that in Kwashiorkor there is some cystic change present in the pancreas and that perilobular fibrosis may also occur. Baggenstoss (1948) noted this type of change to occur in patients dying with uraemia and also (1948c) following death from lesions of the alimentary tract (carcinoma of stomach, ulcerative colitis, etc.).

Veghelyi et al (1950) noted cystic change in the pancreas of children fed on a diet deficient in normal protein and they further observed that cessation of pancreatic function was one of the first clinical signs of such deficiency. Similar histological changes were found in the pancreas of rats fed on a deficient diet. Miller and Rigdon (1952) were able to produce pancreatic fibrosis in ducks by feeding a diet deficient in proteins.

While these findings appear to establish that dietary deficiency may produce both cystic change and fibrosis in the pancreas

the lesions illustrated by the above authors do not look exactly like those of fibrocystic disease. Further, in none of these dietary deficiencies has any generalised abnormality in mucus secretion been noted and thus it seems to me unlikely that dietary deficiency, although capable of producing histological change in the pancreas and of interfering with pancreatic function, plays any part in the production of fibrocystic disease.

A most excellent comprehensive review has recently been written by Shwachman, Leubner and Catzel (1955) in which the authors give an outline of all the many difference lines along which research in fibrocystic disease has proceeded and survey the present position of research in this disease. Most of the hypotheses advanced by previous authors are considered and their advantages and defects are discussed. A short summary has also been given in a leading article (B.M.J., 1956).

SUMMARY OF HISTORICAL REVIEW

Little more than twenty years have passed since fibrocystic disease of the pancreas was identified as a definite disease producing a complex of symptoms from which it is possible to make a clinical diagnosis of the condition. Further studies showed that with care and patience it was possible to obtain samples of duodenal juice from very young children, and that the absence of normal pancreatic ferments from this juice was diagnostic of fibrocystic disease. Many articles have appeared on this subject, and the foregoing review includes what are considered to be the more important. Nevertheless, the growth

of knowledge on this subject can be divided into fairly clear cut stages.

The first period of development consisted in the publication of reports of children who had a coeliac-like disease, but who died and were found at autopsy to have an abnormal pancreas, which usually was both fibrous and cystic. By 1940 several considerable collections of such cases had been made and published by Andersen and others. It was accordingly realised that the disease was relatively common and was the cause of death in about 3% of children coming to post mortem examination in children's hospitals in such widely separated countries as Britain, North America and Australia. During this period, it was also accepted that meconium ileus was another manifestation of the same disease, and occurred when the pancreatic abnormality manifested itself in utero.

The next development (credit for which belongs chiefly to Farber) was the realisation that fibrocystic disease was a generalised condition and affected mucous glands throughout the body. In particular the mucous glands of the bronchi were almost always found to be involved. Further, it was assumed that the disease was congenital and that the lesion of the pancreas was always present if not fully developed at birth. Yet several reports appeared of patients who had a normal duodenal juice, but subsequently developed pancreatic achylia and were proved at post mortem to be cases of fibrocystic disease with characteristic histological changes in the pancreas.

This suggests that at least the pancreatic lesion in this disease is progressive

During this time much work has been done on metabolism in fibrocystic disease. In general this has indicated that failure to thrive, which is so common in this disease, is the result of pancreatic achylia. This causes impaired absorption, particularsly of fat and fat soluble substances, such as vitamin A, with consequent production of steatorrhoea. Treatment with pancreatic extracts was found to produce a substantial improvement in the absorption of these substances, and so often brought about a great improvement in the patient's state of nutrition.

The general experience, however, is that the respiratory condition is little altered by such therapy and that it is pulmonary infection which is usually the cause of death.

Although the value of examination of duodenal juice in the diagnosis of fibrocystic disease has long been known, duodenal intubation is not easy and is a very time-consuming procedure. Consequently many attempts have been made to find other diagnostic tests. Of these, examination of the faeces for tryptic activity has proved useful as a screening test, but other tests devised have not proved of practical value in the diagnosis of this condition.

The most recent stage in the growth of our knowledge on fibrocystic disease was initiated by the suggestion of Gibbs, Bostick and Smith (1950) that pancreatic achylia was not always present. Subsequent authors, especially Shwachman, have fully established that this is correct and have shown

that the deficiency of secretion does not always affect the three enzymes equally, since trypsin may disappear while lipase production remains almost normal. Further, it has been shown that respiratory symptoms may occur long before any evidence of pancreatic dysfunction can be detected. Thus the more recent information on fibrocystic disease suggests that it may not develop until later childhood, that there may be only slight impairment in pancreatic function, and that partial and mild cases of the disease exist.

Several large series of cases have now been collected. These have fully confirmed the familial nature of the disease and have suggested from statistical surveys that the disease is hereditary and is transmitted by a mendelian recessive factor.

Sources of material

My interest in fibrocystic disease of the pancreas was aroused when I spent a period with Dr. A.M.MacDonald in the Department of Pathology, Royal Hospital for Sick Children, Glasgow. During this time a number of children with this condition came under observation in both the medical and surgical wards to which I had access. Subsequently, when these children died, I carried out post mortem examinations on them. Since leaving the Royal Hospital for Sick Children, Glasgow, Dr.MacDonald made arrangements so that I have been able personally to carry out most of the post mortem examinations of children dying with this condition.

In the last two years I have performed autopsies on a number of cases of fibrocystic disease in Ruchill and Knightswood Hospitals, Glasgow and in Seafield Hospital, Ayr, and Gateside Hospital, Greenock. In this way I have been able personally to observe and examine forty cases of the disease.

A most valuable source of material has been the records and files of the Pathology Department, Royal Hospital for Sick Children, where Dr.MacDonald had, for a number of years, made a practice of removing at every autopsy a portion of pancreas for histological examination.

Both the slides and the block of this material are filed in the Pathology Department and I was able to examine the section of pancreas from all these cases. In many instances, as detailed subsequently, it was possible to obtain these blocks and have fresh sections prepared. Although little detailed description of these many pancreases is given in this thesis, nevertheless, the examination of this material formed the basis of my histological experience and provided a concept of the normal pancreas which proved invaluable.

I should like to express my appreciation and thanks for the time and effort which were devoted to the collection of this material.

Scope of investigation

The work on which this Thesis is based was commenced as a review of the cases of fibrocystic disease occurring in the Royal Hospital for Sick Children. The primary objects were to assess the frequency of the condition, in what forms it presented, and how often it was possible to establish the diagnosis clinically.

I did hope, however, that some further information might be obtained, as Sick Children's Hospital, Glasgow serves a very large area in which there is relatively little movement of the population and so I hoped it might be possible to follow the natural history of the disease as it developed in successive members of a family. This has now been done in several families and in two of them, three children have actually come to autopsy. The Royal Hospital for Sick Children, Glasgow, is not, of course, the only hospital in Glasgow to which children are admitted. There is a paediatric unit in Stobhill Hospital and the City Fever Hospitals admit cases of pneumonia in babies and young children and cases of fibrocystic disease are admitted because of this complication. It has not been possible to examine babies dying in the maternity hospitals in the area, but it seems probable that most cases of fibrocystic disease in neonates survive long enough for symptoms of obstruction to be apparent and consequently, it is felt that most young babies are transferred to a surgical paediatric unit. Lastly, a certain number of these children undoubtedly die at home.

An attempt has been made to assess the proportion of children dying at home and an estimate of the number of children affected with fibrocystic disease has been made.

An epidemiological and genetical study of the disease has been carried out on the cases found in the West of Scotland. In order to confirm, and in many cases amplify, the details of family history available, an attempt was made to visit every family and the study reported on Chapter VI is based on this survey.

The relationship of coeliac disease and fibrocystic disease is discussed in Chapter V. It was felt worth while to undertake this study because claims have been made that patients with fibrocystic disease of the pancreas may secrete trypsin in their duodenal juice and it has been suggested that cases of coeliac disease are merely mild cases of fibrocystic disease. Coeliac disease is, of course, only rarely fatal and adequate histological examination on the pancreas and other organs has only rarely been reported. In the present investigation, six cases of fatal coeliac disease have been encountered, and these are described in detail.

Examination of Pancreases

Prior to 1949 a number of cases of fibrocystic disease had been found in the Royal Hospital for Sick Children, and material had been kept. This has been examined partly to confirm the diagnosis and also to widen the scope of a review of the histological features of the lesion.

Since 1949, however, portions of pancreas have been taken at every post mortem. These had been preserved and were available for examination. The figures given in Table I (Col.3) indicate that it was possible to examine the pancreas of practically every child who died in the Royal Hospital for Sick Children, Glasgow, during the last seven years. During this period, it has been the practice to ask for permission to carry out an autopsy on all patients who died and permission was granted in about 80% of cases. There was no obvious bias in the cases in which permission was obtained. In a certain number of cases (about 3% of the total) the pancreas was not available, and so careful enquiry into the history and autopsy findings were made. In all these cases death was attributable to some definite lesion, such as tuberculous meningitis, tumour, trauma. Consequently, it can be assumed that the present enquiry gives an accurate indication of the frequency of fibrocystic disease in a general children's hospital.

Incidence of fibrocystic disease of the pancreas

The foregoing notes outline the investigations carried out and as shown in Table I, in a seven-year period, 1,146 pancreases have been examined histologically from a total of 1,193 post mortems. The histological criteria on which the diagnosis of fibrocystic disease is based are described and discussed in the section on Pathology (Chapter IV). The number of cases of fibrocystic disease encountered has varied slightly from year to year, varying from 2.8% in 1950 to 6.4%

TABLE I

ANNUAL INCIDENCE OF FIBROCYSTIC DISEASE AS FOUND AT AUTOPSY IN THE ROYAL HOSPITAL FOR SICK CHILDREN, GLASGOW

Year	Number of Autopsies	Number of Pancreases examined histologically	Number of Cases of fibrocystic disease	Percentage incidence of fibrocystic disease
1949	192	174	6	3.0
1950	176	170	5	2.8
1951	165	161	9	5.4
1952	188	184	12	6.4
1953	169	163	6	3.7
1954	159	155	8	5.0
1955	144	139	7	4.9
TOTAL	1193	1146	53	4.5

in 1952. The all-over average is 4.5%. Table II gives figures of other investigations which have been carried out in different centres. It seems reasonable to point out that in none of the other series was all pancreases examined histologically. Further, the authors do not indicate the proportion of deaths on which autopsies were performed. Consequently, it seems possible that a bias towards fibrocystic disease may have arisen through conscious selection of cases for autopsy.

It can be stated with some confidence that the incidence of fibrocystic disease in the Royal Hospital for Sick Children, Glasgow is about 5% of the total deaths. In Ruchill Hospital, Glasgow the incidence has been six cases in one hundred child autopsies but no real body of evidence exists as to what happens elsewhere in this area. Although cases have occurred and been reported to me from practically every hospital admitting children in the West of Scotland, it is not possible to determine what proportion of infant deaths these constitute.

Other pancreatic diseases

This review has not brought to light any examples of primary pancreatic diseases or dysplasias. No case of congenital hypoplasia of the exocrine pancreas or of congenital cystosis of the pancreas has been encountered, nor have any gross maldevelopments of the gland been seen. Six cases of syphilis with pancreatic fibrosis have been found and in

TABLE II

INCIDENCE OF FIBROCYSTIC DISEASE OF THE PANCREAS

POST MORTEM ANALYSIS

Author	No. of P.Ms.	No. of Cases	
Roberts Present series R.H.S.C. Glasgow 1949 - 1955	1193	53	4.5%
Andersen	605	20	3.3%
Blackfan and May	2800	35	1.3%
Farber	1089	52	4.8%
Bodian	1300	54	4.2%

several cases of coeliac disease the pancreas has been hypoplastic. These findings are discussed subsequently.

DESCRIPTION OF THE CLINICAL FEATURES OF THE CASES ENCOUNTERED IN THIS STUDY

1. Number and distribution of cases.
2. Clinical features of fibrocystic disease.
   - A. Meconium ileus and intestinal atresia.
   - B. Respiratory infection.
   - C. Marasmus.
   - D. "Coeliac Syndrome".
   - E. Bronchiectasis.
3. Presenting symptoms.
   - A. Respiratory symptoms.
   - B. Abnormal stools.
   - C. Failure to thrive.
4. Age of onset and relation to presenting symptoms.
5. A. Duration of life - age at death.
   - B. Relationship to presenting symptoms.
   - C. Relationship to age of onset.
   - D. Related to month of birth.
6. Biochemical investigations.
   - A. Tryptic activity in duodenal juice.
   - B. Tryptic activity in faeces.
   - C. Faecal fat.
   - D. Other biochemical tests.
7. Effect of therapy.

DESCRIPTION OF THE CLINICAL FEATURES OF THE CASES ENCOUNTERED IN THIS STUDY

1. Number and distribution of cases

In the survey which has been carried out ninety-nine fatal cases of fibrocystic disease of the pancreas were encountered and in all of these the diagnosis was confirmed by histological examination of the pancreas. As shown in Table III the greatest number of cases were encountered in the Royal Hospital for Sick Children, Glasgow, but other cases were found throughout the West of Scotland in practically every hospital which admits children. This table merely indicates the wide geographical spread of this disease and shows that by no means all cases are referred to the Royal Hospital for Sick Children. It does not, of course, give a true indication of the relative frequency of occurrence of the condition in different hospitals in the area.

2. Clinical manifestations of fibrocystic disease

Although commonly called "fibrocystic disease of the pancreas", this condition is a generalised one affecting secretory glands throughout the body. In consequence, the lesions produced by it and hence the clinical symptoms are not all related to pancreatic dysfunction. Indeed, in some cases evidence of pancreatic dysfunction may be very slight. The following paragraphs give only a brief account of the main clinical manifestations seen in the present series of cases.

TABLE III

OCCURRENCE OF FIBROCYSTIC DISEASE IN VARIOUS HOSPITALS IN GLASGOW AND THE WEST OF SCOTLAND

Number of Cases	Name of Hospital	Location
74	Royal Hospital for Sick Children	Glasgow
6	Ruchill Hospital	"
1	Knightswood Hospital	"
1	Stobhill Hospital	"
1	Heathfield Hospital	Ayr
4	Seafield Hospital	"
1	Kilmarnock Infirmary	Kilmarnock
2	Gateside Hospital	Greenock
1	Hawkhead Infectious Diseases Hospital	Paisley
91	Total	

2A. Meconium ileus and intestinal atresia

In this series of ninety-nine cases about one fifth (Fig.2) p.56 of the patients suffering from fibrocystic disease were found to have meconium ileus. That is to say at laparotomy or at post mortem the small intestine was distended with dark green viscid mucus while the large bowel was small in size and contained grey pultaceous material. Two patients showed volvulus of the distended small intestine and in two others there was an atresia in the middle portion of the small intestine.

These cases all presented similar clinical features. The children were born after a normal labour, showed no abnormality at birth and except in two cases, the abdomen was not noticed to be distended. The first noted abnormality was usually failure to pass meconium while vomiting commonly commenced some 36 hours after birth and about this time abdominal distension usually became manifest. A clinical diagnosis of intestinal obstruction having been made, an exploratory laparotomy was performed in most of these cases and a number of different procedures were carried out in an attempt to relieve the obstruction. These consisted of various attempts to remove not only the large mass of mucus in the small intestine, but also the inspissated mucus in the small and apparently underdeveloped large intestine. In the earlier cases physical removal of the mucus was attempted either by manual extraction or by washing out the bowel with saline but in later cases solutions of various enzymes were introduced

into the bowel in an attempt to aid digestion of the mucus and to clear it away. The enzymes tried included several preparations of pancreatin - Tryptar (a proprietory, highly purified preparation of trypsin), crude Lysozyme (prepared from white of egg) and Papain. While many of these solutions did help to break up the mucus, none of the solutions tried was really effective and pancreatin was probably the poorest. In only two instances was satisfactory clearance of the bowel obtained and the majority of the babies died within a few days of operation, only a few surviving longer than a week.

It is a pleasure to record my appreciation and thanks to Mr. W. A. Dennison of the Royal Hospital for Sick Children, Glasgow, for co-operation in trying out these various enzyme solutions on cases admitted to his wards, and for his help and the willingness with which he discussed the problem of treating these children.

Four cases of anal stenosis were encountered in babies who were subsequently found to have fibrocystic disease of the pancreas. Although the lesion in two instances was only a simple membranous obstruction and was easily relieved surgically, the children did not thrive and both died, one at three and one at five weeks of age. The other two patients had a more extensive atresia of the rectum and neither of them made a good recovery from operation. They subsequently failed to gain weight, developed pneumonia and died.

2B. Respiratory infection

Infection of the respiratory tract occurs early in the course of the disease. The basic cause (see pathology of lung lesion p. 105) is obstruction of the smaller air passages with mucus. Infection of this retained mucus with Staphylococcus aureus occurs and leads to an acute purulent bronchitis. This acute bronchitis is the cause of the spasmodic cough which is an early and consistent sign of respiratory infection in these cases. The bronchi rapidly become blocked and this leads to collapse of associated areas, while spread of infection often produces localised patches of pneumonia. In severe cases lung abscesses may form. If the purulent bronchitis persists for a long time bronchiectasis may result (see cases 11 and 78).

The following clinical history is often given. The child appears normal at birth and thrives for 2-3 months when it develops a cold. This fails to clear and the child is sent in to hospital and found to have pneumonia. Treatment with a number of antibiotics is then usually tried but in spite of this the pneumonia does not resolve. From then on the child fails to thrive in spite of feeding well and steatorrhoea often develops. Death generally occurs within two months of the first clinical manifestations of the disease.

2C. Failure to thrive - marasmus

Failure to thrive is a characteristic and early symptom in practically every case of fibrocystic disease as

described previously. On occasion it may be the sole reason for seeking medical advice but much more commonly, failure to thrive is associated with other clinical manifestations of the disease, such as steatorrhoea or respiratory infection.

Table IV shows the weight on admission of thirty-seven cases of fibrocystic disease in whom the weight was recorded. The patients have been grouped according to age at their last admission to hospital and it can be seen at a glance that all these children are substantially below the expected weight for their age. While there is some variation, on the average these patients weigh only 70% of their expected weight; in the more extreme cases of severe disease, the child weighed only 50% of its expected weight.

2D. "Coeliac Syndrome"

This type of clinical presentation is most commonly seen in older children who have thrived normally for a few months after birth. The child then stops gaining weight, the abdomen is noted to be protuberant and steatorrhoea develops. In a short time the appearance of the child is characteristic (fig.1) with a small, puny, wasted body and a large swollen protuberant abdomen. In about half of these cases the mother seeks advice because the child has failed to thrive, while in the remainder, some abnormality in the child's stools is noticed and advice sought for this reason. In most cases, on questioning the child's mother, she admitted that she noticed the child's

TABLE IV

WEIGHT ON ADMISSION OF 37 CASES OF FIBROCYSTIC DISEASE

GROUPED ACCORDING TO AGE

Birth to three months				Three to six months				Over six months			
Case No.	Age in months	Weight K.G.	% of expected weight	Case No.	Age in months	Weight K.G.	% of expected weight	Case No.	Age in months	Weight K.G.	% of expected weight
1	1	2.27	71%	5	5	3.4	50%	4	7	3.05	48%
2	1	2.85	78%	16	6	4.28	68%	13	17	8.3	80%
11	1	2.7	74%	17	5	3.52	63%				
14	1	2.7	71%	19	6	5.2	80%	27	21	7.31	70%
15	½	2.4	75%	37	4	4.2	84%	38	11	4.4	61%
21	3	4.45	85%	40	4	3.9	80%	39	11	5.7	62%
24	¾	3.1	83%	48	4	3.87	77%				
26	3	4.25	94%	50	5	3.97	70%	56	19	9.4	90%
31	3	3.1	70%	63	4	4.0	71%	58	21	6.4	70%
32	3	2.2	55%	71	4	3.2	75%	63	8	6.8	94%
				22	4	3.71	90%	64	10	6.4	79%
51	3	2.7	54%					67	42	10.2	70%
54	1	2.5	63%					12	36	9.1	68%
55	1½	2.9	75%					44	8	4.4	60%
								46	15	5.1	62%
Average			73%				73%				70%

motions were bulky and foul smelling and that they were more frequent than usual. Some cases, particularly in young children, present, however, with acute diarrhoea and are sent in to hospital as cases of gastro-enteritis. It is only when this acute episode is over that the true underlying nature of the case can be recognised.

Although this is a fairly well defined disease syndrome it is only part of the complex of fibrocystic disease and sooner or later these cases develop respiratory tract infection. From then on the prognosis as to life is essentially that of the respiratory infection and most of these children eventually die with "pneumonia".

2E. Bronchiectasis

Although only two cases in the series belonged to this group they are described at some length because they did not show the usual manifestation of fibrocystic disease and the diagnosis was not made in life. Although most cases of fibrocystic disease are detected clinically, it is felt that there are probably still some undetected cases of this type in whom other manifestation of fibrocystic disease are minimal.

These two patients (case 11 and 78) were a five years old boy and a seventeen years old girl and resembled each other in having been in several hospitals with bronchiectasis, this diagnosis being confirmed by bronchography. Both were quite well grown, although rather thin for their age but none of the wasting seen in the coeliac syndrome type of fibrocystic disease was present, and neither had a protuberant abdomen. During

their stay in hospital they took ordinary, mixed hospital diet and nothing abnormal was noted about their faeces. No steatorrhoea was evident at any time and in the case of the seventeen-year old patient the fat content of faeces obtained at post mortem was not abnormally high. Consequently both these patients were regarded as cases of bilateral bronchiectasis and it was only at post mortem that the pancreatic lesion was detected.

3. Presenting symptoms

An assessment has been made of the first symptom or abnormality noticed in these patients with fibrocystic disease. This presenting symptom in almost every case was the reason for seeking medical advice. It was thought reasonable to suppose that the presenting symptom might indicate the system most seriously affected by fibrocystic disease. The three main presenting symptoms were cough, which indicates respiratory tract involvement, the passing of abnormal faeces and failure to thrive and gain weight. The latter were regarded as indicative of pancreatic and thus of alimentary tract involvement. As shown in Table V, cough was by far the commonest presenting symptom and occurred in rather more than half the patients in this series.

3A. Respiratory symptoms

Cough was by far the commonest symptom noticed by parents. The cough was usually harsh and often paroxysmal. In consequence, nine out of twenty-nine cases complaining of cough were regarded as whooping cough and were sent into

TABLE V

PRESENTING SYMPTOM IN 54 CASES OF FIBROCYSTIC DISEASE+

	No.	%
Cough	29	54
Abnormal faeces	12	22
Failure to thrive	13	24

+ Cases of meconium ileus are excluded.

Note: In this and in all following tables % is given as the nearest whole number.

hospital as such although as far as can be ascertained, actual whooping was not observed in any of these cases. This diagnosis was made more frequently in very young children between one and two months of age. In older children the cough was often loose and productive.

3B Alimentary symptoms - abnormal faeces

In most cases the child's mother described the motions as pale and foul smelling. In only three cases did the mother mention the fact that the motions were oily. In seven out of the twelve cases in which the complaint made was the passage of abnormal faeces, the mother also complained that stools were frequent and loose. In four cases the child was sent in to hospital as a case of gastro-enteritis, which it simulated by presenting with an acute onset of profuse diarrhoea.

3C Failure to thrive

This complaint was made in thirteen cases and the loss of weight was usually marked. Most commonly the mother commented that the baby had been normal at birth and had thrived normally for a short time. Subsequently, although the child continued to feed well or even voraciously it no longer thrived and gained weight. When seen at hospital these children were usually between 30% and 40% below their expected weight.

As indicated in Table V failure to thrive and passage of abnormal faeces are the presenting symptoms in about 50% of all cases. As they are probably both mainly manifestations

of deficient pancreatic secretion they are considered together in the following review of the age of onset and expectation of life.

It should be stressed that the presenting symptoms do not indicate how the disease will progress. Many cases whichpresent with cough subsequently develop steatorrhoea and fail to thrive while cases whichpresent with steatorrhoea may die with respiratory infection.

4. Age of onset and relation to presenting symptoms

Although fibrocystic disease of the pancreas is generally regarded as a congenital abnormality no clinical evidence of the condition is usually found for some time after birth and in exceptional cases (e.g. Case 78) the onset of clinical manifestations of the disease may be delayed for many years. With rare exceptions, however, the disease declares itself in the first few months of life. As shown in Table VI forty-one out of fifty-three cases (80%) developed symptoms within the first three months of life.

As mentioned above the presenting symptoms may be due to involvement and infection of the respiratory tract or be due to pancreatic deficiency and resultant malabsorption mainly of fat. Consequently, cases were grouped according to whether the presenting symptoms were respiratory or alimentary. Of cases with primary respiratory symptoms, 76% occurred in the first three months of life while 78% of those with primary alimentary symptoms occurred in the same period. In Table VI it is shown that there is no appreciable difference in the age

TABLE VI

AGE OF ONSET RELATED TO PRESENTING SYMPTOMS IN 53 CASES OF FIBROCYSTIC DISEASE+

Age in months	Number of cases		Presenting symptoms			
			Respiratory		Alimentary	
	No. of cases	% of total cases	No. of cases	% of above cases	No. of cases	% of above cases
0 - 1	12	25	6	20	6	27
1	10	19	7	24	3	13
2	14	27	9	30	5	23
3	5	9	1	3	4	17
4	4	7	3	10	1	4
5	3	5	2	7	1	4
6	3	5	1	3	2	8
6+	2	3	1	3	1	4
	53		30		23	

+ Cases of meconium ileus are excluded.

of onset in the two groups of patients.

5A. Duration of life - Age at death

Although some children survive for a number of years, in this area the majority of children with fibrocystic disease die in the first six months of life. In the present series thirty out of fifty-three cases (55%) died between the second and fifth months (Table VII). Eighteen children (34%) survived longer than six months. In fig.2 the length of survival is shown graphically.

5B Relationship of age at death and presenting symptoms

The age at death was considered in relation to the presenting symptoms and is shown in Table VII. Children with symptoms which involved the alimentary tract tended to survive longer than those with primary respiratory symptoms. Thus, while only seven patients (23%) with primary respiratory symptoms survived longer than six months (the average age at death being fourteen months) eleven patients (45%) with primary alimentary symptoms survived more than six months (the average age at death being eighteen months).

An attempt was made to determine if the mode of onset of the disease affected the expectation of life. As shown in Table VIII patients whose presenting symptoms were respiratory tended to live for a shorter period than those who developed primary alimentary symptoms. However, the difference between the two groups is not appreciable.

5C Relationship of age of onset to age of death

That the expectation of life might well be related

TABLE VII

AGE AT DEATH RELATED TO THE PRESENTING SYMPTOMS IN 53 CASES OF FIBROCYSTIC DISEASE+

Age in months.	Number of cases		Presenting symptoms			
			Respiratory		Alimentary	
	No. of cases	% of total cases	No. of cases	% of above cases	No. of cases	% of above cases
0 - 1	-	-	-	-	-	-
1	2	4	2	7	-	-
2	9	17	4	14	5	22
3	7	13	4	14	3	13
4	8	15	6	21	2	8
5	6	11	4	14	2	8
6	3	6	2	7	1	4
6+	18	34	7	23	11	45
Total	53		29		24	

+ Cases of meconium ileus are excluded.

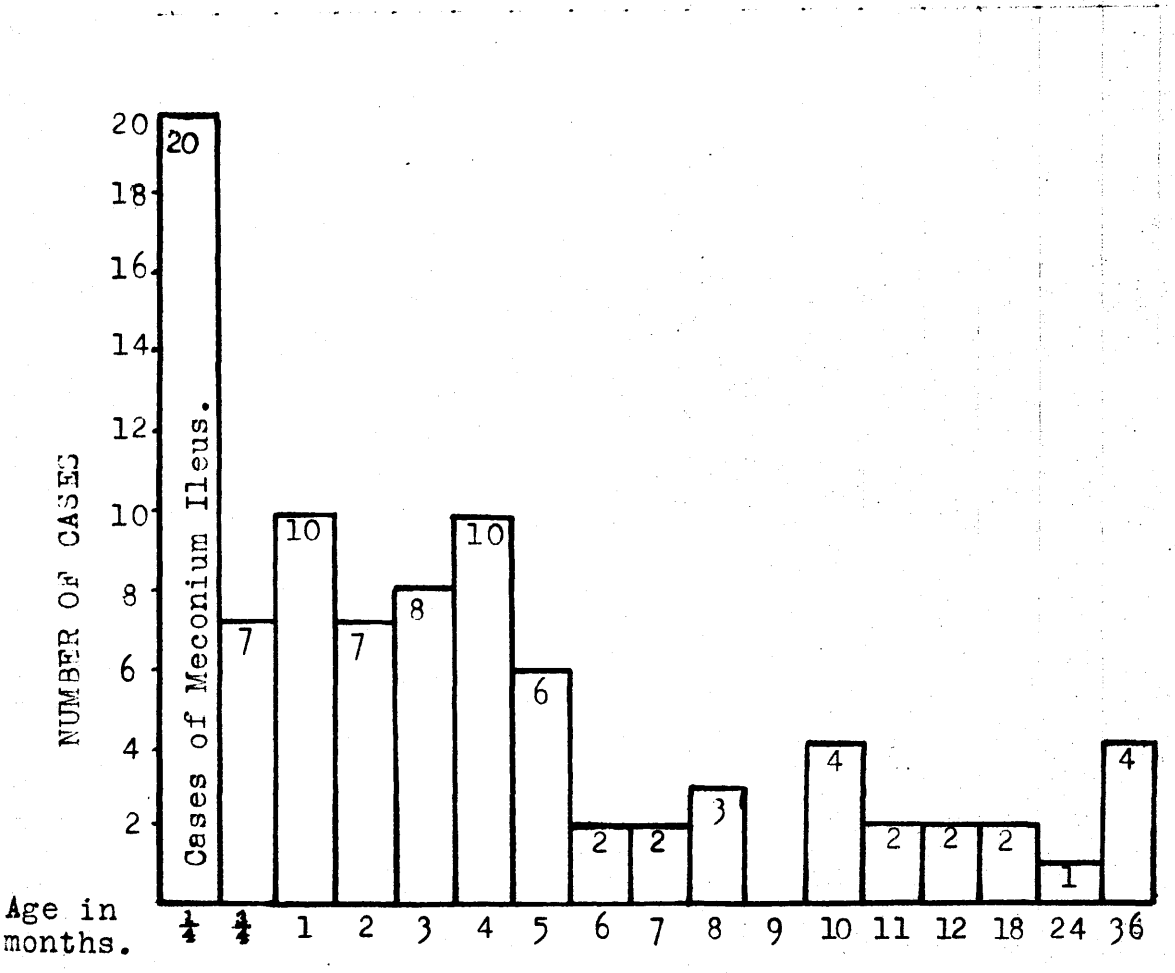


Fig.2. Showing age at death of 89 cases of Fibrocystic Disease.

TABLE VIII

PERIOD BETWEEN ONSET AND DEATH IN 53 CASES OF FIBROCYSTIC DISEASE+ RELATED TO PRESENTING SYMPTOMS

Duration in months	Number of cases		Presenting symptoms			
			Respiratory		Alimentary	
	No. of cases	% of total cases	No. of cases	% of above cases	No. of cases	% of above cases
0 - 1	9	17	7	23	2	9
1	8	15	2	7	6	26
2	10	19	6	20	4	17
3	7	13	6	20	1	4
4	4	8	2	7	2	9
5	4	8	2	7	2	9
6	3	5	2	7	1	4
6+	8	15	3	10	5	22
Total	53		30		23	

+ Cases of meconium ileus are excluded.

to the age of onset and to the system primarily affected was next considered. As shown in Tables IX and X generally the younger the child, the poorer the expectation of life. Primary respiratory symptoms tended to be associated with a poorer expectation of life in all the age groups, but no great difference is present between the two groups.

6. Biochemical investigations

Although fibrocystic disease of the pancreas can often be suspected from the history and from a general clinical examination it is not easy to prove the diagnosis during life. Damage to the pancreas is often severe and can reasonably be assumed to impair severely or stop completely the secretion of enzymes from the pancreas. It is, therefore, rational to attempt to sample the pancreatic juice to examine it for the presence of pancreatic enzymes. In practice trypsin is the only enzyme which can easily be estimated.

The difficulties of obtaining duodenal juice are considerable and, consequently, there have been many attempts to devise other tests which are easier to carry out in the wards. These are only briefly commented on as none has, as yet, been found which is as reliable as the determination of tryptic activity in duodenal juice.

6A. Tryptic activity

Examination of duodenal juice and/or faeces for evidence of tryptic activity was carried out in two cases of this series.

Duodenal juice

The examination of duodenal juice for tryptic activity

TABLE IX

DURATION OF LIFE RELATED TO AGE OF ONSET IN 30 CHILDREN WITH PRIMARY RESPIRATORY SYMPTOMS

Age of onset in months	No. of cases	Length of survival (months)	Short	Long	Ave.
0 - 1	6	$\frac{1}{4}$ 5 $\frac{1}{4}$ $\frac{3}{4}$ $3\frac{1}{2}$ $1\frac{1}{2}$	$\frac{1}{4}$	5	2
1	7	$3\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{4}$ 3 2 $3\frac{1}{2}$ 4	$\frac{1}{4}$	$3\frac{1}{2}$	$2\frac{1}{2}$
2	9	$\frac{1}{4}$ 2 1 2 6 2 2 4 3	$\frac{1}{4}$	6	$2\frac{1}{4}$
3	1	$\frac{1}{4}$	-	-	$\frac{1}{4}$
4	3	11 6 24	6	24	13
5	2	2 3	2	3	$2\frac{1}{2}$
6	1	5	-	-	5
6+	1	15	-	-	15

TABLE X

DURATION OF LIFE RELATED TO AGE OF ONSET IN 23 CHILDREN WITH PRIMARY ALIMENTARY SYMPTOMS

Age of onset in months	No. of cases	Length of survival (months)						Survival Short	Survival Long	Survival Ave.
0 - 1	6	1	1	$\frac{3}{4}$	$1\frac{1}{4}$	$2\frac{1}{4}$	$4\frac{1}{4}$	$1\frac{3}{4}$	1	$4\frac{1}{4}$
1	3	$1\frac{1}{2}$	$\frac{1}{4}$	3				$1\frac{1}{2}$	$\frac{1}{4}$	3
2	5	5	5	9	2	1		$4\frac{1}{2}$	1	9
3	4	16	2	2	16			9	2	16
4	1	6						6	-	-
5	1	32						32	-	-
6	2	36	4					20	4	36
6+	1	1						1	-	-

is a standard procedure in the diagnosis of fibrocystic disease, but it is not an easy one. It is difficult to pass a tube into the infant's duodenum and it requires a skilled and experienced operator. Even if the tube can be passed into the duodenum and its position confirmed by X-ray it is by no means an easy matter to aspirate the duodenal juice which is usually abnormally viscid. (The determination of the viscosity of duodenal juice has been suggested as a diagnostic test, but no viscosity measurements have been carried out in the cases presented). It is worth commenting that in only three instances were the attempts to obtain duodenal juice unsuccessful. I think this indicates the high standard of skill and dexterity of the various operators. Fluid was only accepted as duodenal if it was alkaline in reaction. It was tested for tryptic activity by adding doubling dilutions to tubes containing gelatin. Liquefaction of the gelatin was taken as indicative of tryptic activity. As shown in Table XI in fifteen out of fifteen cases the duodenal juice contained no trypsin and in none liquefaction of gelatin occurred suggesting that trypsin was present in the fluid.

Since it is difficult to obtain duodenal juice from normal children cases of coeliac disease were used as controls and the general impression is that this test is very reliable. Normal duodenal juice always contains trypsin and its absence is regarded as absolute proof that the patient suffers from fibrocystic disease. Conversely, it is probable that a patient

TABLE XI

SHOWING RESULTS OF EXAMINATION OF DUODENAL JUICE AND FAECES FOR TRYPTIC ACTIVITY IN 21 CASES OF FIBROCYSTIC DISEASE

Case No.	Material	
	Duodenal Juice	Faeces
17	-	-
40	-	-
44	-	-
50	-	-
60	-	-
61	-	-
65	-	-
67	-	-
56	-	-
58	-	-
5	-	0
16	-	0
38	-	0
39	-	0
51	-	0
64	0	+
21	0	+
31	0	+
32	0	+
26	0	-
62	0	-

Symbols:

0 Test not done
\- No digestion of gelatin
\+ Gelatin digested

TABLE XII

SUMMARY OF RESULTS OF ESTIMATION OF TRYPTIC ACTIVITY IN MATERIAL FROM 21 CASES OF FIBROCYSTIC DISEASE

Material	No. of tests	Present	Absent
Duodenal juice	15	0	15
Faeces	16	4	12

whose duodenal juice contains trypsin does not suffer from fibrocystic disease. Although it has been stated in one or two publications that patients may have trypsin in their duodenal juice and subsequently be proved to be cases of fibrocystic disease this has not been observed in the present series of cases. In the present series all patients with pancreatic achylia were cases of fibrocystic disease.

6B Tryptic activity of faeces

Examination of faeces for tryptic activity may be carried out in a similar manner to that described for duodenal juice or may be done more simply by adding a drop of faeces emulsified in saline to the emulsion surface of a piece of X-ray plate. Digestion of the gelatin is easily seen by the appearance of an area of clearing in the opaque emulsion.

This test has three great advantages over the test for tryptic activity in duodenal juice, the first and obvious one being the ease with which faeces are obtained and the second that the patient need not be exhausted by a difficult technical procedure which is also time-consuming from the operator's point of view. The third advantage is the test itself which requires no carefully prepared solutions and can be easily carried out in a side-room with no special equipment.

Examination of faeces for tryptic activity was carried out in sixteen cases and in twelve of them no digestion

of gelatin was obtained. In four, however, there was some digestion of gelatin, suggesting that trypsin was present. Unfortunately in these cases it was not possible to carry out the examination of duodenal juice and it is thought probable that these are false positive results. In two of the cases the faeces were cultured and gave a growth of B. proteus. This organism was demonstrated to produce a powerful gelatinose and it may well be that it was this substance which produced digestion of the gelatin in the test.

In an attempt to assess the reliability of the test 100 specimens of faeces from children convalescent from a number of conditions were examined and all gave digestion of gelatin on X-ray film or, in a test tube, digested gelatin of a greater dilution than 1/100. Thus it can be concluded that the examination of faeces for trypsin is a useful test. If no digestion occurs then the patient suffers from fibrocystic disease. As mentioned above in four out of sixteen cases digestion of gelatin occurred and it must, therefore, be borne in mind that a false positive result is a possibility. It is considered that the examination of faeces for tryptic activity is a useful screening test and is particularly worth trying in debilitated children.

Recently the tryptic activity of faeces has been estimated by the same method as that employed for duodenal juice. In general the results of this more elaborate method of testing have been very similar to those of the simple test

described above. Horsfield (1952) found that over the age of one year, quite a proportion of normal children have no proteolytic enzymes in their faeces. On the other hand patients with fibrocystic disease only rarely had proteolytic enzymes in their faeces.

6C Examination of faecal fat

The observation that steatorrhoea occurred in fibrocystic disease of the pancreas was made a long time ago and has, of course, been repeatedly confirmed by many authors. In the present cases a number of patients were investigated and all showed a raised faecal fat. The average figure obtained varied between 35% and 40% of the dry weight of the faeces when the patient was on ordinary hospital diet. The highest figure recorded was 60% and this was found in one of the older children who was grossly emaciated.

6D Other biochemical tests

A number of other tests have been used in an attempt to diagnose fibrocystic disease. Woiski working in the Royal Hospital for Sick Children, Glasgow, fed these children with amino acids and subsequently estimated the amino acid content of the blood. He was able to show that there was poor and slow absorption from the intestine but the results were not distinct or specific enough to form the basis of a diagnostic test.

Glucose absorption is also slowed and results in a flat curve when a glucose tolerance test is done.

7. Effect of therapy

Not many cases lived for more than three months from the onset of the disease, and consequently, it cannot be claimed that many of these children received great benefit from any treatment given.

Antibiotics were used to treat the respiratory infection from which many of these children were suffering, and these appeared to be effective in restricting the infection to the bronchi and preventing the occurrence of extensive pneumonia or abscess formation. They certainly were effective in prolonging life, temporarily at least. The earliest case found occurred in 1949 and so it is not possible to make any comparison between cases treated and not treated by antibiotics. Several of the earlier cases, however, show extensive abscess formation in the lungs, a feature which is not often seen now.

Treatment with pancreatic extracts was employed in some cases, but although the children's condition improved and the weight rose rapidly there is no evidence that such treatment materially improved the expectation of life in any of the present cases.

THE NORMAL PANCREAS

1. Introduction.

2. Histochemical methods.

3. The Normal Postnatal Pancreas.

   A. The Acinar Tissue.

   B. Histochemistry of Secretion.

   C. Normal Variation in Zymogen Granules.

   D. The Pancreatic Duct.

4. Postnatal Development of the Pancreas with a comment on Hypoplasia.

5. Hyperplasia of Islet Tissue.

CHAPTER III

1. Introduction

Although descriptions of the pancreas are, of course, given in all standard textbooks of histology the description of the acinar tissue is frequently superficial and lacking in detail in contrast to the detailed account of the islets of Langerhans which is usually given. Since any study of pathological processes demands, as a basis, a knowledge of normal structure, a considerable time has been spent in examining between 600 and 800 normal pancreases from children of all ages and I feel that a brief account of the main features of the normal pancreas should be given before proceeding to consider fibrocystic disease.

As indicated in the general introduction I commenced work on fibrocystic disease as part of an investigation into the histochemistry of mucus. At this time the periodic-acid-Schiff method had recently come into use and along with W.F.H. Jarrett, I had developed a simplified scheme for the examination of the higher muco-polysacchorides. The methods developed and used during this work (Roberts and Jarrett, 1950) and the general outline of the scheme of identification which was employed in conjunction with these methods are now given as together they form the basis of the histochemical work of this thesis.

2. Scheme of histochemical investigation of muco-polysaccharides

This scheme is an outline of the methods employed in the identification of those substances which are stained (e.i. coloured red) by the periodic-acid-Schiff (P.A.S.) technique. Table XIII gives in diagramatic form the outline of the steps taken in the identification of muco-polysacchorides in this thesis.

The following is a general classification of the poly-saccharide complexes which occur in animal tissues and are present after routine fixation, dehydration and embedding. Their common factor is the hexosamine or glucosamine radicle, which, by virtue of containing a 1:2 glycol grouping is stained by the P.A.S. technique.

Group I. Polysaccharides, e.g. Glycogen.

Group II. Muco-polysaccharides. Although these compounds have a low but significant protein content they give reactions which are predominantly carbohydrate.

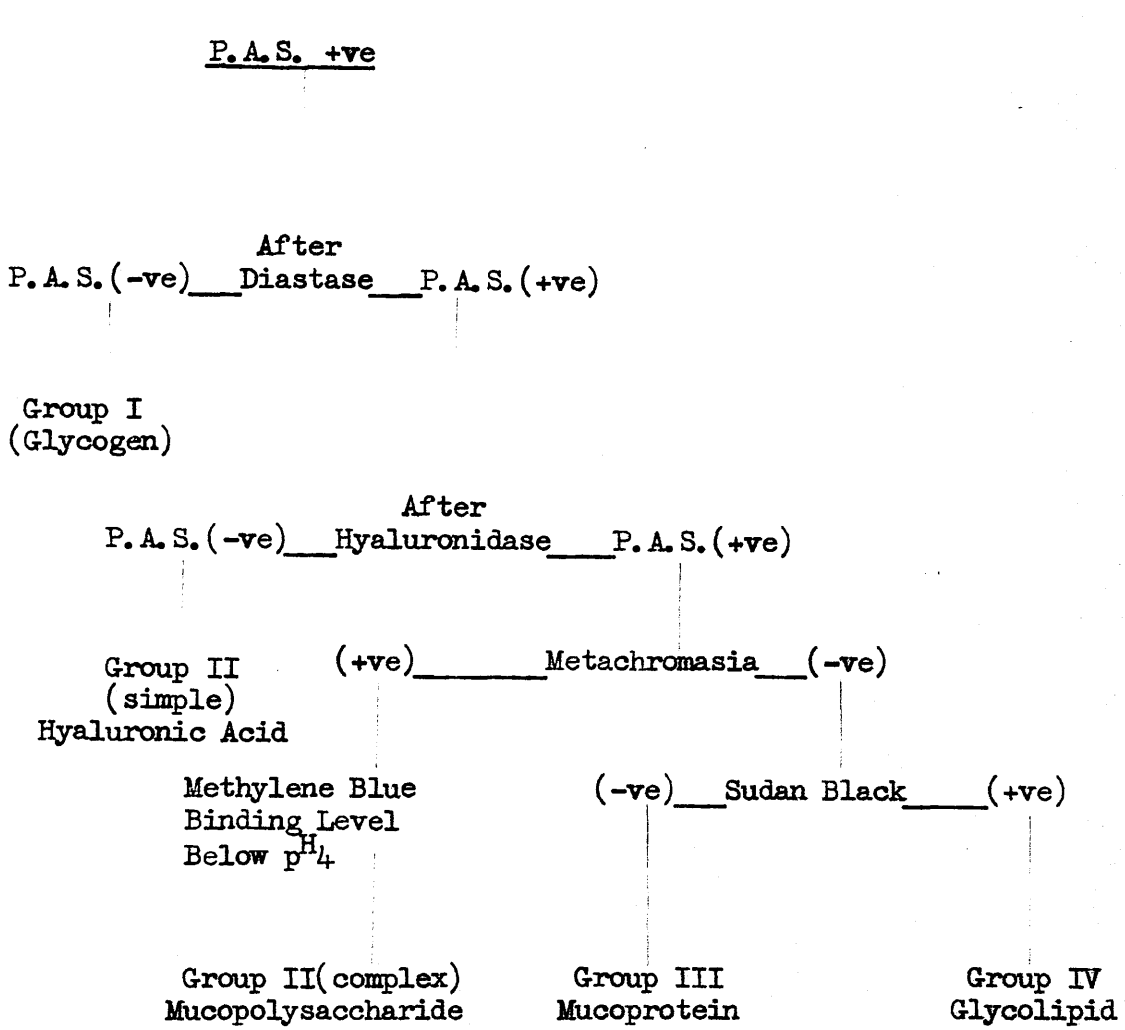
(a) Simple - or sulphate free, e.g. Hyaluronic acid (from umbilical cord or synovial fluid).

(b) Complex - or sulphate containing, e.g. Mast cell granules, Chondroitin sulphate or cartilage, mucoitin sulphate from gastric mucin, Corpora Amylaceae, etc.

Group III. Muco-proteins and glyco-proteins (these cannot be differentiated histologically as their chemical difference is an arbitrary quantitative one). They are protein-carbohydrate compounds with relatively high protein or peptide content, and

TABLE XIII

THE IDENTIFICATION OF P.A.S. POSITIVE MATERIAL



give reactions which are predominantly protein in nature, e.g. beta granules of the anterior pituitary, serum muco-proteins, submaxillary and Brunners gland mucins.

Group IV Glyco- or Muco-lipids. These have a fatty residue bound to a carbo-hydrate residue, e.g. Cerebrosides.

TECHNIQUE

Fixation Any fixative which causes swelling of mucin should be avoided.

Alcohol containing fixatives, e.g. Carnoy's Fluid, are best for glycogen, but since, in after-treatment, no fluid containing less than 50% alcohol may be used, these are unsuitable for the complete routine. Picric Acid should not be used as it produces severe cytoplasmic distortion. Formalin does not fix glycogen but causes protein to react with it in such a way as to make it almost insoluble in water. Another advantage is its rendering of sphingomyelins and cephalins insoluble, even in boiling alcohol and ether. In general I have found both cytoplasmic preservation and brilliance of staining best with Corrosive-formal, a fluid satisfactory for all of the substances and methods concerned in the complete routine.

Dehydration Ordinary ethyl alcohol methods are perfectly satisfactory. Butyl alcohol and Amyl Acetate-Methyl Benzoate series are also good (the former of especial value for obtaining minimal shrinkage of kidney basement membranes and glandular structures in general).

Embedding Paraffin is the best medium. The Sudan Black methods for lipoids may be done on frozen sections, but after C.F. fixation,

paraffin is quite satisfactory for the reasons given above.

Periodic Acid-Schiff
Solutions used

1. Alcoholic Periodic Acid

Periodic Acid	400 mg.
Aq. Dest	10 ml.
M/5 Sod. Acetate Buffer	5 ml.
Pure ethyl alcohol	35 ml.

2. Acid Reducing Rinse

Potassium Iodide	1 g.
Sodium Thiosulphate	1 g.
Aq. Dest	20 ml.
Pure ethyl alcohol	30 ml.
2 N. H.Cl.	0.5 ml.

Fuchsin-Sulphite (Schiff re-agent)

2 gm. basic fuchsin (special type) is dissolved in 400 ml. boiling water, cooled to 50°C. and filtered. Add to filtrate 10 ml. 2 N.H.Cl. and 4 g. Potassium meta bisulphite. Stopper and leave in dark in a cool place overnight. Add 1 gm. decolourising charcoal and filter promptly. Add up to 10 ml. or more 2 N.H.Cl. in small amounts until the mixture, spontaneously drying in a thin film on a side, does not become pink. This solution should be kept in a dark well stoppered bottle in a cupboard and will keep at least 2 months.

The Periodic Acid crystals should be kept in a desiccator. Keep the bench solutions in covered dishes and discard Schiff solution when the faintest tinge of pink appears in the solution. Small amounts of the acid reducing rinse tend to spoil Schiff's reagent and care should be taken to avoid contamination.

Method

1. Take section to water.
2. Rinse in 70% spirit.
3. Place in periodic acid solution (1) for 10-15 minutes.
4. Rinse in 70% spirit.
5. Place in acid reducing solution (2) for 2 - 3 minutes.
6. Rinse in 70% spirit.
7. Rinse in water until free of alcohol.
8. Place in Schiff reagent for 15 - 45 minutes.
9. Wash in water 5 minutes.
10. Dehydrate, clear and mount.

Sulphite rinses are unnecessary: prolonged washing causes diffusion of fuchsin staining. Carry a control section through Schiff without periodic acid pretreatment.

Diastase: While the purified enzyme may be used, saliva at room temperature for 10 minutes is satisfactory. Hyaluronidase: Commercial "Hyalase" (Benger) is used. 1,000 units are dissolved in 100 ml. phosphate-citrate buffer at p^H 6.9. This is superior to veronal acetate buffer, the latter tending to dissolve out cytoplasmic inclusions. Sections are treated at room temperature for 24 hours. Controls are carried through buffer alone for the same time. Metachromasia Stain sections in 0.1% Toluidin blue C.I. 925 for 10 minutes and examine at water stage. Mount in Karo or glycerine jelly. Ethyl alcohol tends to remove delicate metachromasia and cellosolve rinse is superior. Methods of preserving metachromasia through dehydration should not be used. Methylene Blue 5×10^{-4}M. solution in Citrate-phosphate buffers of various p^H are used. Stain sections for 24 hours to obtain maximum intensity. Examine in water and subsequently mount as above if desired.

Sudan Black/

Sudan Black

1. Take section to water.
2. Rinse in 70% spirit.
3. Stain 20 minutes in a 0.37% alcoholic (70%) solution of Sudan Black B.
4. Differentiate in 70% spirit.
5. Mount in Karo or glycerine jelly.

Table XIII gives the outline of the scheme of identification.

3 The normal postnatal pancreas

3A The acinar tissue

After the age of about three months, a child's pancreas is physiologically mature and the morphological features of an adult pancreas are present. It then consists of closely packed lobules of glandular tissue which are separated by very narrow septae of fibrous tissue (fig.3). Small aggregation of fibrous tissue are present around the blood vessels and larger collecting ducts. Only at the periphery of the gland are the lobules less closely packed (fig.4). Staining by the usual histological methods shows practically no connective tissue stroma in the gland but silver impregnation methods show that there is an extensive network of reticulin (fig.5). The acini are formed of tall cuneiform cells (fig.6) in which the nuclei are situated at the base of the cell, while the free border contains abundant acidophilic zymogen granules (figs. 7 and 12). The basal portion of the cell tends to stain blue in haematum and eosin preparations and histochemical methods show that this area is rich in ribonucleic acid. A fine network of reticulin

surrounds the individual acini and this, like the fibrous tissue, forms small condensation around the vessels and ducts.

The normal adult pancreas seen following removal at operation (figs.10 and 11) shows essentially similar features. Although extensive studies have been made by Saguchi (1949) on secretion in the pancreas such studies have been purely experimental and have concentrated largely on the changes in the mitochondria and Golgi apparatus and have dealt with the formation of granules rather than their disintegration and discharge. Sergeyeva (1938) studied the pancreas of the cat after the vagus nerves had been subjected to prolonged stimulation by an induction current and found the acinous cells were almost entirely depleted of secretory granules and that the small ducts were distended with material stainable with the same dyes as the granules. Starling (1936) states that vagal stimulation, the injection of pilocarpine and other cholinergic drugs, or the action of secreting causes the granules to diminish greatly in numbers (at least in the experimental animal). Although Duthie (1933 and 1934) and Beattie and McDonald (1933) studied the formation and discharge of zymogen granules, as far as I can determine no satisfactory account of the histochemical changes involved in secretion has been given.

3B Histochemistry of secretion

Consequently, a histochemical investigation of the nature of the zymogen granules was carried out. Zymogen

granules of the pancreas stain with periodic-acid-Schiff technique following treatment with diastase and are not metachromatic. They do not bind methylene or toluidine blue at low p^H, but do stain with osmic or sudan black. This set of reactions suggests that the granules are composed of lipo-protein.

The lumen of the smaller ducts and canaliculi contain a homogeneous material which is strongly P.A.S. positive (fig.12). This material in contrast to the granules is metachromatic and binds toluidine and methylene blue at low p^H but it does not stain with either osmic acid or sudan black in either frozen or paraffin embedded material and so has the histochemical characteristics of a muco-polysacchoride. Unfortunately it has not been possible to determine the source of the material in the canaliculi. Although it gives the reactions of mucus it seems probable that it is not secreted by the cells lining the ducts lower down but is secreted by the acinar cells and is composed of the zymogen granules which undergo chemical change as they are discharged (there is evidence that a similar change to Brunner's gland mucus takes place as it is secreted).

The larger ducts are lined by a cubical or columnar epithelium which secretes mucus (fig.13) and histochemical examination showed that this mucin is an acid muco-polysacchoride. In this epithelium the mucin is not formed as large droplets in goblet cells, but forms as small droplets which are discharged

from the free border of the cell (fig.14). It is accordingly difficult to determine on cytological grounds alone if the individual cells are over-active and producing an excessive amount of mucus (see also fig.17).

A number of mice were killed following fasting and also after full normal feeding. In the fasting mice the pancreas showed abundant zymogen granules and only a small quantity of muco-polysacchoride in the smaller ducts while in the others the amount of zymogen granules present was greatly reduced. In mice killed after the injection of pilocorpine the granules were even more markedly diminished in quantity and the amount of secretion in the tubules was increased. No zymogen granules or masses of lipo-protein were ever seen in the tubules and it seems probable they are discharged and the complex lipo proteins of which they are composed broken down into simpler chemical constituents of which only the geneous muco-protein stains.

Attempts were made to stain the enzymes in the cells or tubules. The only histochemical method which gave satisfactory results was that for lipase (Pearse, 1954) and by this method it was possible to demonstrate lipase in both the granules and tubular material in fresh fixed material. In ordinary autopsy human material the results obtained were poor and diffuse due no doubt to post mortem autolysis resulting in both the chemical breakdown and the release of the material from its normal location.

3C Normal variation in zymogen granules

As mentioned above, in experimental animals it is possible to secure discharge of the majority of zymogen granules (see also Maximow and Bloom, Textbook of Histology, 6th Ed., fig.401, p.409). There is, however, little information of such physiological changes in human pancreases.

A large number of "normal" pancreases were, therefore, examined from children who died from a variety of diseases, from acute fulminating infections to chronic wasting diseases. In almost every instance the pancreas looked grossly normal and the acinar cells contained abundant acidophilic zymogen granules. In a few instances only the pancreas appeared to be in a discharged or exhausted state as the acinar cells were small in size and contained practically no zymogen granules. Sometimes (fig.15) the lobules were normal in size but the acini were obviously shrunken and are separated by a small space while in other cases (figs.16 and 17) the lobules appear to have diminished in size. This appearance was found in less than 5% of the pancreases examined.

With a view to studying normal physiological changes, pancreases were examined from twenty-six patients who died very suddenly. Of these eight died of pulmonary embolism while convalescent (from operation, six, and lobar pneumonia, two) and six died almost instantly with coronary artery thrombosis and eight were infants who were found dead in their cots and were stated to have been previously healthy. These pancreases

were compared with those of a patient of a similar age group selected at random from the records and no gross degree of difference in the amount of zymogen granules present was seen. Consequently, it is concluded that the human pancreas is much less labile than that of the experimental animal and that both in life and at autopsy it normally contains a considerable amount of zymogen granules.

3D The pancreatic duct

Some comment on the pancreatic duct also seems to be required. Early investigations of fibrocystic disease looking for a cause of pancreatic achylia cut serial sections of the pancreatic duct and found an area in the head of the pancreas where the lumen of the duct is extremely small. This they regarded as an area of stenosis. In the course of the present investigation serial sections have been cut through the head of nine normal adult and infant pancreases and all showed such an area of apparent stenosis of the main pancreatic duct. This narrowed area of the duct is considered to be quite usual and indeed since it is surrounded by fibro-muscular tissue, it is probably a sphincter; (Boyden (1941) considered that this is so. Leven (1938) was able to obtain retrograde filling of the pancreatic ducts with radio-opaque material in a patient with a biliary fistula and it is interesting to note that the outline of the pancreatic duct as obtained by this means, corresponds almost exactly with that obtained by Cornblith and Otani in a case of fibrocystic in which they cut serial sections of the pancreas and from these reconstructed the entire duct system.

Muscle is also present in the wall of the main duct as it passes through the submucosa of the duodenum (fig.19).

4. Postnatal development of the pancreas

In common with many other organs the pancreas does not present a normal mature appearance at birth or for the first few weeks of life.

As indicated in the introduction some 300 "abnormal" pancreases were selected for further study and examination of the records showed that almost 200 of them were from children dying during the neonatal period. For this reason alone it seems reasonable to discuss the normal development of the pancreas before considering the histological changes in fibrocystic disease in more detail. The pancreas as seen in a child dying within a few days of birth weighs about 5 grams and appears normal in size in relation to the other structures in the abdomen. It also presents quite a normal anatomical relationship of head, body and tail. On histological examination, however, certain differences are at once apparent. The lobules are small in size and are rounded off at the corners (fig.19). They consist usually of a central islet of Langerhans which is surrounded by a single ring of exocrine acini (fig.20) and the individual acini are separated by strands of loose areolar tissue and are not tightly packed together as seen in older children or adults. The connective tissue separating the lobules and acini is loose and appears oedematous. In the next few days this oedema diminishes and the fibrous tissue becomes more compact (figs. 21 and 22). At this stage staining

with Van Gieson's or Mallory's methods often gives unsatisfactory results for although these connective tissue strands have the morphological appearance of fibrous tissue they often stain indifferently. In contrast staining of these neonatal pancreases by the silver methods for reticulin shows that, compared with the older infant, there is a considerably greater amount of reticulin present. This is present not only in the septa between the lobules but is also present between the acini. (figs.23 and 24). Special staining methods, however, show that zymogen granules are present in fair numbers (fig.25) and also that no mucus plugs are present in the small ducts and canaliculi. Nevertheless, it is at this stage of development that the appearance of the normal neonatal pancreas bears a distinct resemblance to the type of fibrocystic pancreas seen in meconium ileus.

It seems probable that this apparent increase in reticulin fibres merely indicates that the connective tissue stroma of the gland is not fully expanded at this stage of development. As the pancreas matures (fig.26) glandular acini multiply, the lobules become much larger and the reticulin fibres apparently become less in quantity as they are now more widely separated or stretched out (a similar type of change is seen in the breast). This hypertrophy of the exocrine acini proceeds fairly rapidly and by about three months of age the pancreas assumes a normal adult appearance (figs. 3, 4 and 5).

Although the exocrine tissue appears definitely small in amount in the neonatal pancreas when compared to the amount

of islet tissue present, there is every reason to suppose that it functions actively from birth and all normal pancreases examined by me showed the presence of secretory granules. During the course of this study it proved possible to examine sixteen foetal pancreases and in all over six months of age, the pancreatic tissue showed secretory granules (fig.27). This would suggest that the pancreas is well formed at an early stage of intra uterine life and is capable of producing a potent enzyme containing secretion even in premature children.

4. Hypoplasia of the pancreas

During this examination of neonatal and foetal pancreases an attempt was made to determine if the degree of development of the pancreas was in accordance with the child's general development and whether it ran parallel with the development of the other organs. The kidney was chosen as the organ which showed most clearly structural changes due to immaturity and consequently a comparison was made in all cases of the degree of development of the pancreas and the kidney. As controls the organs of forty-six premature children were examined; in all of them the degree of immaturity of the kidney and the pancreas appeared roughly equivalent.

Further, in all neonates examined if the pancreas was immature the kidneys also were immature. In about 200 such cases examined no evidence of delayed development or hypoplasia of the pancreas was found.

5. Hyperplasia of islet tissue

Hyperplasia of islet tissue (fig.28) was found in about twenty cases. Five of these children died suddenly and unexpectedly but in no case was there any clinical or biochemical evidence to suggest that the abnormality of the islets was in any way responsible. This abnormality was never associated with any alteration in the exocrine tissue of the pancreas.

CHAPTER IV

THE PATHOLOGY OF FIBROCYSTIC DISEASE

1. Introduction.

2. Pancreas.

3. Salivary glands.

4. Alimentary tract.

5. Respiratory tract.

6. Liver.

7. Sweat glands.

8. Examination of mucus.

   A. Histochemistry.

   B. Enzymic digestion.

THE PATHOLOGY OF FIBROCYSTIC DISEASE

1. Introduction

My intention at the start of the present investigation was to study the morbid anatomy and histology of fibrocystic disease in the hope that this might give some indication of the aetiology of the condition. Great importance was attached to the finding of some clue to the rational therapy of fibrocystic disease per se and not merely to the pancreatic or respiratory manifestations of the disease.

Since this started as a histological study I have naturally devoted considerable time and care to the study of the morbid anatomy and histology of fibrocystic disease and have found much of interest. Consequently it would be natural and easy to spend a great deal of time and space giving a full and grand catalogue of all the varied lesions seen in this widespread and often bizarre disease. Since a fatal outcome is almost inevitable the morbid appearances have been extensively studied by many workers and are described at length by several (Bodian, 1953). For this reason I propose, therefore, to give only a brief outline of the main morphological and histological features as I have personally seen them in the present series of cases, and this I do especially where I feel that mere repetitive description of pathological processes is adding little to the further understanding of the disease. In contrast those features which have particularly interested me and which I feel

are significant and contribute something to our knowledge of the disease are described at greater length. The conclusions which I have reached and the inferences drawn from the study of the histological lesions are indicated.

The grosser manifestations of the pancreatic lesions have been known for some time but little attention appears to have been paid to the less severe forms of the disease. This, of course, is only natural where the material available for study has usually been obtained from cases dying of the condition. In most hospitals the pancreas is examined histologically only if there is some clinical reason to suspect that it is abnormal or if lesions are found at autopsy which suggest this. Consequently I appreciate that I was extremely fortunate to find that Dr. McDonald in the Royal Hospital for Sick Children, Glasgow, had taken a portion of the pancreas in over 1,100 consecutive autopsies and had kept this material for subsequent histological examination. Although most of the cases of fibrocystic disease (and this includes all those in which gross structural alteration of the pancreas had occurred) had been recognised at the time the patient died it did seem worth while going through the material available and re-examining the pancreas The other organs were also examined where necessary. From a preliminary assessment I soon appreciated that Haemalum and Eosin staining was far from an ideal method for the examination of the pancreas in fibrocystic disease and it seemed possible that early changes could have been overlooked in the routine examination of sections

stained only by this method. Accordingly all the sections of pancreas in these 1,100 autopsies were re-examined and those which showed any detectable morphological abnormality were set aside for fuller examination. In addition in every case of pneumonia or infection of the respiratory passage, steatorrhoea, or failure to thrive, the pancreas was more carefully examined. Thus in about 300 cases, selected as indicated above, the blocks of the pancreas were re-cut and stained by a variety of methods.

Even at the start of this investigation it was apparent that many of the cases showed such gross morphological changes that the diagnosis was obvious (fig.30). It was soon realised that although cystic change was marked in some cases, in others it was extremely slight. Consequently, I felt that cystic change was not a constant finding and so could not be regarded as of value as a diagnostic feature, especially in the early stages of the disease. Since it seemed possible that fibrosis might be the earliest definite histological change in fibrocystic disease of the pancreas, sections from a considerable number of cases were stained by Mallory's and Van Gieson's methods. In those cases in which there was gross fibrosis in the pancreas both these stains clearly demonstrated the increased amount of connective tissue present (figs. 31, 32 and 33). In contrast where the amount present appeared to be only slightly increased these two stains gave poor and generally unsatisfactory results as many strands of what appeared to be connective tissue remained

unstained (figs. 34, 35 and 36). The same sections, however, were stained by Gordon and Sweet's silver method for reticulin and this gave consistent and useful results as it clearly demonstrated the normal reticulin framework of the gland (fig.37). Any increase or other deviation from the normal was clearly shown and was easily assessed. Accordingly this method was used for staining the pancreas in every case in the series and the pattern of reticulin fibres and fibrous tissue disclosed by it are discussed and illustrated. Other methods (especially the P.A.S. method) were used to stain mucus and zymogen granules and gave most helpful results (fig.38). Histochemical examination of the mucus in the pancreas was carried out according to the scheme outlined in the previous chapter.

Fibrocystic disease of the pancreas is by no means limited to the pancreas itself but is characterised by the occurrence of lesions in many systems. Although the change in the pancreas was for long considered to be the main lesion in this disease (hence the commonly used name) it has for some time been thought that it is only part of a generalised abnormality affecting mucus-secreting glands. Nevertheless, it seems reasonable to comply with tradition and the changes in the pancreas will be considered first in the description of the pathology of the disease as seen in the present series.

2 Pancreas

2A Gross morphological appearance

The naked eye appearance of the pancreas in fibrocystic disease is not striking (fig.39). The organ is always normally formed and in no instance was any gross hypoplasia, maldevelopment or heterotopia seen. The pancreas often appeared rather small and thin and may be reduced in weight by about 50%. For reasons which are given subsequently in this series only a few pancreases were dissected off from the duodenum and weighed but in these instances the average weight of the pancreas from fibrocystic children dying in the first few months of life was about 4 G. compared with a normal average of 7 G. In a few instances the colour of the pancreas was pink but this was the only abnormality seen and the normal nodular appearance of the pancreatic lobules could always be made out both on external examination and on section. In only one instance in this series of cases (Case No.78) did I find a pancreas which contained cysts large enough to be seen by the naked eye and so enable me to make a confident diagnosis of the disease at autopsy; it is probably significant that this patient was a girl aged 17 years. As a result of this experience, I feel that the only certain way of diagnosing or excluding fibrocystic disease is to carry out histological examination of the pancreas and for the past four years I have made a practice of doing this in every child on whom I have performed an autopsy.

2B Histological appearance

The histological changes seen in the pancreas in fibrocystic disease are frequently gross and easily recognised. While the most obvious morphological features of the disease are fibrosis and cystic change, I feel compelled to remark on the substantial variation in appearance which occurs in this disease. In general the changes seen are more or less uniform throughout the pancreas in any given case although occasionally cystic change may be more marked in one lobule than in the others. In contrast the changes in the pancreas in meconium ileus are relatively slight and are very different from those seen in long established cases of fibrocystic disease in older children. The majority of cases of fibrocystic disease, however, show pancreatic changes which fall between these two extremes. Although it seems probable that cystic change and fibrosis advance with age this is by no means always so (figs. 40-46) and pancreases have been seen with little cystic change and no gross fibrosis (fig.47, Case 46) in children who have suffered from the disease for an appreciable time.

1. Fibrocystic disease The changes seen in established cases of fibrocystic disease, especially when the patient dies in later childhood, are gross and the formation of cystic spaces throughout the gland is a prominent feature. These cysts are often lined by a cubical or columnar epithelium (fig.48) and frequently contain eosinophilic concretions (fig.49) which may be laminated. This lining epithelium is mucus secreting and the eosinophilic concretions also give the histochemical reactions for acid/

mucopoly-saccharide. In some instances where the concretions are large the central portion of the mass is not eosinophilic and does not give the histochemical reaction of mucus.

I consider it probable on morphological grounds that these large cystic spaces are distended ducts and that the secretion which they contain is composed mainly of mucin secreted by the duct epithelium and is not derived from the acini. Some support is given to this interpretation by an attempt which was made to demonstrate lipase by the method of Gomori (Pearse, 1954, p.464). Following treatment by this method the acinar tissue in a normal pancreas stains black indicating the presence of lipase. In the pancreas examined from a case of fibrocystic disease no lipase could be demonstrated in either the acinar tissue or in the retained secretion in the ducts suggesting that the material is not retained exocrine secretion of the gland acini but merely inspissated mucus secreted by the ducts.

Acinar tissue is always present no matter how severe the cystic change is and sometimes substantial amounts of exocrine tissue is present in the pancreas (figs.50, 51 and 52). This exocrine tissue, however, is never normal. The acini are always small in size (fig.53) and the individual cells of which they are composed consist of little more than a nucleus which is surrounded by a very thin rim of cytoplasm. No zymogen granules are present in the acinar cells. (figs.54 and 55). These granules are consistently absent and I consider their absence

to be important and to be one of the fundamental lesions in this disease. Plugs of mucus are present in the centre of the glandular acini. This is a very characteristic change and has been found to be consistently present (figs.54 and 55).

Fatty infiltration of the pancreas is very unusual in fibrocystic disease. It has occasionally been, however, and in one instance was marked (fig.60).

There is usually an increase in the amount of fibrous tissue in the pancreas although as mentioned above it is difficult to assess how much is present for the conventional connective tissue stains delineate it rather poorly. The increase in reticulin is more marked and appears to me to be a reliable index of the degree of increase in connective tissue. The connective tissue may be very fine (figs.56 and 57) but in "late" cases it is coarse (figs.58 and 59) and extends between the individual acini so that the normal acinar pattern becomes lost; even in these late cases the lobular pattern of the pancreas is well preserved but the individual lobules are separated by strands of very dense mature fibrous tissue (fig.34), and I formed the opinion that atrophy of the acini is more likely to be due to primary disease or loss of function than to strangulation in fibrous tissue.

In this connection it is interesting to note that in cases of congenital syphilis there may be considerable fibrosis throughout the pancreas but the acini are still well formed, zymogen granules are present in many of the cells and no clinical

evidence of pancreatic dysfunction can be found.

Many authors, including Bodian, have been impressed with the number of cells which they saw in the fibrous tissue in the pancreas and which they thought were "plump fibroblasts". This led them to conclude that the fibrous tissue in the pancreas was really granulation tissue and arose as a result of inflammation. I find myself unable to agree with this suggestion although I have occasionally noticed that fibroblasts are present in appreciable numbers. Often the connective tissue appeared relatively acellular. In no case did I ever observe that the connective tissue was vascular or showed a pattern of capillaries similar to that found in organising connective tissue elsewhere in the body. It is my opinion that the excessive amount of fibrous tissue present in the pancreas in fibrocystic disease is not granulomatous in origin as it is too orderly and is laid down along the normal trabecular architecture of the gland. Other possible reasons for the development of this fibrous tissue are discussed subsequently (page 95).

2. Meconium ileus The lesion of the pancreas as seen in the average case of fibrocystic disease is gross and almost certainly represents a late or terminal state in the development of the pathological process. With a view to determining the primary nature of the lesion as well as studying its development, the pancreases of patients who died in the first few days of life with meconium ileus were studied with particular care.

The pancreas in children dying with meconium ileus often appears relatively normal on cursory examination as the gross

cystic change and obvious fibrosis seen in the average case of fibrocystic disease is not present. This is particularly the case when the lesions are compared with the pancreas of a child about two weeks old (p.82). In meconium ileus there is only a slight increase in the amount of connective tissue between the lobules and to a lesser degree between the individual acini (figs. 61 and 62). This tissue, however, did not stain at all strongly with the usual fibrous tissue stains but did stain easily and strongly by the silver impregnation methods for reticulin (figs. 63 and 64). Both Gordon and Sweet's, and Laidlaw's methods gave similar results. I consider that the apparent increase in the amount of connective tissue in the pancreas in these cases, at least in the early stages of the lesion, is condensation of the reticulin basement membrane stroma of the gland. In other words, the gland in fibrocystic disease resembles the foetal gland in that the acini are not expanded and so have not drawn out the reticulin basement membrane structure of the gland.

In many cases of meconium ileus the pancreatic exocrine tissue is well formed (figs. 65 and 66) and the individual cells are quite large and have abundant cytoplasm. Nevertheless special staining shows that they do not contain zymogen granules (fig.67). In no case of fibrocystic disease which

I have encountered has it been possible to demonstrate zymogen granules in the pancreas. Further I believe this deficiency of zymogen granules to be characteristic of fibrocystic disease (see Coeliac Disease p.123 and fig. 148) and consider that this absence of zymogen granules indicates a fundamental defect in the mechanisms of secretion. Another constant finding in these neonatal pancreas is that the small ducts and canaliculi are distended (figs.68 and 69) and contain a material which gives the histochemical characters of a mucopolysaccharide. The picture in these early cases of fibrocystic disease closely resembles that seen in animals killed following the experimental injection of pilocarpine (Maximow and Bloom, 1953).

From the examination of the pancreas of children who have fibrocystic disease and die before the pancreatic lesion has developed to the gross lesion so often seen in this disease I feel reasonably certain that atrophy of the acinar cells associated with absence of zymogen granules and the plugging of the small ducts with secretion are the fundamental primary pancreatic lesions in fibrocystic disease. Fibrosis and cyst formation I regard as late secondary changes.

In discussing how the cystic lesions seen in the pancreas are produced I feel that it is essential to remember that there are two totally different glandular structures in this organ. The ducts which are lined with tall columnar cells secrete mucus and the acini which are really serous glands secrete a watery fluid rich in enzymes.

In contrast in the later stages of the disease the structures, which we see greatly distended by mucus, are lined with a columnar epithelium and when judged by this criterion would appear to be ducts. Even in a case where this cystic change of the ducts is gross there are usually numerous areas where the acini are seen to be small and atrophic and do not appear to be producing any secretion. In some cases there is evidence of excessive mucus secretion extending down the ducts into relatively small structures. Whether these are terminal ductules or acini it is not possible to determine. These structures would certainly appear to be secreting mucus and I regard them as terminal ductules for there is no evidence that specialised zymogen secreting cells ever revert to the less highly specialised activity of mucus secretion. Certainly neither duct ligation nor damage as in chronic pancreatitis induces them to secrete mucus.

Little or nothing is known of the secretion of enzymes by the pancreas in fibrocystic disease. In Case 78, as was mentioned earlier, the cystic dilatation of the ducts was gross enough to see at autopsy and when the pancreas was cut across inspissated refractile material which was almost crystalline in appearance could be easily expressed from the ducts. This material was ground up with buffer at $p^H 7$ and was tested for the presence of enzymes. No amylase or trypsin was detected. This observation I think gives support to the suggestion that the material lies in ducts and is mucus secreted by the non-specialised epithelium lining in the ducts.

I would suggest that the cystic change in the late stages of fibrocystic disease is a cystic dilatation of ducts. Why these ducts should show cystic dilation has never been explained especially when it is remembered that there is evidence that there is no obstruction in the duct system. I would suggest that the production of an excessive amount of mucus of high viscosity by the duct epithelium is probably a major factor. Normally, of course, the mucus secreted in the ducts is diluted and swept away by the copious watery secretion of the acini. I have indicated elsewhere that I feel that a primary feature in fibrocystic disease is suppresssion of the acinar secretion and that it is the absence of the acinar secretion in fibrocystic disease which allows the mucus secreted by the ducts to gather, dilate the ducts, and eventually inspissate into the characteristically laminated eosinophilic concretions which are so frequently found in the pancreas of older children.

The pancreas has been considered first simply because it is the most grossly and constantly affected part of the alimentary tract but, as indicated in the introduction, Farber and many following investigators have shown that the whole alimentary tract is affected by an abnormality of mucous secretion. The affection of mucous glands throughout the body is emphasised by Bodian who has illustrated mucous glands from the uvula to the cervix in his monograph on fibrocystic disease.

In the present series of cases it has been observed repeatedly that while mucous glands practically anywhere in the body

may be affected the glands in most sites e.g. salivary glands are only affected in a proportion of cases. It is not possible to discern any factor which determines if the glands will be affected or not.

3. Salivary glands

Whilst the parotid salivary gland is composed entirely of serous (albuminous) secreting acini, the submandibular gland is largely composed of a mixture of mucous and serous acini. This obvious statement that the submandibular and parotid glands are composed of quite different types of glandular tissue can be repeated with some justification as several observers appear to have overlooked this point or at least do not comment on it. In published reports some observers state that the salivary glands are always affected (Bodian 1952) while others (Zuelzer and Newton, 1950) indicate that they are rarely affected. The explanation may well be that the observers who examined the mixed mucous secreting submandibular gland found it affected while those who looked at the parotid glands considered them to be normal.

In the present series of cases, "salivary glands" were removed for examination in twenty-eight cases. To be more explicit the submandibular glands were removed in twenty-eight cases and the parotid glands in about fourteen cases. During the period while I was collecting these glands an investigation into salivary inclusion disease was being carried out and as a result threehundred normal glands were available for comparison. All salivary glands removed were fixed in formal-corrosive sublimate solution which had

the advantage for this work of not causing artificial swelling of mucus so that I considered that over-distension of the gland acini could be assessed with some degree of reliability.

Attention was naturally directed at first to the mucous secreting submandibular salivary glands and in several cases they showed overfilling of the cells and gland acini with mucus (figs. 72 and 74). In only a few cases (Case 51,, fig. 72) was there gross distension of the collecting ducts with some slight fibrosis of the surrounding stroma. The dilated ducts in the submandibular gland contained mucus which gave all the usual histochemical reactions of salivary gland mucus. When the glands were examined I thought at first that they showed no abnormality as the general structure of the gland was normal. No over distension of ducts or acini with mucus was seen and the gland stroma showed no fibrosis (figs.72, 73 and 75). Later, however, I examined glands which had been stained by the P.A.S. technique (fig. 39) method and realised that in some cases there were no zymogen granules present. The presence of these granules has now been looked for systematically in the salivary glands and in quite a number of the cases in this series the parotid contained no zymogen granules (figs.77 and 78). In many cases of undoubted fibrocystic disease the glands contained a normal confluent of zymogen granules (figs.79 and 80). The submandibular gland presents a similar picture to that seen in the pancreas and this gland also is thought to be in a state of physiological exhaustion. Certainly the gland shows the appearance which may be expected following long continued vagal stimulation.

Search was made in all cases for evidence

of salivary inclusion disease and histological evidence suggestive of infection with this virus was found in three cases. Two of these were children who died within the first few days of life with meconium ileus. The third case (Case 68) died at the age of four months (figs.81 and 82). In one case the parotid gland acinar cells were filled with large coarse basophilic granules. While these structures did not appear to be zymogen granules it was not possible to determine their nature.

4. Alimentary Tract

As mentioned in the description of the clinical features most children suffering from fibrocystic disease have a distended abdomen and at autopsy the bowel was usually dilated, but contained only gas and a small amount of yellowish pultaceous foul smelling faeces. The wall of the bowel was often unnaturally pale in colour. One patient (Case 46) was admitted to hospital with the clinical features of a sub-acute obstruction and on examination at autopsy both the large intestine and the terminal portion of the small intestine were found to contain a large amount of inspissated pultaceous faeces. No other possible cause of obstruction was found and it is thought probable that obstruction was due to the impaction of the inspissated faecal material. In all the other cases no clinical evidence of obstruction or of delay or difficulty in the passage of stools were encountered.

Histological examination of Brunner's glands in the duodenum was carried out in practically every case and

histological abnormality was consistently found. The glands were always dilated (figs. 84 and 92) and often contained an excess of mucus. Histochemical examination of this mucus showed that it was composed of mucoprotein which of course is the normal type of mucus in these glands in man and the carnivora. I consider this observation is of some importance as it indicates not only that the much more common acid mucopolysaccharide secretin glands are affected but that other glands secreting a different substance (in this case mucoprotein) are also affected (see discussion p.188).

This affection of Brunner's glands is very marked in all cases of meconium ileus and I have come to regard it as a most useful diagnostic point in cases of meconium peritonitis (see Case 93) in which the actual cause for the rupture of the bowel can rarely be made out.

In meconium ileus the intestine presented a characteristic appearance. In a typical case the small intestine was distended (fig.93) with dark green very viscid mucus. The distension caused a fusiform swelling of the bowel which was maximal 2 - $2\frac{1}{2}$ ft. from the ileo coecal valve but extended from the jejun right down to the ileo-coecal valve. Proximal to this valve the bowel contained green meconium. In marked contrast the large bowel was very small in size (figs.93 and 94) and was practically empty containing only a small amount of whitish grey material instead of normal green meconium. No physical obstruction between small and large intestine has

ever been demonstrated but the colour of the large bowel contents indicates quite clearly that no material from the upper small intestine has ever passed down through the ileo-coecal valve.

Histological examination of the small intestine in meconium ileus shows (fig.95) gross distension both of the goblet cells and of the crypts of Lieberkuhn with an excessive amount of mucus. Although the large bowel is small in size its lumen contains a considerable amount of material (fig.96) which gives the staining reaction of mucus. Numerous desquamated cells are also present. The muscle coat is well formed and appears thick as the bowel is in the contracted state.

In children dying at a later age with fibrocystic disease this over-secretion is much less marked and the small bowel may show no histological abnormality. In contrast the Brunner's glands usually show their characteristic abnormality in these cases (fig.86) (see Case 41). In the large intestine in fibrocystic disease changes due to gross oversecretion of mucus are not usually marked. The mucosa contains a normal proportion of goblet cells and there is no distension of the crypti with mucus. The muscle of the bowel wall is well formed. Careful examination of the small intestine for Paneth cells was carried out by examining numerous blocks of the intestine stained by haemalum and eosin and other simple stains. In none of the cases examined (and this included cases of meconium ileus and fibrocystic disease) could these cells be seen while in control material from children of similar age they were

easily seen in haemalum and eosin stained material. This absence has not been previously commented on and its possible significance is discussed subsequently.

Meconium Peritonitis The occurrence of meconium peritonitis (fig.97) has been observed in a number of cases. In many, if not all, these cases the underlying cause would appear to be fibrocystic disease (fig.98) and examination of the bowel (fig.99) shows distension of the glands with mucus very similar to that seen in meconium ileus. It seems reasonable to suppose that meconium peritonitis occurs when the distended bowel ruptures and the thick viscous mucus which it contained escapes into the peritoneal cavity. Histological examination of the mucus on the surface of the viscera shows such evidence of organisation as leaves no doubt that the condition has been present for a considerable time before birth.

Bowel Atresia Of fifty-seven consecutive cases which died with fibrocystic disease at the Royal Hospital for Sick Children, Glasgow, twentyone died under the age of one month. Ten of these children had a classical meconium ileus, four had an imperforate anus and three had atresia of the small intestine. The atresia was situated in the mid of the small intestine at app roximately the jejuno-ileal junction. A survey was made to see if fibrocystic disease was associated with atresia elsewhere in the alimentary tract (Table XIV). The records were searched and the pancreas was examined from fifteen cases of eosophageal atresia and thirteen cases of atresia in the

TABLE XIV

ASSOCIATION OF FIBROCYSTIC DISEASE OF PANCREAS WITH ATRESIA OF THE ALIMENTARY TRACT

Portion Affected	Number of Cases	Number showing fibrocystic disease
Oesophagus	15	0
Small intestine	21	3
Rectum and anus	12	4
Total	48	7

duodenum or the proximal portion of the jejunum. In none of these cases was there any evidence of fibrocystic disease of the pancreas. Of eight cases of atresia of the ileum, three showed fibrocystic disease and of twelve cases of imperforate anus, four showed fibrocystic disease.

While atresia of the small intestine can be reasonably explained as the end result of a reactive secondary change to the presence of abnormal mucus in the bowel no reasonable explanation can be put forward to explain the atresia of rectum or anus which has been observed in this series of cases.

Erythroblastosis foetalis

Although it has not been possible in the present series to determine the rhesus genotype of many of the cases, an attempt along different lines was made to see if erythroblastosis and fibrocystic disease were associated conditions. The pancreases from forty-two proved cases of erythroblastosis were examined. Although the pancreas was sometimes oedematous, no other abnormality was seen in the exocrine tissue in which zymogen granules could always be demonstrated.

5. Respiratory Tract

Introduction Clinical involvement of the respiratory tract is usual in all cases of fibrocystic disease and as indicated in Chapter II (p. 48) most cases of fibrocystic disease come under medical supervision because of respiratory infections. All the cases available for examination were treated with antibiotics so that the natural development of the disease in the lungs had been arrested and perhaps modified to some extent but in no instance could it be regarded as completely eradicated. It had been intended to make a brief comparison between the lung lesions in those cases treated with antibiotics and those to whom no treatment had been given. For obvious reasons this is not possible.

Morbid anatomy In most cases at autopsy the lungs are pale in colour and are voluminous due to widespread emphysema. Contrasting markedly with the rest of the lungs there are depressed dark red areas of collapse which are usually situated in the posterior portion of both lobes. The lower lobe is, of course, usually the most severely affected (fig.101).

1. Abscesses can be seen when they are close to the pleural surface. Rupture of these abscesses (fig.102) into the pleural cavity may give rise to an empyema or pyopneumothorax.

2. The lung parenchyma generally shows areas of collapse around the bronchi and these alternate with extensive and sometimes very severe emphysema. Areas of bronchopneumonia

and/or abscess formation are not uncommonly found in the lower lobes (fig.103). In a few cases widespread bronchiectasis has been seen in both upper and lower lobes (fig.104).

On section of the lung the bronchi are usually filled with thick creamy yellow pus which on culture usually gives a heavy pure growth of a coagulase positive staphylococcus aureus. A most characteristic and indeed almost diagnostic appearance in treated cases is this extensive purulent bronchitis which is associated with minimal spread of infection into the surrounding lung alveoli.

Histology of pulmonary changes Although respiratory involvement is common and indeed may be the rule in children who die over the age of one month the severity of the affection varies greatly from case to case. Before proceeding to describe the lesions, I should like to make clear that there is one group of cases in which respiratory involvement does not usually occur. In meconium ileus there is no change in the lungs and histological examination of the respiratory tree reveals no evidence of over-secretion of mucus (fig.105). This fact seems odd when one remembers how gross is the evidence of over-secretion of mucus in the alimentary tract.

Histological examination of the trachea, bronchi or lungs is established cases of fibrocystic disease usually shows widespread over-secretion of mucus. While in the trachea and main bronchi the over-secretion is seen in the mucous glands in the submucosa. Both the gland acini and their ducts

(figs.106, 107, 108, 109 and 110) show gross distension with mucus. The smaller bronchi (figs.111, 112 and 113) and even the terminal respiratory bronchioles (fig.114) may be completely filled with mucus. This excessive amount of mucus would seem to be secreted by the columnar cells lining these smaller air passages. It is interesting to note that in contrast to asthma or bronchiectasis (figs.115 and 116) there is a great increase in the number of goblet cells in the bronchial epithelium whereas in fibrocystic disease no such increase of goblet cells occurs (fig.117). It seems worth commenting on the fact that the ciliated border of the epithelial cells (fig.118) is usually clearly seen.

Although a few cases have been encountered in which the air passages have been filled with mucus and death has resulted from asphyxia, in most cases infection of the bronchial passages occured and the mucus became infiltrated and soon largely replaced by pus cells which completely fill the bronchi (figs. 119 and 120).

Mechanical obstruction of the bronchi thus occurs and as a result areas of the lung around the bronchi collapse (figs.121 and 122). In those areas where obstruction is not complete, air drawn into the lungs past the obstruction is unable to escape. In consequence of this large areas of the lungs become emphysematous (fig.123). Frequently infection spreads through the wall of the bronchus into the surrounding lung and a bronchopneumonia develops (figs.124 and 125).

In other cases the infection proceeds to abscess formation (fig.126) and destruction of large areas of lung may result from this.

In the larger air passages pyogenic infection of the bronchial wall often occurs (figs.109, 110 and 127) and if this is long continued there may be extensive damage to the tissues (fig.128) and much of the natural elasticity of the bronchial wall may be lost. These damaged bronchi dilate and a state of bronchiectasis is established (fig.129).

Only one case in the present series (Case 51) showed extensive squamous metaplasia of the bronchi (figs.130 and 131). While it is probable that this may have been due to Vitamin A deficiency, this cannot be assumed with certainty as extensive infection was present in the lungs and the metaplasia may well have been due to long continued bronchial infection.

I feel that I should point out that I have seen a considerable number of cases which show severe respiratory infection with Staphylococcus aureus and these cases are clinically indistinguishable from fibrocystic disease. In addition both clinically and biochemically these children show evidence of impaired pancreatic function. Although histological examination of the lungs shows evidence of excessive secretion of mucus no evidence of generalised over-secretion can be found in Brunner's gland or elsewhere in the alimentary tract. The pancreas is depleted of zymogen granules but no mucus plugs are present and the pancreas can by no means be regarded as fibrocystic. One of these cases (9210) had a family history which

was suggestive of fibrocystic disease as two older sibs had died early in childhood with pneumonia. Cases of this type have been extensively studied to see if any relationship to fibrocystic disease could be established. I thought it possible that these cases might be examples of fibrocystic disease without pancreatic involvement but was unable to uncover evidence which would establish this.

I have described the pulmonary lesions in some detail because it is the state of the lungs which determines survival and because I feel that any rational therapy which may be found for fibrocystic disease will have to deal with the fundamental cause of the pulmonary lesion. In other words some method will have to be found to stop the excessive secretion of mucus of high viscosity. It is, I am certain, of little use trying to break down the viscid mucus which forms in the bronchi in fibrocystic disease.

I have attempted to break down bronchial mucus in vitro with trypsin, lysozyme, hyalase and streptokinase and have also tested the effect of Alevair (a surface tension reducing agent). Trypsin was the only one of the enzymes which had any appreciable effect on this mucus and even trypsin was slow to act and required at least five hours before it appreciably softened this mucus in vitro. As a result of these attempted digestions, I think it unlikely that an agent will be found which, acting for a short time and at low concentration, will be able to liquefy this viscid mucus sufficiently for the normal bronchial scavenging system to be able to clear it away.

6. Liver

The liver in the majority of cases studied showed some fatty degeneration (figs.132, 133) but showed no other gross abnormality. In a few cases in older children there was an abnormal reduplication of the small bile ducts in the portal tracts. This was very well seen in Case 78 which is illustrated (figs.134, 135). The bile ducts as can be seen are slightly dilated and contain (when seen in H. & E. stained sections) an orange-yellow granular material. On histochemical examination this is not, and does not, appear to contain mucus. The pigment present is different in colour from bile and does not give the staining reaction of bile pigment and at present is unidentified. In no case has gross cystic change of the intrahepatic bile ducts been observed although distension of the mucus glands in the neck of the gall bladder was observed in quite a number of cases (fig.136).

No explanation of the cause of this fibrosis and change in the intra-hepatic bile ducts offered. It is interesting to note that this change was found in the liver only five times in the present series of almost one hundred cases although in a recent annotation (Brit.Med.J., 1956, p.649) "focal biliary cirrhosis" was stated to occur in about 25% of cases.

7. Sweat glands

Following the report of di Sant' Agnese on the abnormal concentration of salt in sweat, portions of skin from the sole of the foot and axilla were removed for histological examination. I have now been able to examine the sweat glands in four cases and in no instance did the sweat glands show any gross abnormality of morphology (figs. 137 and 138). No abnormality of secretion in them could be detected by histochemical examination. The possibility that the sweat glands might be increased in numbers was considered. No gross increase was apparent but no attempt at actual gland counts has been made.

The breasts were also examined and while some appeared normal in others cystic change of the ducts was observed. This was not a simple distension with mucin and it is thought probable that it was not due to the fibrocystic disease. This possibility has been discussed in more detail recently by Stroud and Heppleston (1956) and by Sandison (1956) who have considered whether antibiotic therapy may not be responsible for this change.

Mast cells appear to be reduced in numbers in the submucosa and in other tissues examined. The individual cells contain only a small compact group of granules closely applied to the cell nuclei. The granules do not spread widely along the cell processes into the adjacent tissues in the normal way. Although the granules present do stain strongly with toluidin blue they do not appear to stain by the P.A.S.

method. In view of the small numbers of cells present it is difficult to recognise them with certainty on morphological grounds and so substantiate this observation on changed staining reaction with its implication of altered chemical constitution.

8. Examination of mucus

Since the most obvious abnormality in fibrocystic disease or mucoviscidosis seemed to be in mucus secretion it appeared essential to carry out a fairly extensive examination of the mucus to try to assess where the abnormality lay. As detailed below, two quite different methods were employed.

8A. Histochemical examination of tissues

Although no gross abnormality in the staining reaction of mucin from cases of fibrocystic disease were seen a number of histochemical tests were carried out in material from three cases of fibrocystic disease. The following methods of staining mucin were carried out on lung duodenum and small intestine from cases of fibrocystic disease and from normal controls.

1. Mucicarmine.
2. Hale's iron method for mucopolysaccharide.
3. Periodic-acid-Schiff method after treatment with diastase and after treatment with 1% N_aOH.
4. Polychrome methylene blue and toluidin blue.
5. These two dyes were both employed in baths of varying acidity. The p^H level ranged from 2 to 8.
6. Digestion by hyalase, mucinase and lysozyme followed by staining by the P.A.S. technique.

It can be seen that a wide battery of staining techniques and histochemical methods was employed and to all of these techniques the mucus in fibrocystic disease reacted in a perfectly normal manner.

8B Gross enzymic digestion of mucus

Although histochemistry failed to demonstrate any difference between the mucin present in fibrocystic disease and that present in normal tissues I felt that the mucus in the dilated portion of the small intestine in meconium ileus should be studied. This material had one great advantage; it was the only mucus which could be obtained in really large amounts and so was available for suitable enzyme digestion experiments.

While mucus from several cases of meconium ileus was used in this work I was fortunate in obtaining material from a case (No.47) on which I performed an autopsy within two hours of death. The mucus was removed with sterile precautions and was stored at 2° C.

The enzyme to be tested was made up in the buffer solution at the appropriate p^H and was dispensed in 10 c.c. amounts in sterile universal containers. A small portion of mucus measuring approximately 1 c.c. in volume was dropped in and the tubes were placed in an incubator at 37°. A control tube containing saline was always set up. In this the mucus softened slightly but settled on the bottom of the tube as a gelatinous mass which could not be suspended or broken up even by vigorous shaking. Digestion of the mucus mass

in the enzyme bath was slow and often required 12 hours. After this time if digestion occurred the supernatant became cloudy and the mucus mass at the bottom of the tube was easily broken up to give a uniform turbid suspension. Table XIV shows the results obtained by this form of enzyme digestion. It can be seen that while the mucus was digested by pancreatin and tryptin, papain was the most active proteolytic digestive agent. An interesting result obtained was that egg white induced rapid digestion but purified lysozyme had no action. A somewhat unexpected result was the very rapid digestion obtained with streptokinase which is not an enzyme itself but is a co-enzyme or activator. This might suggest that normal mucolytic enzymes are present in the intestinal mucin but require activation. This suggestion is supported by the observation that when I attempted to repeat this digestion with the same mucus when it had been stored for three months no breakdown occurred; it was normally digested by papain and the proleolytic enzymes. From this I infer that on standing the normal mucolytic enzymes had become lost and the addition of an activator could not then cause digestion.

Three different types of mucus were used as normal controls. These were:-

1. Normal meconium from the large bowel of stillborn babies.
2. Contents of a blind reduplicated loop of small intestine.

3. Contents of an enterogenous cyst of the mediastinium.

This was probably the best control material obtained as it closely resembled the material being tested in appearance and consistency. These three control materials all showed similar digestion by the enzymes listed in Table IV. Although fully appreciating that little is known of the chemistry of mucus and even less of the normal mucolytic enzyme systems responsible for the breakdown of mucus , which is a long chained complex polysaccharide, I feel that these rough experiments suggest that there is no gross abnormality in the mucus in meconium ileus. I have already suggested that one over-riding abnormality is that it is present in excessive amount; such a finding causes me to wonder whether its obviously high viscosity may not be explained simply by the abnormally high concentration.

TABLE XV

SHOWING RESULTS OF DIGESTION OF FRESH MUCUS BY VARIOUS ENZYMES* INCUBATED FOR 12 HOURS AT 37°C.

		Degree of digestion
1.	Pancreatin	+
2.	Papain	++
3.	Trypsin	+
4.	Egg white	++
5.	Purified lysozyme	-
6.	Mucinase	+
7.	Streptokinase	+++
8.	Saline control	-

* The enzymes were all made up in phosphate buffer at optimal p^H.

Bacteriology

In almost every case in which respiratory infection occurred in the course of fibrocystic disease, culture of pus from the respiratory passages was carried out and in all cases a growth of Staphylococcus aureus was obtained. In most instances this was obtained as a pure growth. Sensitivity tests were carried out and in the majority of the cases which were, or had been, on antibiotic treatment it was found that the organism was resistant to penicillin, aureomycin and terramycin. In no instance did it appear that antibiotics were able to clear the respiratory tract of infection.

Consideration was given to the problem of why infection should always be by this particular organism. Although it seems most likely to be due to the presence of the mucus in the respiratory tract no specific factor which favoured the growth of the Staphylococcus aureus was detected. It seems reasonable to assume that the constant infection of the bronchial tree is merely a reflection of the wide distribution of the Staphylococcus aureus especially in hospital.

CHAPTER V

COELIAC DISEASE

REPORT OF SIX FATAL CASES

1. Introduction.

2. Clinical features.

3. Family history.

4. Pathology.

5. Conclusions.

1. Introduction

Coeliac disease and fibrocystic disease of the pancreas frequently present very similar clinical pictures, and as described in Chapter I, it is only within recent years that the differences between these two diseases have been outlined. Although this thesis is concerned largely with fibrocystic disease of the pancreas, certain information about coeliac disease was obtained in the course of the investigation described and I feel that a brief description of six cases of coeliac disease which I encountered can usefully be given.

Coeliac disease has been defined as a chronic wasting disease which commences between the age of nine months and two years and is characterised by the passage of large, pale, bulky, offensive stools which contain a greatly increased amount of fat. Sheldon (1948) considered it to differ from fibrocystic disease in two points: examination of the duodenal juice always reveals the presence of normal pancreatic enzymes and the disease is rarely fatal.

Since the disease is rarely fatal there is little information on the pathology of the disease. Parsons (1932) commented that P.M. reports were rare but noted that the pancreas was normal in those few cases examined. Andersen (1938) stated that the pancreas was normal in thirty cases of coeliac disease which she examined. This opinion was based on examination of a simple H. & E. stained section of the pancreas. In her paper no record is given of the other organs of the body. I have been unable to trace any more recent publications giving

autopsy reports and histological details of cases of coeliac disease.

Until recently it was thought that the distinction between fibrocystic and coeliac disease could be reliably based on the examination of the duodenal juice, as it was thought that enzymes were always absent in fibrocystic disease. Recent American work has shown clearly that in fibrocystic disease the duodenal juice may contain digestive enzymes and so it now becomes much more difficult to separate these two diseases on clinical grounds.

In view of the very great similarity between the two conditions it seemed to me worth while to examine cases of coeliac disease fully and see if they showed histological lesions in the pancreas, mucus glands, liver or any othe r organs similar to those found in fibrocystic disease.

2. Clinical features

The details of clinical histories of these cases are given in Appendix II. The ages of onset and death are given in Table XV, and it can be seen that the average age of onset is about one year and death occurred over the age of two years. The usual clinical presentation was loss of weight and failure to thrive. The motions were always pale and bulky and in every case contained an increased amount of fat (average 52%).

In the later stages of the disease pitting oedema of the arms, legs and back occurred and the plasma proteins were

greatly lowered. Terminal respiratory infection occurred in three cases. In all these cases duodenal intubation was carried out and gave a fluid which contained trypsin in high concentration.

3. Family history

Although fibrocystic disease shows a strong familial distribution it is generally considered that coeliac disease does not run in families. The family histories of the six cases in this group are shown in the following table (Table XVI). In these six families there were twenty-two conceptions which resulted in the birth of twenty-one live children, three died early and were stated to be premature. There were, thus twelve normal unaffected children in these six families. Coeliac disease would thus appear not to show any tendency to occur in families and in this respect to differ from fibrocystic disease.

TABLE XV

SHOWING AGE OF ONSET OF ILLNESS AND DEATH IN SIX CASES OF COELIAC DISEASE

	Age of Onset	Death	Faecal fat	Weight
1.	1 year	2½ years	-	60%
2.	1 year	2 years	56%	90%
3.	3/12	1½ years	50%	
4.	7/12	2 years	38%	
5.	1.2/12	2.4/12	64%	66%
6.	5 years	7 years	47%	

TABLE XVI

SUMMARY OF FAMILY HISTORIES OF SIX CASES OF COELIAC DISEASE

Position of child in birth order

Case No.	1	2	3	4	5	6	7
C. 1	Dead Premature	A. & W.	Patient				
C. 2	Miss	A. & W.	Dead Premature	Patient			
C. 3	Patient						
C. 4	A. & W.	A. & W.	Dead 3 yrs. Measles	A. & W.	A. & W.	A. & W.	Patient
C.5	Patient						
C.6	Patient	Dead Premature	A. & W.	A. & W.	A. & W.		

Mis. Miscarriage. A. & W. Alive and well.

4. Pathology

Death in most of these cases was due to broncho-pneumonia but histological examination of the lungs showed none of the changes which were found commonly in fibrocystic disease. In no instance was there any evidence of excessive secretion of mucus into the bronchi (fig.139) and the mucus glands in the trachea appeared normal (fig.140).

The pancreas in all cases showed no gross abnormality on naked eye examination. On histological examination most of the pancreases appeared normal. In case C1, however, the acini were small in size (fig.141) and showed a fine peri-acinar fibrosis. There was marked diminution in the amount of zymogen granules present (fig.142) but no mucus plugs were present in the exocrine acini. In cases C5 and 6 the acini were noted to be small and to be deficient in zymogen granules (figs.143, 144, 145, 146 and 147). In neither of these cases was there fibrosis or dilatation of the ducts or canaliculi.

Sections of the Brunner's glands were examined in all these cases. It will be remembered that these glands were consistently affected in fibrocystic disease. In the present group of cases of coeliac disease these glands were normal. The examination of multiple blocks from a variety of organs all failed to show any evidence of over-secretion. (figs.150, 151, 152 and 153).

5. Conclusions

This it is considered that in coeliac disease there is no over-secretion of mucus as occurs in fibrocystic disease. It is my opinion that these are two completely different diseases and I feel certain that coeliac disease is not a mild manifestation of fibrocystic disease.

CHAPTER VI

EPIDEMIOLOGICAL AND GENETIC STUDIES

1. Introduction.

2. Family histories.

3. Sex Incidence.

4. Proportion of siblings affected.

5. Pregnancy factors.

6. Maternal age.

7. Birth order.

8. Parents.

9. Aunts and uncles.

10. Cousins.

1. Introduction

Surveys conducted by Bodian in London and Lowe May and Reed in Chicago have shown that in affected families about one quarter of all children born die of fibrocystic disease and this observation has led these authors to conclude that the disease is transmitted by a Mendelian factor. A preliminary assessment of the families in the present series of cases indicated that the incidence of fibrocystic disease in affected families was higher than was expected if the disease was transmitted by a simple Mendelian factor. This suggested to me that the conclusion that the disease was hereditary might be wrong and I considered that the possibility of the disease being due to an intra-uterine infection of the foetus should be re-investigated. The various reasons leading to this suggestion are set out at some length in Chapter VII, p. 159.
At this stage in the investigation I was fortunate in being able to discuss this problem at considerable length with Professor L. S. Penrose who indicated clearly that he felt that the previous surveys were not complete and that he considered it was well worth while carrying out another more detailed survey. Further, he felt that the West of Scotland area was very suitable for such a survey because the population was relatively static and reliable family histories could be obtained with much greater frequency than in London or Chicago.

Accordingly I decided to visit the homes of all the children in this series to obtain information, not only about the brothers and sisters of affected children, but also about

their aunts, uncles and cousins. I hoped also to obtain some information about the health of their parents and grandparents.

On giving the project due consideration I decided that it would not be advisable or possible for me to carry through the home visiting myself. Householders are accustomed to visits by female health workers of various types and readily admit them to their homes and co-operate willingly in answering questions put to them. In contrast male visitors are regarded with suspicion and find it difficult to gain admission to the household or obtain any confidential information. Another reason why I was unable to visit the families myself was the obvious fact that, as the families were widely scattered around Glasgow, home visiting would be very time consuming.

Accordingly, after discussing the problem with Miss P.A.T. Cullen, Head Almoner, Royal Hospital for Sick Children, Glasgow, I got in touch with Miss Cleveland, Department of Social Service, University of Glasgow, and explained to her the objects of the survey, the type of visits that would have to be paid and the kind of information which was wanted. I stressed that I felt that the visits would be difficult and depressing for the investigators because of the high death rate in these affected families and that in addition it might be very difficult to gain entry into many of the households as I felt that the mothers might well be bitter and resentful following the death of a child. Nevertheless, Miss Cleveland felt that the work would be useful training and experience for

her student almoners and arranged that Misses Campbell, Davies and Ingram would be available for a limited time to carry out these visits. It is a pleasure to record my appreciation to these ladies for the thorough and conscientious way in which they carried out their visits.

Since most of the cases of fibrocystic disease had been patients in the Royal Hospital for Sick Children, Miss Cullen, Head Almoner at the R.H.S.C. very kindly took a very great deal to do with the organisation of the survey and from her I learned much about the methods of tracing families in Glasgow. It was largely due to Miss Cullen's efficient organisation that it was possible to trace such a high proportion of these families and it is a great pleasure to record my indebtedness to her.

The general arrangement made was that a brief letter was sent to the parents at the last known address. This letter simply stated that an investigation was being carried out and it was proposed to visit the home shortly. The co-operation of the parents was excellent and many of them wrote in to arrange suitable time for visiting. Indeed, contrary to my expectations in only one family did the proposed visit cause acute resentment. If the family had removed the letter was returned by the dead letter office of the post office. Enquiry was then made through the city factor's office who in many instances was able to give the address of families who had been re-housed. In this way it proved possible to trace and interview the parents of 55 out of the 85 affected families included in the series. No attempt was

made to interview families who lived at considerable distance or in the Hebrides, nor was any effort made to visit the homes of recent cases as it was felt that the details of family history recorded in the hospital case sheets were accurate and fully up-to-date.

Before visiting commenced, I spent a considerable time with the student almoners who were told in detail of the various manifestations of fibrocystic disease and the reasons why the information was being sought from the parents of these children. Once the student almoners' interest was aroused in this way, they all carried out their visits most conscientiously and went to great trouble in following families who had shifted from the given address.

The following case record was drawn up and the students were instructed in its use.

FIBROCYSTIC SURVEY

Name of Patient: _____ Index Case No.: ____

Address: _____

No. of rooms: _____ No. of occupants: _____

Mother: _____ Date of birth: _____

General Health: _____ Chest Trouble: _____

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1					
2					
3					
4					
5					
6					

Father: _____ Date of birth: _____

General Health: _____ Chest Trouble: _____

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1					
2					
3					
4					
5					
6					

Familial relationship of parents: _____

_____

Grandparents: Alive Health Dead Age Cause

MATERNAL
Grandmother: _____

Grandfather: _____

PATERNAL
Grandmother: _____

Grandfather: _____

Cousins: Any similar illness or early deaths? _____

Know any other child with similar illness? _____

Patient or Propositus: _____ No. in birth order: ___

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

_____

Patient or Propositus: _____ No. in birth order: _

Name: _____ Date of Birth: _____

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

_____

Patient or Propositus: _____ No. in birth order: _

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

The main purpose of the investigations was to obtain a full family history of proved cases of fibrocystic disease. It was hoped to obtain accurate details of any illnesses of the children already born into these families. In addition it was intended to obtain information of pregnancies or miscarriages subsequent to the birth of a proved affected child. Accurate information of the dates of all children, both normal and affected, was sought with a view to carrying out an epidemiological study of the children. Since there is little information available about the state of health of the parents of fibrocystic children, enquiry was made about the parents' general health. Particular information was sought about the occurrence of chest disease or chronic bronchitis.

In practice it proved impossible to obtain, with any reasonable accuracy, the dates, or even years, of birth of the parents' brothers and sisters and the visitors were content to find out the number of brothers and sisters the parents had and to enquire if they knew of any deaths in infancy or childhood among nephews and nieces, i.e. cousins of the affected child. This survey was carried out between January and June, 1956 and the completed family histories are given in full in Appendix IV.

Opportunity was also taken to visit the families of the six cases of coeliac disease which are described in Chapter V. The family histories of these cases is given in Appendix V.

2. Family histories

In the course of the survey, fiftyfive families were visited and full details of the children were obtained. The information obtained about the sibs of the index cases is set out in Table XVII. In addition, full and accurate details of the children are available in eighteen additional families who were not visited for a variety of reasons. Details of the children of these eighteen families are given in Table XVIII. The two groups appear comparable and have been combined in the genetic investigations which follow. Thus, as shown in Table XXIX, information is available about the children born into seventythree affected families. There were in addition to the seventythree index cases, fifteen proved affected cases (i.e. proved by post mortem or proved clinically). There were thirtyfour children who were classed as probably affected. These either died in the first few days of life with "stoppage of the bowels" or suffered from chronic respiratory infection and failed to thrive (twentysix of these thirtyfour children are known to be dead). Conforming with the usual practice I have grouped proved and probably affected cases together and refer to them subsequently as affected. Full details of the number of sibs born, normal, proved affected, probably affected arranged according to birth order are given in Table XX.

TABLE XVII

SHOWING SIBSHIPS OF 62 PROVED CASES OF FIBROCYSTIC DISEASE BASED ON INFORMATION OBTAINED FROM PARENTS IN SURVEY.

BIRTH ORDER OF SIBS.

Case No.	1.	2.	3.	4.	5.	6.	7.
1.	■	□					
4.	●						
5.	▬ D.3/12	□	□	◒ D.3/12	●	○	
9.	□	●	□				
12.	●	○	□	○			
13.	○ D.	□	D. ○	D.5/12 ▬	○	▬	
14.	□	●	◒	▬			
15.	○	○	□	○	■	○	
16.	▬ D.	◒	●				
17.	□	○	●				
19.	■	■ CD. 18/12	□				
20.	□	◒ D.	□	▬ D.1/12	□	●	
22.	○	●	□	□			
23.	□	□	■ M.				
24.	□	○	○	▬	□		
25.	▬ M.	○	□	● MD			
26.	○ S.B.	◒ D.3/12	▬ D.3/12	○	◒ D.	●	
31.	□	●					
32.	□	□	□	●			
34.	○	□	□	■	○		
36.	○	□	● M.				

continued.

BIRTH ORDER OF SIBS.

Case No.	1.	2.	3.	4.	5.	6.	7.
37.	●	○					
38.	●	Mis.	Mis.	□			
40.	□	■	◒ D. $12\frac{3}{12}$.	▬ D.3/12			
41.	□	▬ D.	○	○	□	■ M.	○
42.	Mis.	■	□	○			
44.	■	■ C.					
46.	■	□ S.B.	▬ D.	■ D.			
48.	■	○					
49.	▬ D. $12\frac{2}{12}$.	□	□	■ M.			
50.	□	●	□	○			
53.	▬ D.	■ M.					
54.	●	○	■ C.				
55.	◒ D.2/12	■	□				
56.	○	■	○				
57.	■ C.	●	○				
59.	▬ D.	● D.	● M.				
60.	● D.	■					
61.	○	□	●				
62.	○	□	■	○			
63.	■						
64.	▬ D.	○	●				
65.	◒ D.	□	■				
66.	■ M.	■ D.1/12					
67.	●	○					
68.	●	Mis.					

continued.

BIRTH ORDER OF SIBS.

Case No.	1.	2.	3.	4.	5.	6.	7.	8.
69.	● D.11/12 □		■ M.	■ DM.				
70.	Sib 4 of Case 69.							
71.	○	○	□	●				
72.	●							
73.	Sib 2 of Case 60.							
75.	○	○	■	○				
76.	□	●	□	●				
77.	●							
78.	●							
82.	Sib 2 of Case 76.							
84.	Sib 4 of Case 46.							
85.	○	◒ D.1/12 Mis.	◨ D.3/12 □			□	● CD $\frac{18}{12}$	■
90.	Sib 2 of Case 66.							
94.	■	■						
97.	Sib 4 of Case 25.							
98.	Sib 2 of Case 59.							

MALE.		FEMALE.	
□	Normal.	○	Normal.
■	Proved affected.	●	Proved affected.
◨	Probably affected.	◒	Probably affected.

C. Clinically proved case.
D. Dead.
M. Case of Meconium ileus.
Mis. Miscarriage.
S.B. Still birth.
— Index Case.

TABLE XVIII

SHOWING SIBSHIPS OF 18 PROVED CASES OF FIBROCYSTIC DISEASE. INFORMATION OBTAINED FROM HOSPITAL CASE SHEETS.

BIRTH ORDER OF SIBS.

Case No.	1.	2.	3.	4.	5.	6.	7.
2.							
3.		D.					
7.		D.		D.			
8.		D.					
10.							
11.	Mis.		D.				
21.	D.		D.				
27.	Mis.			D.			
35.		M.					
39.	S.B.						
45.		M.					
47.							
51.							
52.				M.			
58.							
79.		D.					
95.		D.					
96.		C.D.					

TABLE XIX

	Present Series		Bodian	
Index cases	73		77	
Proved affected	15		3	
Probably affected	34 ø		16	
Stillbirths	3		2	
Dead (cause not known or not fibrocystic disease)	4		6	
Alive and well (under 2 years)	-		7	
Normal. Alive and well	105	(45%	73	(45%)
	234		177	

ø 26 of these children are dead, deaths being due to chronic respiratory infection, intestinal obstruction or failure to thrive.

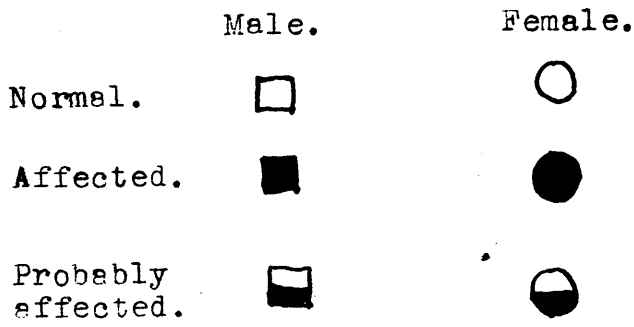

Male.
Female.
Normal.
Affected.
Probably affected.

TABLE XX

SHOWING NUMBERS OF LIVE BORN SIBS AFFECTED, PROBABLY AFFECTED AND NORMAL ARRANGED ACCORDING TO BIRTH ORDER

	Birth Order of Sibs							
	1	2	3	4	5	6	7	All
Total sibs	68	63	49	30	11	7	2	230
All males	37	30	30	15	8	3	1	124
All females	31	33	18	15	3	4	2	106
□	14	13	19	3	4	2	-	55
○	14	19	7	9	3	2	-	54
□+○	28	32	26	12	7	4	-	109
■	12	16	8	7	3	2	-	59
●	13	8	9	5	1	2	1	39
■+●	25	24	17	12	4	4	2	98
◪	11	1	3	5	-	-	-	20
◓	4	6	2	1	-	-	-	13
◪+◓	15	7	5	6	-	-	-	33
■+◪	21	17	11	12	3	2	-	69
●+◓	17	14	11	6	1	2	1	52
■+◪+●+◓	38	31	22	18	4	2	1	121
% affected	56	49	45	60	36	30	-	52
% of males affctd.	56	56	36	80	38	66	100	55
% " females "	55	43	61	40	33	50	50	49

Details of one 8th born affected sib are omitted.

3. Sex incidence

Twohundred and thirty children were born into the seventythree families included in this series and of these rather more than half, onehundred and twentyfour (54%) were male. Of the proved affected children, fiftynine (56%) were males and thirtynine (44%) were females and of a total of ninetyeight proved affected children, twenty (60%) of the probably affected cases were male. There is thus a slight preponderance of male children in the present survey but this is not considered to be significant. The proportion of male and female sibs (Table XX) appears relatively constant when considered in relationship to the birth order.

4. Proportion of sibs affected

In human mating a disease transmitted by mendelian recessive inheritance rarely manifests itself in the classical theoretical proportions of one affected to three normal children. The number of children affected is usually greater than are one fourth of the total number of offspring. The major cause of this discrepancy is that families are missed out of a given series because the children born into them are normal, although the parents are genetically capable of producing affected children. In the present series of cases there are onehundred and twentyone affected children out of twohundred and thirty children born into seventythree families. This gives an over-all incidence of 53% but for the reasons outlined above this simple form of assessment is of no use in genetical analysis of the material.

In an attempt to correct the discrepancy in the series caused by the omission of the families where the children happen to be normal the following methods were devised:-

1. "Sibling method" of analysis. In this method the number of sibs of the affected children is determined and also the number of affected sibs of affected children and the percentage of affected children is derived from this proportion. This method gives good results if the families in the series are not selected but are examples of ideal random sampling. If, however, the families are selected this method gives a figure higher than 25%. The cases in this series have been analysed by this method (Table XXI) and for all sizes of sibships give a figure of over 40%. The usual course for this method giving a high percentage incidence is that cases are included in the series because more than one child is affected. While I have included in the analysis all cases of fibrocystic disease I encountered, it is not possible to be certain that the cases were not in fact selected by the very fact that practitioners are more likely to send a child into hospital if an elder sib has already died.

2. The proband method of analysis. The proband method was devised in an attempt to correct the weighting of a series in favour of too many affected. It tries to accomplish this by removing from the series the affected person (the proband is geneological terminology) who brought the family

TABLE XXI

SHOWING ANALYSIS BY THE SIBLING METHOD OF THE INCIDENCE OF FIBROCYSTIC DISEASE IN THE CHILDREN OF 73 FAMILIES

No. of children in families	No. of sibs of affected	No. of affected sibs	% affected
2	25	18	72
3	59	30	50
4	53	22	41
5	20	-	-
6	29	12	40
7	14	6	42
All	196	84	43

to the attention of the investigator. In this method the number of normal and affected sibs of the proband are determined and the percentage affected derived from these numbers.

If one is dealing with a condition is which the affected child died shortly after birth, then earlier cases of the disease should be regarded as secondary cases and not as probands. From theoretical considerations the proportion of affected children in such a series must of necessity fall below the expected 25% unless the series of affected families is very highly selected.

The proband method of analysis has been applied to the present series (Table XXII). As shown, the observed percentage affected as given in column 5 averages 32% while the theoretically expected percentage affected (column 6) is around 16%. While it is possible that this series is biased by selection beyond my personal control, it seems to me unlikely that it is so highly selected that the observed frequency is doubled.

3. "Percentage affected" method. The "percentage affected" method of analysis is one which recognises that families in which the defect might have occurred but did not, have been excluded, i.e. it is specially designed for analysis of just such a series as the present in which every family is selected by possessing at least one affected member. This method also depends (as do the two previous methods) on expansion of the binomial theorem $(a + 3b)$ and it calculates the

TABLE XXII

SHOWING ANALYSIS BY THE PROFOUND METHOD OF THE INCIDENCE OF FIBROCYSTIC DISEASE IN THE CHILDREN OF 73 FAMILIES

No. of sibs in family	Total children	Total children minus profounds	Total affected minus profounds	Observed % Affected	Expected % Affected
2	32	16	9	55	14.2
3	69	46	17	37	14.8
4	60	45	14	31	15.4
5	20	16	-	-	15.8
6	30	25	8	32	16.5
7	14	12	4	33	16.9
All	225	160	52	32	15.7

percentage of affected children one would expect in a random sampling of children in 2, 3, 4, 5, etc. child families if the defect is a recessive or dominant factor. This method of assessment is shown in Table XXIII in which it can be seen that the number and the percentage of affected children is considerably higher than that expected from theoretical considerations.

This method which is also known as Hogben's factorial analysis, has been applied to those fiftyfour families who were visited and about whom full genetic histories were obtained. The results are given in Table XXIV where it is seen that the number of cases observed is considerably higher than expected if the disease is recessive ($p = \frac{1}{4}$) but less than that expected if the disease is transmitted by a dominant factor ($p = \frac{1}{2}$).

A further elaboration of this method of analysis is to calculate what the ratio of affected children would be within a sibship of given size. This has been carried out and the results given in Table XXV show that the observed incidence is considerably higher than the expected number of families with two or three sibs affected.

4. Another method of estimating the probability of a sib being affected is to include only those children born after the index case (or first proved case in the family).

This method assumes that there is no effect of birth order (separate analysis of the present series suggests that this is so) and is independent of the way in which the families

TABLE XXIII

SHOWING ANALYSIS BY THE "PERCENTAGE AFFECTED" METHOD OF THE INCIDENCE OF FIBROCYSTIC DISEASE

		Observed		Expected (p = 0.25)	
No. of sibs in family	Total children	No. affected	% affected	No affected	% affected
2	32	25	78	17.3	57.1
3	69	36	52	29.8	43.2
4	50	29	50	18.3	36.5
5	20	4	20	6.5	32.7
6	30	13	43	9.2	30.8
7	14	6	42	4.2	29.9

Columns 5 and 6 are calculated on the assumption that transmission is recessive, i.e. p = 0.25.

TABLE XXIV

HOGBEN'S FACTORIAL ANALYSIS APPLIED TO 54 FAMILIES AFFECTED WITH FIBROCYSTIC DISEASE

Sibship size	Number of sibships	Observed affected	Expected affected ($p = \frac{1}{2}$)	Variance	Expected affected ($p = \frac{1}{2}$)	Variance
1	7	7	7.000	0.000	7.000	0.000
2	11	16	12.573	1.342	14.667	2.446
3	14	24	18.158	3.682	24.000	6.857
4	15	26	21.945	6.300	32.000	11.733
5	3	6	4.917	1.776	7.740	3.246
6	3	8	5.475	2.328	9.144	4.137
7	1	2	2.027	0.970	3.528	1.667
Total	54	89	72.095	16.398	98.079	30.084

$p = \frac{1}{2}$ Difference (Observed - Expected) = + 16.905 ± 4.049

$p = \frac{1}{2}$ Difference (Observed - Expected) = - 9.079 ± 5.485

TABLE XXV

SHOWING OBSERVED DISTRIBUTION OF AFFECTED CHILDREN WITHIN EACH FAMILY COMPARED WITH THAT EXPECTED IF THE PROBABILITY OF BEING AFFECTED IS 1 IN 4

Size of family	Two		Three			Four			
No. of affected	1	2	1	2	3	1	2	3	4
Observed	7	9	10	9	4	7	3	4	1
Expected	7	1.2	10	3.3	0.4	8	4	1	0.1

were collected. In the present series there were fortyone children born after the index case and seventeen of them were affected (ten proved and seven probably affected). This gives an incidence of affection of 0.41. Bodian is the only author to have used this method previously and he states that in his series there were six affected children out of a total of twentyseven born after the index case. This gives an incidence of 0.32 which he felt was sufficiently close to "the expected value of 0.25% to support his contention of transmission by a recessive gene.

5. Pregnancy factors

Nine of the mothers out of fiftythree remembered some abnormality in the pregnancy of an affected child and these are listed below:-

Case No.	
13	Kidney trouble
14	Kidney trouble - forceps delivery.
17	Varicose vein
31	Anaemia
36	Didn't feel well , but no specific illness
40	Kidney trouble and jaundice
46	High blood pressure
54	Bronchitis
69	Hyperemesis

The ailments complained of are the common complaints of pregnancy and no evidence of any specific illness was obtained.

6. Maternal age

The mean maternal age of the birth of sixtytwo affected children is 28.96. This compares with an expected value of 27.84 ± 4.76 (SD) obtained by a method (Penrose, 1953) similar to the Greenwood-Yule reconstruction from the families themselves. The difference between the observed and expected ages is 1.12 ± 0.60 (SE). This is barely significant but hints that the condition is more frequent among the children of older mothers.

7. Effect of birth order

This has been calculated by the percentage affected method.

Birth rank	Number observed	Number expected
1 to 3	47	50.51
4 to 8	15	11.49
Total	62	62

As shown above, there is a slight increase in the affected sibs born in later pregnancies.

8. Parents

Since fibrocystic disease is usually lethal in childhood it is not to be expected that the parents will be affected. Recently di Sant' Agnese has shown that the parents may show an abnormality of sweat secretion and has published details of a family in which this abnormality was associated with chronic bronchitis. The majority of the parents were healthy but eight gave a history

of chronic bronchitis. Chronic bronchitis is, of course, very common in this area and an incidence of eight out of one hundred parents does not seem abnormally high.

No instances of consanguinity of the parents was recorded.

9. Aunts and uncles

In the course of the survey the parents were asked about their own brothers and sisters. While many could give accurate information about the dates of birth and subsequent health of their sibs, many of the parents could not do so and were only able to accurately state the number of their brothers and sisters who survived to adult life. In forty-four families information about the parents' sibs was available and showed that on the mothers' side two hundred and thirteen sibs survived to adult life while only four were known to have died in childhood. On the fathers' side, there were two hundred and ten surviving sibs and seven were known to have died in childhood. These figures clearly show that there have been few deaths in childhood in the parents' sibs who actually came from families which averaged more children than the present national average.

It seems to me very improbable that any of the parents' sibs were affected with fibrocystic disease.

10. Cousins

Enquiry was always made about the health of the child's cousins and the reply almost always was "I am the only one in the family to lose my children". In only two cases did the parents state that a sister had lost children in early infancy.

CHAPTER VII

DISCUSSION

1. Incidence.

2. Mode of transmission.

   A Infection.

   B Sensitisation.

   C Heredity.

3. Relationship to other lesions.

   A Meconium ileus.

   B Coeliac disease.

   C Bowel atresia.

   D Rhesus sensitisation.

   E Chronic respiratory disease.

4. Pathogenesis

   A Obstruction of pancreatic ducts.

   B Mucoviscidosis.

1. Incidence

The incidence of fibrocystic disease has been studied by various observers (see Table II, p. 37) and the incidence obtained has varied between 2% and 5% of hospital deaths which come to autopsy. Naturally this figure varies according to the types of cases admitted to hospital and the selection of cases for autopsy. In the present series an average of 5% of the children dying in the Royal Hospital for Sick Children, Glasgow, have suffered from this disease. No accurate estimate of the number of cases coming to autopsy in other hospitals in the area can be made but it seems probable that a similar proportion of deaths occur. (In Ruchill Hospital there have been six fatal cases of fibrocystic disease in one hundred child deaths).

The major difficulty in assessing the number of children affected with fibrocystic disease born in the whole community is, of course, the difficulty of relating a statistic derived from a selected hospital population to the general population of the whole country.

An attempt was made in the present investigation to estimate the proportion of children who died at home and in hospital. As shown in Table XXVI, when seventy-two deaths in forty-five families were enquired into, it was found that sixty-four children died in hospital and only eight at home. It is possible, however, that this figure may not be completely true of the population at large. To go to the other extreme,

TABLE XXVI

SHOWING PLACE OF DEATH OF 74 AFFECTED CHILDREN ARRANGED ACCORDING TO BIRTH ORDER

Birth order	Hospital	Home
1	20	5
2	19	-
3	9	1
4	9	2
5	2	-
678	5	-
All	64	8

even if the forty-five index cases on which the diagnosis was made are excluded, eight out of twenty-seven children in these families have died at home or 70% died in hospital. There is no accurate national figure of the proportion of children who died at home or in hospital but the Registrar General (1956) has made two estimates for me both of which indicate that approximately 50% of children die in hospital (the actual figures were 51% and 49% for 1950 and 1951 respectively).

Since the majority of cases of fibrocystic disease (see fig.2) die after one month and before one year of age it seems to me to be reasonable to relate the number of deaths in fibrocystic disease to the death rate in this group of infants rather than to the total infant mortality when attempting an assessment of the frequency of the condition in the general population.

Thus it seems reasonable to start with the statement that 5% of children who die in hospital between the ages of 1 and 12 months do so from fibrocystic disease. Between 70% and 90% of all cases of fibrocystic disease die in hospital. Seven thousand children between 1 and 12 months old die each year in Britain. Of the 3,500 who died in hospital, 5% or 175 suffered from fibrocystic disease; of the remaining 3,500 who died at home, between 20 and 75 suffered from fibrocystic disease. Thus, between 195 and 250 children die each year with fibrocystic disease. Each year, 100,000 births are recorded and the proportion affected with fibrocystic disease therefore lies between 1/400 and 1/500 of all live births.

This/

This estimated incidence is somewhat lower than the estimates given by other observers who have estimated the frequency as high as 1/100 live births. In these estimates it has been assumed that because 5% of children in hospital die with fibrocystic disease, 5% of all children who die are affected with fibrocystic disease. In the present investigation an assessment was made of the proportion of affected children who die at home and this has been very small. This has been allowed for in the calculations and I believe the frequency estimated is reasonably accurate.

2. Mode of transmission

Fibrocystic disease of the pancreas has long been regarded as a familial disease. Indeed even before the histological nature of the disease was discovered, Garrod and Huntley, 1921, described a case of familial infantile steatorrhoea and as the parents were cousins, they suggested that this disease might have a hereditary mode of transmission. Subsequent authors fully confirmed the familial incidence of the disease and many have accepted that it is transmitted as a hereditary mendelian factor. I think that this explanation was accepted rather uncritically at least to begin with and I have attempted to reconsider the method of transmission with an impartial mind.

I now propose to review briefly the various ways in which the disease may be transmitted and to conclude with a consideration of the hereditory factors in this disease.

2A Infection

The suggestion that fibrocystic disease of the pancreas was an infectious disease was first put forward by Brody (1941) who found acidophilic inclusions in various tissues (but not the pancreas) in two cases of fibrocystic disease. For this reason he thought that the disease might be due to an infection. It now seems probable that his cases of fibrocystic disease were also suffering from salivary gland inclusion disease. This does not seem to be uncommon for in the present series of cases salivary gland inclusion disease was looked for and typical inclusion bodies were found in three cases.

When Brody made his suggestion it was generally considered that the foetus was completely protected from infection by the placenta, one possible exception being syphilis. In the years which have passed, evidence has been produced which shows that virus infections can readily pass through the placental barrier and affect the foetus. The correlation between maternal rubella and congenital heart disease is substantiated on statistical grounds and is now fully accepted. Toxoplasmosis is an example of a disease in which the mother is a symptomless carrier of a parasite which passes through the placenta and causes severe damage to the foetus. Recently Dible has suggested that hepatitis and cirrhosis in the newborn is due to the transmission from mother to foetus of a virus which is probably that of serum hepatitis and he has further suggested that once the

mother is infected, the infection persists for a long time, if not for life, with the result that all children born subsequently are affected with the disease. Salivary gland disease is another virus infection which is transmitted through the placenta. MacDonald and McArthur (1953) have shown that vaccinia may also be transmitted to a foetus in utero and indeed suggested that such a transmission occurred frequently if the mother was vaccinated about the third month of pregnancy.

It is thus now well established that many different infections which may produce little or no clinical upset in the mother but produce a viraemia/can pass through the placenta and affect the foetus.

The illustrations given also serve to show that such transplacental spread can occur with a number of different groups of viruses and is not obviously related to virus particle size. (Recently Goodall (1956) has shown that foetal red cells often pass into the maternal circulation. If this is so there must be relatively large breeches in the endothelium lining the maternal and foetal blood sinuses and/the size of the infecting particles would no longer be a factor in the transferrence of infection).

Workany (1947) has reviewed the importance of the intra-uterine environment and has shown how the relative deficiency of various factors including vitamins may result in foetal maldevelopment.

Before proceeding further to examine the possibility of intra uterine infection in more detail it seems worth while considering briefly a few of the known facts on the transmission of infection to children. Finlay (1930) has shown that even in syphilis the transmission of disease to the offspring is erratic and that several children may escape infection while one born subsequently may be affected. This of course is the case in fibrocystic disease where several normal children may be born between two affected children. (Case 25)

Another fact which should be borne in mind is that in several virus diseases (e.g. psittacosis) infection may persist, latent, for a long time but produce transient periods of viraemia and result in the transmission of the disease to the young. It thus seems to be clearly established that the transplacental transmission of infection to the foetus does take place especially where a viraemia occurs in the course of the maternal disease. It is further clear that once the mother is infected with certain diseases, only some of the children born subsequently are infected. The reasons why the others escape are not fully established. Another observation which influenced me in reconsidering the transmission of fibrocystic disease was the observation by Godman, Bunting and Melnick (1952) that the intra-peritoneal injection of Coxsackie virus B into sucking mice produces a selective necrosis of the exocrine tissue of the pancreas leaving the islets of Langerhans unaffected. As it is

precisely this portion of the pancreas which is affected in fibrocystic disease, it seems reasonable to consider if a similar type of agent might not be responsible for both lesions. Coxsackie infections which are often associated with a viraemia are known to occur in the early autumn especially in September and October. Following this line of thought I was led to speculate whether the Coxsackie or some related virus might be the cause of fibrocystic disease of the pancreas. If so, the children affected might be those who were conceived in early summer and who were about the third month of intra uterine life in September or October for the reports on rubella and vaccinia indicate that the foetus is most susceptible to damage by virus at or before the third month of gestation.

At the time this speculation was made, the material was incomplete but the dates of birth of some fifty-seven children known to be cases of fibrocystic disease were available. Table XXVII shows the months in which these sixty children were born and it can be seen that twice as many affected children (forty) were born between January and June as were born (seventeen) in the remainder of the year. While the total numbers are too low for statistical methods to be applied and give significant results they are regarded as "interesting" from a statistical point of view. The only published report in which dates of birth are stated is that

TABLE XXVII

SHOWING MONTH OF BIRTH OF 57 CASES OF FIBROCYSTIC DISEASE

Preliminary investigation

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jly.	Aug.	Sep.	Oct.	Nov.	Dec.
All affected	8	11	3	6	7	5	1	5	3	2	2	4
First affected	6	5	2	4	-	2	1	3	-	-	-	-

Bodian (1952) series

All affected	17	8	8	14	13	6	9	6	5	14	6	10
First affected	8	4	5	3	8	1	1	2	3	5	1	3

of Bodian and when I arranged his cases according to the month of birth, I found that a preponderance of births occurred in the first six months of the year (Table XXVII).

A further point of interest is that both series show a fall in the number of births in February with a further rise in March. The possibility that there has been a loss of foetuses due to an overwhelming infection has been considered.

I wondered if the first child affected in a family might give a clearer indication of when maternal viraemia occurred (if indeed this does occur) and consequently (Table XXVII) I examined the dates of birth of the first affected child born into any family and found that all except four of the total of twentythree affected children were born in the first six months of the year.

This preliminary investigation suggested that some factor might be operating which caused children born at one season of the year to be affected and was one of the reasons why the investigation described in Chapter VI, p.126 was undertaken. It was also hoped that the normal children of the family would act as a control group and for this reason particular attention was paid to obtaining the dates of birth of these normal children as well.

Following this investigation the month of birth of 143 children in seventy-one families were ascertained accurately. These children were grouped as affected and normal (Table XXVIII).

TABLE XXVIII

SHOWING THE MONTH OF BIRTH$^{\emptyset}$ OF 143 AFFECTED AND NORMAL CHILDREN FROM 71 FAMILIES

Month of Birth

No. of children	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Affected	7	13	3	6	3	10	2	6	4	4	6	7
Normal	12	7	8	3	7	6	6	4	5	4	3	7
Total	19	20	11	9	10	16	8	10	9	8	9	14

$\emptyset$ Dates of birth have been confirmed by the parents.

In the affected group considerably more children, 45 : 29 are born in the first six months of the year but almost the same preponderance, 43 : 29 is seen in the normal control group. The proportion of affected children born varies greatly and in a most irregular fashion from month to month.

This fuller investigation shows conclusively that the heavy incidence of births of affected children observed in the early stages of this work was quite fortuitous.

I am now certain that no significant seasonal incidence of births occurs in fibrocystic disease. This being so it seems unlikely that the disease is in any way related to the occurrence of Coxsackie or other virus infection during pregnancy.

Although leading to a negative conclusion this small statistical investigation has been most valuable and has firmly reinforced the primary principles of statistical work. "Never do statistics on small groups and use control groups wherever possible".

2B Sensitisation

The association of fibrocystic disease of the pancreas with erythroblastosis foetalis was first noted by Glanzmann(1946) and since then has been commented on by a number of authors. In the present series although no child with erythroblastosis was found there are four children whose blood was Rhesus positive with a positive Coombs reaction and were born to Rhesus negative mothers. Unfortunately, in the majority of cases

no information about maternal and foetal blood groups is available and although these children probably showed no iso-immunisation this cannot be taken for granted.

As indicated in Chapter IV p.106 some forty cases of erythroblastosis foetalis were available for examination and none showed any histological evidence of fibrocystic disease of the pancreas. It seems reasonable to conclude that fibrocystic disease is not caused by Rhesus incompatibility or is directly associated with this type of sensitisation.

Nevertheless, it was thought worth while to see if a similar sensitisation (auto-immunisation) mechanism might be operating. If any sensitisation mechanism were involved, I would not expect the firstborn child to be affected and would expect that births would not show a random distribution but would occur more frequently in children who came later in the family. Lastly, I would expect that the more severe manifestations of the disease (in this context it seems reasonable to regard meconium ileus as the most severe form of the disease), would occur in children born later in the families. In point of fact, as shown in Table XXIX, firstborn children have frequently been affected with meconium ileus. This manifestation of the disease apparently occurs at random throughout the families.

The results as shown in Tables XXIX and XXX in no way support the suggestion that this disease is due to sensitisation for the births of affected children occur fairly evenly throughout

TABLE XXIX

SHOWING DISTRIBUTION OF CASES OF MECONIUM ILEUS RELATED TO BIRTH ORDER IN 14 CHILDREN FROM 11 FAMILIES

	Birth order					
	1	2	3	4	5	6
No. of children born	12	12	9	4	1	1
No. of children with meconium ileus	2	4	4	3	-	1
Proportion affected	17%	34%	33%	75%	-	100

TABLE XXX

SHOWING RELATIONSHIP OF BIRTH ORDER TO INCIDENCE OF FIBROCYSTIC DISEASE

ONLY FAMILIES WITH THREE OR MORE CHILDREN ARE INCLUDED IN THIS TABLE

	Position in birth order					
	1	2	3	4	5	6
No. born	47	47	47	26	9	7
No. affected	18	18	25	14	4	5
Proportion affected	38%	38%	53%	54%	44%	70%

the family although there is a slight increase in the proportion of affected children born in third and later pregnancies. Many firstborn children in this series (40 out of 72 families) are affected with the disease and lastly, cases of meconium ileus are also scattered evenly throughout the birth orders and has in some instances been found in firstborn children.

There is, therefore, no evidence that sensitisation or auto-immunisation plays any part in the aetiology of this disease.

2C Hereditary Almost as soon as fibrocystic disease was observed to occur in families it was regarded as hereditary and in most of the previously reported series the number of affected sibs has been about one quarter of the total sibs in the series. This suggested that the disease was transmitted by a recessive mendelian factor.

The present series has been examined by five different methods and the results of three of these methods are summarised in Table XXXI. In all the methods the proportion of affected sibs is substantially higher than that expected if the disease is transmitted by a mendelian recessive factor. This present series contains too many families with more than one child affected to conform with the expected mendelian inheritance.

The interpretation which can be placed on this observation depends on the way the series was collected and depends on whether the series is a true random sample or is highly selected in that only families with more than one affected child have

TABLE XXXI

SHOWING RESULTS OF ANALYSIS OF THE PROPORTION OF SIBS AFFECTED BY THE "PERCENTAGE AFFECTED" SIBLING AND PROBAND METHODS

Size of family	Observed number affected	Expected number affected	Percentage affected by sibling method	Percentage affected by profound method
2	25	17.3	72	55
3	36	29.8	50	37
4	29	18.3	41	31
5	4	6.5	-	-
6	13	9.2	40	32
7	6	4.2	42	33

come into hospital and so been brought into the series. I consider that this is not so as cases of meconium ileus are admitted to hospital regardless of what has happened to previous children. In the house to house survey which was undertaken , families were visited where a case had occurred almost 10 years ago and the family had subsequently been completed. I consider that these families will help to correct any bias in the selection of this material.

It may be that the social difference between the West of Scotland and London may have played an important part in the results obtained and it is noteworthy that the number of sibs per family is substantially higher than in Bodian's series.

I consider that the sample included in the series was drawn with no gross bias in favour of multiple affected sibs and that the analysis carried out suggests that the disease is unlikely to be transmitted by a Mendelian recessive factor.

3. Relationship to other lesions

3A Relationship of the pancreatic lesion in fibrocystic disease to meconium ileus The association of fibrocystic disease of the pancreas and meconium ileus was noted by Andersen (1938) and has since been observed by many other authors. Farber (1944) showed that there were no pancreatic ferments in the duodenal juice in cases of meconium ileus and all authors subsequently have assumed that meconium ileus is a manifestation of fibrocystic disease.

There has, however, been considerable speculation on how the lesion of meconium ileus has been produced. The original suggestion was that the intestinal mucus was not softened and digested because of absence of pancreatic ferments. Even after the introduction of the mucoviscidosis concept which suggested that the intestinal mucus was abnormal in quality, the importance of pancreatic achylia was still stressed. While it is quite true that pancreatic juice does liquefy mucus, it is not an efficient mucinase (as shown in Chapter IV) and I feel that this is not the major factor in the produce of meconium ileus. One obvious finding in this condition is that the intestine contains an excess of mucus. In other words, the mucus glands of the upper alimentary tract secrete many times the normal amount of mucus and I consider that this excessive secretion of normal mucus is a fundamental factor in the production of the lesions.

A further finding in meconium ileus which I think is worth considering is the condition of the large bowel.

Some of the earlier reports referred to the large bowel as an example of microcolon because of the very small size of the bowel. On examination, however, the wall is thick, the muscle coat well developed and the large bowel has the appearance of being hypertonic. Instead of containing normal green meconium the large bowel contains only a small amount of inspissated greyish material which is known to consist of desquamated cells and mucus. This suggests that no small bowel contents have ever passed the ileo-coecal valve. Although there would appear to be an obstruction to the normal downward movements into the large bowel of the green mucus from the small intestine this seems to be functional and not organic as no obstruction has been demonstrated by surgeons or pathologists in the usual type of case. It seems reasonable to conclude that the lesion in fibrocystic disease is produced in part by excessive secretion of mucus in the small bowel and partly by hypertonicity of the large intestine which results in interference in the normal downward progress of material in the alimentary tract.

3B Relationship to coeliac disease Although the clinical manifestation of fibrocystic disease and coeliac disease are similar most observers considered that these two conditions are separate entities. The main features of the two diseases are summarised in Table XXXII . Recently it has been realised that cases of fibrocystic disease may not show pancreatic achylia and also may not manifest themselves clinically for many

years and may survive into early adult life. Accordingly several of the differences between the two conditions stated in Table XXXII are no longer regarded as absolute and many observers have come again to wonder if coeliac disease is not a mild and usually non-fatal form of fibrocystic disease. Such an opinion is speculative and the very poor autopsy reports which are available on coeliac disease have done little to clear the position.

It was in an attempt to clarify this position that I carried out the examinations reported in Chapter V and I think the following conclusions emerge from it.

1. The pancreas in coeliac disease is usually not normal and appears atrophied and lacking in zymogen granules.
2. It never shows any of the characteristic morphological changes of fibrocystic disease.
3. Extensive examination shows no evidence of oversecretion of mucus in the respiratory alimentary tracts.

I conclude, therefore, that coeliac disease is not a mild form of, or related to fibrocystic disease.

TABLE XXXII

DIFFERENCES BETWEEN FIBROCYSTIC DISEASE AND COELIAC DISEASE

	Fibrocystic Disease	Coeliac Disease
Age of onset	Before 2 years	After 2 years
Respiratory infection	Frequent and severe	Usually absent
Pancreatic enzymes	Absent	Present
Ultimate prognosis	Fatal	Recovery
Pancreas	Fibrocystic	Normal

This table was prepared in 1953 for a demonstration in the Scientific Exhibition at the B.M.A. Annual Meeting and was substantially correct at that time.

3C Bowel atresia

The association of bowel atresia with fibrocystic disease is well known and in the present investigation there were three instances of atresia of the small intestine among fifty-seven fatal cases of fibrocystic disease admitted to the Royal Hospital for Sick Children, Glasgow. The explanation usually offered as the cause of atresia of the small intestine is that the bowel mucosa undergoes necrosis and that an organisation of the mucus ensues and results in a fibrous stricture. This seems a likely explanation and could well have been the cause of the lesions seen in the present cases. The stricture was always situated well down the small intestine and in two instances was about 2 ft. from the ileo coecal valve. As shown in Table XIV, atresia in the upper portions of the small bowel was not associated with fibrocystic disease. In contrast, atresia of the lower alimentary tract is associated with fibrocystic disease. It is not possible to suggest any reason why this should be so and the present investigation has not given any additional information.

3D Rhesus sensitisation

The association of fibrocystic disease and rhesus sensitisation was first commented on by Glanzmann (1946) and later publications have given little further information to refute or substantiate this observation. Elsewhere in this work, I have given details of the birth order and degree

of severity of patients with fibrocystic disease and the general impression which I have formed is that there is nothing in the family history to suggest that fibrocystic disease was caused by or associated with rhesus incompatibility or for that matter any other form of sensitisation.

This problem was also examined from another angle. The pancreas from thirty-four fatal cases of erythroblastosis foetalis were examined following staining by a variety of methods and have not showed any evidence of fibrocystic disease. Thus it seems reasonable to conclude that there is no association between fibrocystic disease and rhesus incompatibility.

3E Chronic respiratory disease

When fibrocystic disease was first described it was regarded as a disease of early infancy. In the last decade it has been obvious that it frequently manifests itself in later childhood and in the present series there is a case in a girl of 17. Accordingly it seemed natural to speculate if the disease occurred in adults. Although in children it is usually a fatal disease it seems possible that less severe forms of the disease may occur and if this were so one would expect the disease to affect adults.

Gross overfilling of the submucous mucus glands of the bronchi in chronic bronchitis is a picture very similar to that seen in fibrocystic disease. Consequently the pancreas in twenty-eight fatal cases of chronic bronchitis were examined histologically and none of them showed any abnormality. Three

fatal cases of widespread bronchiectasis associated with gross oversecretion of mucus were also encountered and in these the pancreas likewise showed no abnormality.

Although di Sant' Agnese et al (1953) found some abnormality in the sweat secretion in cases of chronic bronchitis, I have found no histological abnormality in the pancreas to suggest that less severe degrees of fibrocystic disease occur in adults and are associated with chronic bronchitis or chronic lung infections.

Specific enquiry was made at all the houses visited to find out if any of the parents suffered from chest trouble. Eight of the parents in forty families admitted that they had "chest trouble" or chronic bronchitis. This incidence of eight affected with respiratory disease in eighty parents does not appear to be unduly abnormal as it is estimated that 10% of the population in the West of Scotland suffer from chronic bronchitis.

4. Pathogenesis

The cause of fibrocystic disease has been considered and speculations have been made by practically every author who has described cases of the disease. As this review has proceeded, I must confess that I have favoured first one theory and then another only to find that it did not fit with the observed facts and so had to be discarded. It seems reasonable to outline briefly some of these theories as it was from a

consideration of these and of the observations made and recorded in the preceding chapters that I finally came to suggest a new theory of the cause of this disease.

4A Obstruction of pancreatic ducts

Cornblith and Otani (1929) made the earliest attempt to determine the cause and to explain the reason for the histological lesion of the pancreas in fibrocystic disease. They cut serial sections through the head of the pancreas, made a reconstruction of the ducts and showed that the lumen was very narrow close to the duodenal wall but that distal to this the duct widened out into a small ampulla. From there the duct extended throughout the length of the pancreas and the lumen in this remaining portion of the duct was of consistent width. They considered that this narrow segment of duct was evidence of duct-stenosis and thought this was the cause of fibrocystic disease. Oppenheimer (1940), Hurwitt and Arnheim (1942) and Kaufman and Chamberlin (1943) all reported cases of meconium ileus in which they stated that they found atresia of the pancreatic duct close to the duodenum. Since then Howard and Jones (1947) have shown that the duct is normally narrow in this portion and indeed retrograde filling of the pancreatic duct system with radio-opaque material has given, on X-ray examination, an outline identical with that found by reconstructed serial sections.

Subsequent writers have suggested that the blockage to the outflow of pancreatic secretion was due, not to atresia

or stenosis of the ducts, but to inspissation of mucus. Nevertheless, it is of course a characteristic feature of fibrocystic disease, at least in advanced cases, that the main ducts contain large masses of inspissated mucus and so appear to be blocked. There are, however, a number of reasons against accepting the suggestion that blockage with mucus produces the lesion of fibrocystic disease.

First is the observation that blockage of the main pancreatic ducts, either by ligation or by calculus, never produces the picture of fibrocystic disease but causes gradual disappearance of the exocrine tissue which is replaced by fat. This fatty replacement is, of course, very rare in fibrocystic disease and has only been seen in one case. Another objection to accepting the mucus obstruction theory is that fatty necrosis never occurs in fibrocystic disease, while it is thought that obstruction of the small pancreatic ducts is one of the main causes of fat necrosis in adults. A further point in support of this argument is the observation that the serum amylase level is lower than normal in cases of fibrocystic disease whereas one would expect this level to be high if any obstruction existed in the pancreas.

A final objection to the suggestion that obstruction plays any part in the production of fibrocystic disease is the observation made separately by Andersen and Farber who have both reported cases with heterotopic pancreatic tissue which showed changes characteristic of fibrocystic disease. Thus, I conclude

that simple mechanical obstruction does not play any part in the production of either the local pancreatic changes or of the generalised lesions of fibrocystic disease.

4B Mucoviscidosis

The idea that fibrocystic disease of the pancreas was primarily due to an abnormality of mucus secretion was first put forward by Farber (1944). Many subsequent authors especially Shwachman have agreed with this suggestion even if, like Bodian (1952) they have preferred to use a slightly different name. The idea was useful in so far as it indicated that generalised abnormality in glandular secretion was present. Shwachman and others have all commented on the abnormally viscid nature of the mucus and have inferred that it is the mucus itself which is abnormal. This concept has proved useful but does not fit with all the observed facts about fibrocystic disease. It does not, for instance, go any way towards explaining the characteristic lesions of the pancreas which are found in all early cases of fibrocystic disease. Nor does it make any attempt to explain the well known abnormality in sweat secretion. While many other points can be produced showing that the concept of mucoviscidosis is only partially correct there is little to be gained by pursuing this particular line of thought. I feel, however, that the time is now ripe for the promulgation of a new hypothesis which would be more comprehensive and would make a real attempt to include all the observed features of the disease.

CHAPTER VIII

SUMMARY AND CONCLUSIONS

CHAPTER VIII

SUMMARY AND CONCLUSIONS

I must admit that I find it disappointing to set down my conclusions on the work which has been carried out. Although several promising hypothesis have been put forward none of them has stood against careful scrutiny and the conclusions I now summarise are in the main negative ones.

Fibrocystic disease is established as a relatively common condition affecting about 1 in 500 of all live born children.

The possibility that the disease may be transmitted by the passage of an infective agent from the mother through the placenta to the foetus has been considered but no epidemiological evidence has been found to indicate that this occurs. The possibility that the disease is caused by a sensitisation mechanism has been looked into but nothing has been found to suggest that rhesus or any other type of sensitisation is a factor in the aetiology of the condition.

The part played by heredity has been reviewed and the occurrence of the disease in affected families assessed by a number of methods all of which suggest that the incidence is too high to be compatible with transmission by a recessive mendelian factor. This does not mean that transmission of the disease is not by heredity but suggests that it is not transferred by a single recessive factor.

The relationship of coeliac and fibrocystic diseases has been considered. None of the cases of coeliac disease examined has shown evidence of oversecretion of mucus and although the pancreas in this condition is not normal it never shows any of the pathognomonic changes of fibrocystic disease. The proportion of children with coeliac disease in affected families is very much lower than the proportion with fibrocystic disease. I conclude that fibrocystic and coeliac disease are separate and unrelated conditions.

A case of fibrocystic disease in a 17 year old girl who suffered from chronic respiratory infection is recorded. The pancreases of patients who were known to have been affected with chronic bronchitis or bronchiectasis for a number of years were examined but none of the changes of fibrocystic disease was seen. Thus, no suggestion was found that fibrocystic disease of the pancreas is associated with chronic bronchitis in adults.

In the course of this work I have considered many of the suggestions which have been advanced to explain the cause of the disease or the mechanisms by which the characteristic lesions are produced. These various suggestions, in my opinion, all fail because they do not take into consideration or explain the main observed facts which are known. In order to bring the problem into focus it would seem worth while recounting briefly what appear to be the main features

of this disease. These features which I now outline are the points which have struck me as being significant. All of them must be considered and must fit into any hypothesis which is presented.

1. Fibrocystic disease is a generalised disease which affects many different types of secreting glands.

2. It is characterised by an excessive secretion of mucus as can undoubtedly be seen in the small intestine in meconium ileus and although difficult to prove quantatively, almost certainly also occurs in the bronchi.

3. Brunner's glands, however, differ greatly from the intestinal and bronchial mucus glands as they produce a totally different type of mucus which chemically is a mucoprotein instead of an acid mucopolysaccharide. If the primary abnormality in fibrocystic disease consists in some biochemical aberration which results in the formation of a chemically abnormal mucus, it seems improbable that this same abnormality would affect glands producing a totally different chemical substance.

4. The mucus produced in fibrocystic disease is biochemically normal mucus. No abnormality has been noted on histochemical examination or on enzymatic hydrolysis. (See p. and). It is only the abnormally high concentration of mucus in the secretions which make them so viscid.

5. The abnormality of excessive secretion is not confined to mucus glands as most previous authors have suggested. There is an excessive secretion of sweat both in volume

and in total solids (Di Sant Agnese, 1953). The sweat glands, however, show no gross histological abnormality (fig. 138).

6. A change consistently found in the pancreas in all early cases of fibrocystic disease is absence of zymogen granules and distension of the canaliculi with plugs of secretion. This is the picture of, and is considered to result from sustained over-secretion of serous glandular cells.

7. The submaxillary salivary glands may also show absence of zymogen granules. This is also considered to result from sustained over-secretion.

Salivary amylase has been estimated in four cases of fibrocystic disease. In one case amylase was observed in one greatly diminished in quantity and in two cases the saliva contained twice the normal amount of amylase.

The foregoing brief summary of the main findings indicates my view that fibrocystic disease is a generalised disease affecting all glands of external secretion. This opinion has already been expressed but in a limited form by Farber and Shwachman who thought of the disease as a generalised affection of mucus glands only, and consequently suggested the name of mucoviscidosis. While others have thought that the main abnormality in the disease consisted in the production of mucus which was abnormal in viscosity and in chemical composition, I consider that the mucus produced is normal chemically and the

abnormal viscosity shown by the secretions in this disease is due only to an abnormally high proportion of mucopolysaccharide in the mucus gel. The observation that the production of excessive secretion occurs also in Brunner's glands leads me to conclude that the disease is not one of an inborn error in the production or metabolism of acid mucopolysaccharides. The serous cells of both the pancreas and salivary glands are abnormal in all cases of the disease which I have encountered and published reports indicate that the secretion of sweat is abnormal in a considerable proportion of cases.

It is evident, therefore, that any suggested explanation of cause for fibrocystic disease must take into account three main facts: 1) The disease affects glands through the body. 2) Four distinct types of glands with different secretions are affected. 3) The general picture is one of over-secretion.

It would, therefore, appear that the primary abnormality in fibrocystic disease is a persistent over-stimulation of the secreting glands. The close resemblance between the pancreas in early cases, showing degranulation of the serous cells and distension of the intra-acinar canaliculi with secretion, and the pancreas following experimental injection of pilocarpine is striking. If I might speculate on the aetiology of this disease I would say that these features all combine to suggest that the cause is some fundamental abnormality or defect in the control of secretions. In the normal subject stimulation

of the neural end-organs evolves the release of acetylcholine which acts on the glandular cells causing them to secrete. Following this line of thought I have come to wonder if all the protean manifestations of the disease could be explained by an over-production of acetylcholine or some analogous substance.

The experimental inoculation of such a substance produces (Cushny, 1941) an excessive secretion of mucus, the discharge of zymogen granules from serous glands and over-production of sweat. The different glands mentioned above, except the sweat glands, have this in common. They are all supplied by, and their secretion is controlled by, parasympathetic nerves. Impulses passing along these nerves (sometimes referred to as cholinergic) act by the release of acetylcholine or a closely related substance as their end organs. Although the sweat glands are supplied anatomically by sympathetic nerve fibres, they are anomalous as they are induced to secrete not by adrenaline but by acetylcholine and so are usually regarded as cholinergic glands.

The involvement of the two groups of glands with such a different anatomical innervation is, of course, of considerable importance as this is regarded as good evidence that the disease does not consist of an anatomical abnormality of innervation as for example occurs in Hirschprung's disease.

This close correlation between the abnormalities of secretion observed and those which occur on physiological

stimulation of the cholinergic glands leads me to suggest that the fundamental cause of fibrocystic disease is some abnormality in humoral transmission of nerve impulses to secretory glands.

In normal circumstances when a gland is stimulated acetylcholine is liberated at the nerve endings. Once the acetylcholine has been liberated its action is controlled and is usually only of short duration as it is rapidly broken down by choline esterase which is present in large amounts in blood and in certain tissues. If the choline esterase were diminished in amount or alternatively the acetylcholine was more resistant than usual to the action of acetylcholine esterase then the acetylcholine released would act for an abnormally long period of time and so would result in over-secretion of the glands. Alternatively of course the amount of acetylcholine released at the nerve endings might be excessive. While I am unable to produce strong reasons against this suggestion I did not favour it and think that the likely abnormality in fibrocystic disease is a diminution or absence of acetylcholine esterase. Thus, I think it possible that fibrocystic disease of the pancreas is the physiological opposite of myasthenia gravis which is due to a diminished production of acetylcholine or increased resistance to this substance.

Two separate observations in the literature lend support to the explanation offered. Farber (1942) claimed

to have produced fibrocystic disease in cats by the injection of pilocorpine - an observation which has never been confirmed. Ayers, Stowens and Ochsner (1950) cut the vagus nerves in five cases of fibrocystic disease and found that the duodenal juice contained trypsin four days after the operation. Although this report is unsatisfactory as the follow up of the patients was very short, yet I regard this work as giving useful confirmatory evidence. It suggests that the pancreas in the average case of fibrocystic disease does not secrete merely because the larger ducts are blocked by mucus and eosinophilic concretions or that it fails to secrete because the acinar tissue is crushed and destroyed by fibrosis. It indicates that the acinar tissue and the duct system are not really so badly damaged as they appear and of course, shows that they are capable of rapid regeneration and secretion. An apparent paradox is that section of the vagus nerve, the stimulation of which normally produces secretion, should cause the pancreas to start secreting; the explanation may be as follows. The histological appearance of the pancreas and salivary gland are those of exhaustion, due to their being constantly over-stimulated for a prolonged period of time. While this stimulation persists the granules have no chance to reform and as a result secretion from the glands contains no enzyme. When the vagus nerve is cut the pancreas is relieved from incessant over-stimulation, the zymogen granules are allowed to reform and thus the duodenal juice soon comes to contain normal pancreatic ferments.

Although the clinical features of fibrocystic disease are well known and a precise diagnosis can usually be made little can be done at present to appreciably modify the natural course of the condition. The extensive histological changes in the glands throughout the body have been studied and although they explain many of the clinical features little indication of the fundamental cause of the disease has been found and it has not been possible to suggest a rational therapy which would permit affected children to grow into normal adults. Until a normal expectation of life is obtained for these children fibrocystic disease will remain as a challenge to medical science.

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FIBROCYSTIC DISEASE

OF THE PANCREAS

VOLUME II

G. B. S. Roberts

APPENDIX I

ILLUSTRATIONS

This appendix consists of figures chosen to illustrate the description of disease processes given in the text. I hope that in addition to supplying a pictorial representation of the description these figures will also stand as evidence of the veracity not only of description and statements given by me but also of conclusions reached. Most of the material illustrated was obtained from autopsies in the Royal Hospital for Sick Children, Glasgow and the numbers given in this Appendix are the serial post mortem numbers of that hospital. The source of all other material is indicated in the legends. The order in which the illustrations are presented has been given some consideration. At first I had hoped to present them in a systematic manner, arranging them neatly according to the organ affected and the severity of the lesion. In the end it was thought wiser to arrange the figures in the order in which they occur naturally in the text. This is done in the hope that it will facilitate cross reference.

The first main group of illustrations (Fig.3 to Fig.28) relate to Chapter III and are intended to give an indication of the normal histology of the pancreas of the child and of the morphological changes which occur in the course of the normal post natal development which the pancreas undergoes.

The second and by far the largest group of illustrations (Fig.28 to Fig.138) relate to Chapter IV and illustrates the

pathological features of the disease. In choosing these illustrations I have tried to demonstrate that fibrocystic disease does not present a constant histological appearance and that the changes in the pancreas may be relatively slight. Throughout this thesis I have referred to the absence of zymogen granules being a very characteristic change in fibrocystic disease. These granules can be stained strongly by the P.A.S. method but it has proved difficult to depict them satisfactorily in black and white illustrations. The small plugs of secretion present in the acini cannot be easily demonstrated in black and white illustrations. In order to demonstrate these features clearly I have included two coloured illustrations.

The last small group of illustrations (Fig.138 to Fig.153) are from the cases of coeliac disease and have been selected to demonstrate the main differences between this condition and fibrocystic disease.

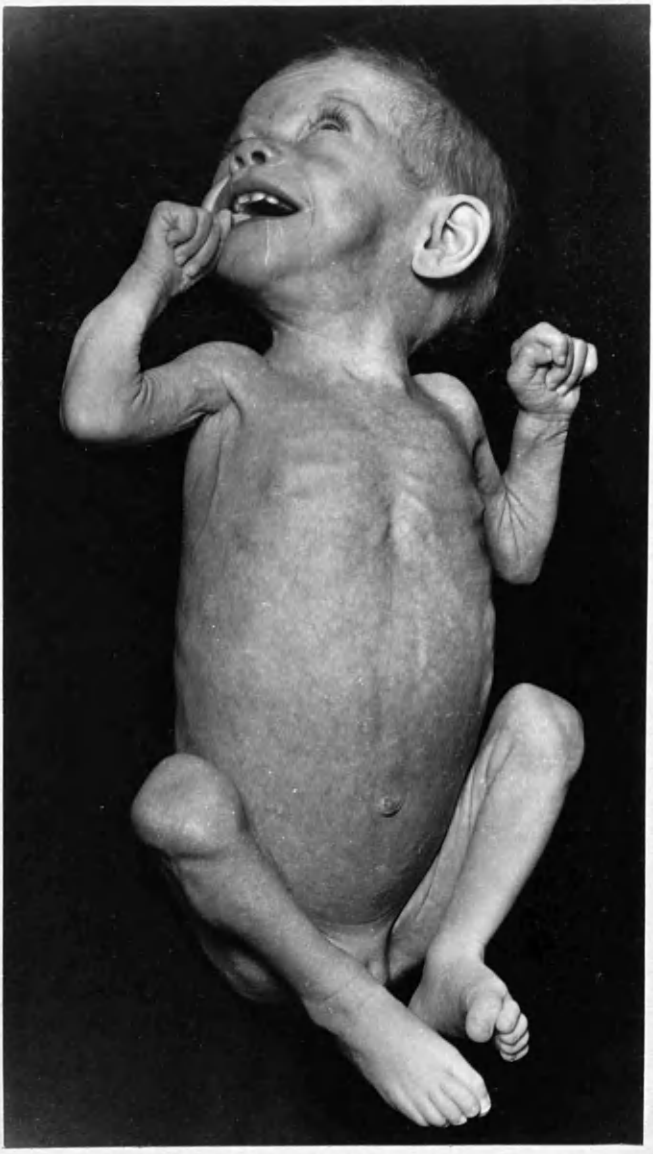


Fig.1. This shows a child aged 10 months who has shown clinical manifestations of fibrocystic disease of the pancreas for the past 4 months and now weighs 55% of his expected weight. Note the protruberant abdomen which contrasts with the severe wasting. Case No. 65.

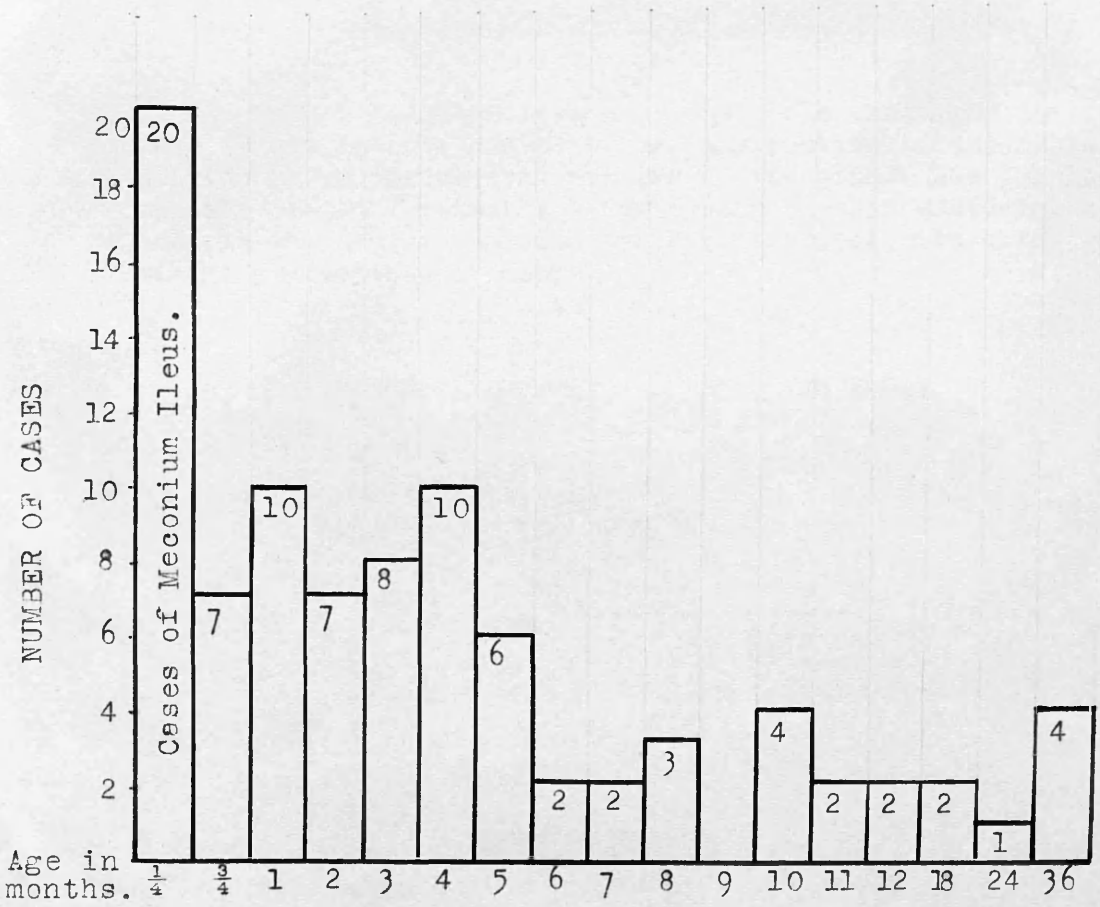


Fig. 2. Showing age at death of 89 cases of Fibrocystic Disease.

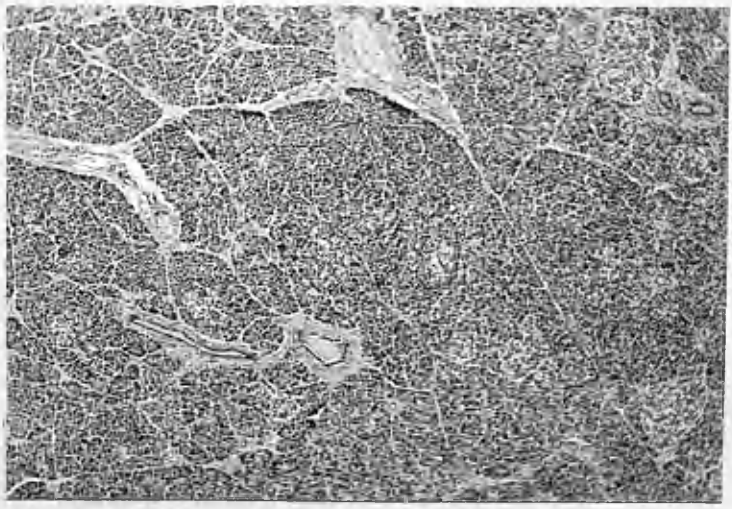


Fig.3. NORMAL PANCREAS from a 6 months old child who was found dead in bed and who had never had any previous illness. This section shows the central portion of the gland. The lobules are closely packed together and have sharp angular contours. A small duct in the centre contains eosinophilic secretion which gives the staining reactions of mucus.

534/52 H & E X 50

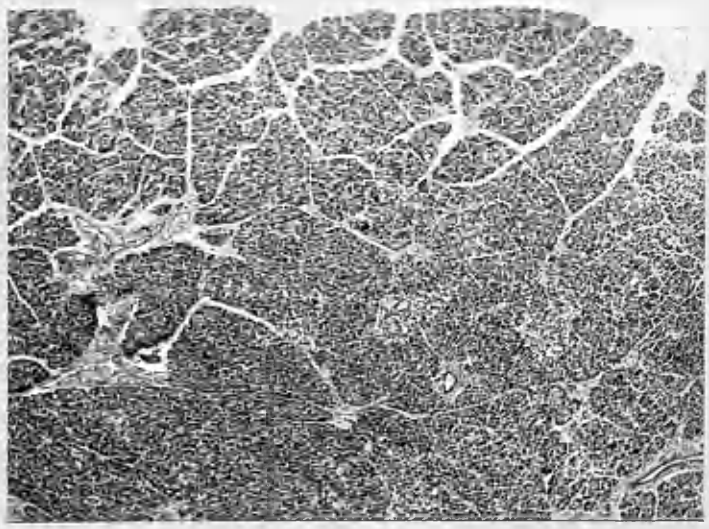


Fig.4. Normal pancreas. This and the following illustrations are all taken from the same child as the previous figure. This shows the peripheral portion of the gland where there is some slight separation of the lobules at the extreme edge.

534/52 H & E X 50

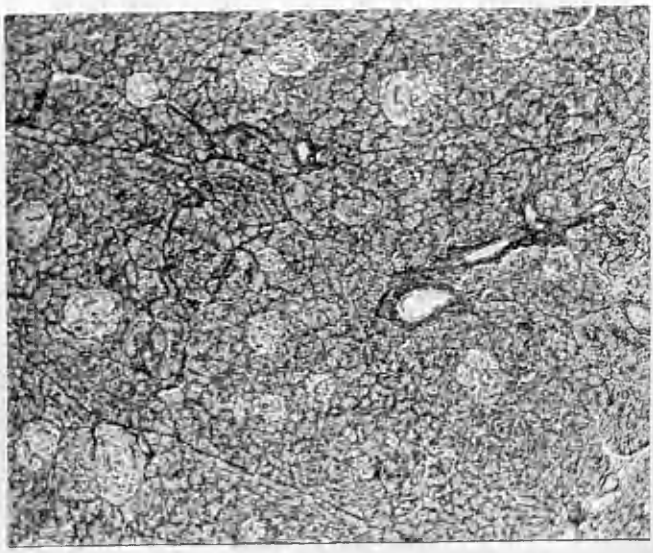


Fig.5. Normal pancreas.
The reticulum framework forms a fine mesh around all the acini. There is no increase of reticulum along the interlobular septae but small aggregates are seen around the ducts and blood vessels.

534/52 Gordon and Sweets reticulum stain X 50

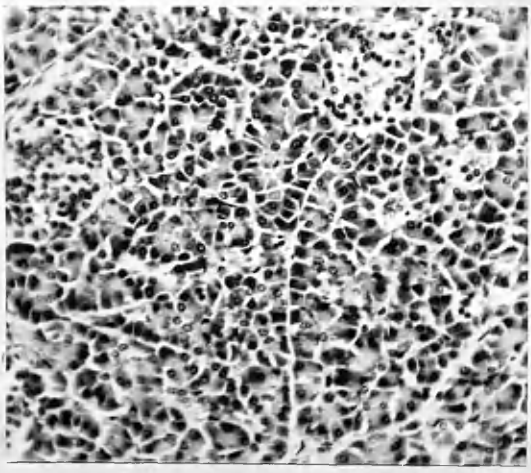


Fig.6. Normal pancreas. This higher power view shows the acini so closely packed together that no connective tissue is visible between either the acini or the lobules. In general it is difficult to make out the outlines of the individual acini. The acinar cells are columnar with the nucleus situated at the base. Compare with Fig.12.

534/52 H & E X 200

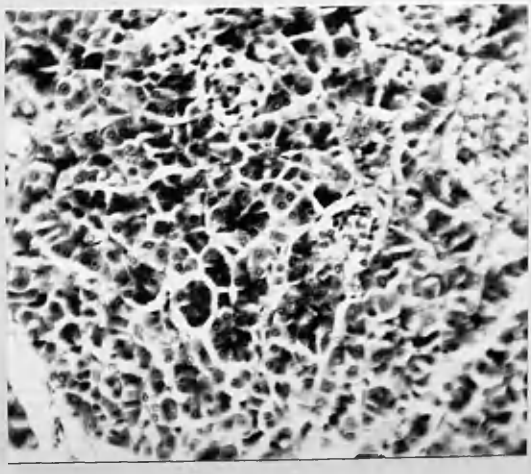


Fig.7. Normal pancreas. In this preparation the zymogen granules have been stained and in the photograph appear as a dark mass in the free border of the acinar cells.

534/52 P.A.S. Haemalum X 230

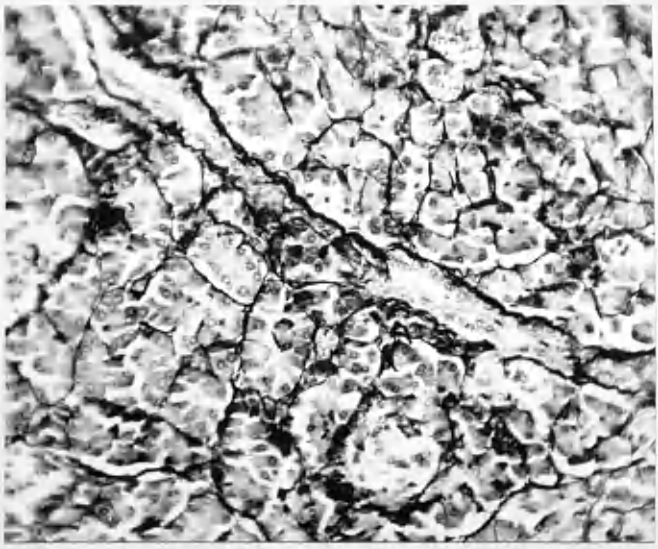


Fig.8. Normal pancreas. This preparation has been stained to show the reticulum which is fine and forms a more or less regular network around the acini.
534/52 Gordon and Sweets Reticulum Stain X 230

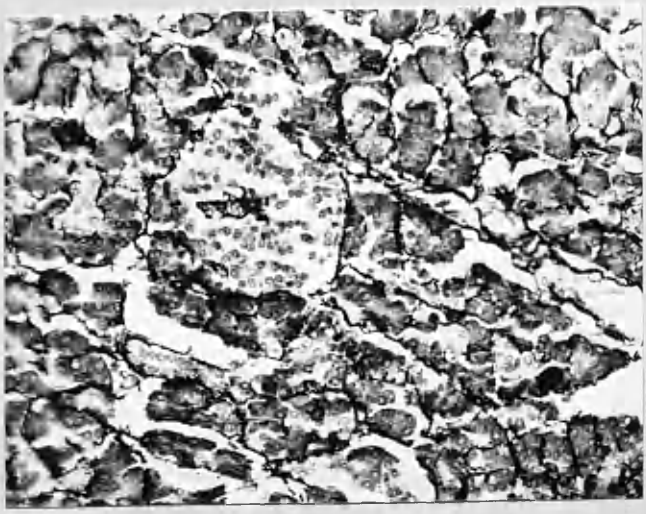


Fig.9. Normal pancreas from a 14 month old child. The fine silver reticulum which surrounds all the acini is seen. An islet is clearly outlined.

8167 Gordon and Sweets Reticulum Stain X 70

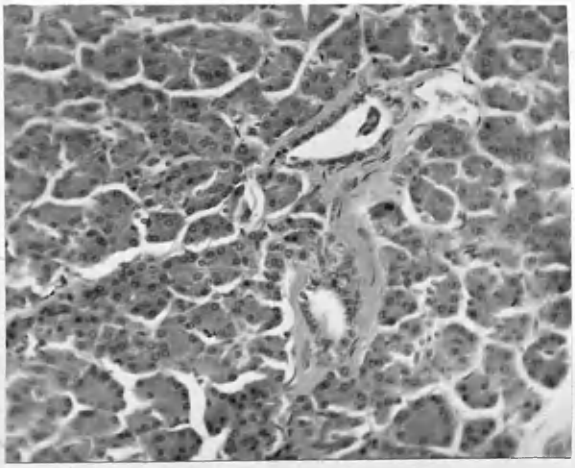


Fig.10. Normal adult pancreas.
This portion of pancreas was removed at operation. The illustration shows the normal structure. The acinar cells have abundant cytoplasm and form compact groups. Two small ducts lined by cubical epithelium are shown.
523769 H & E X 230

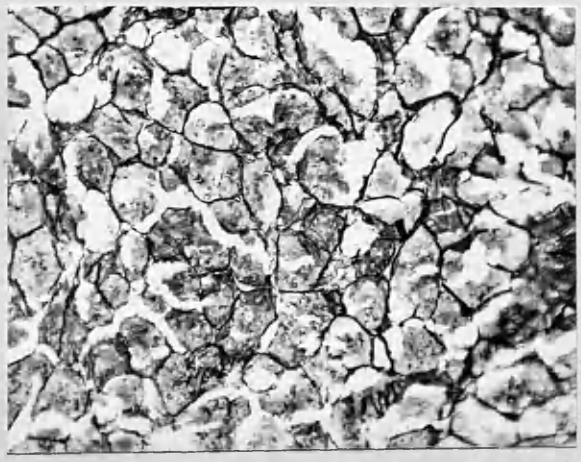


Fig.11. Normal adult pancreas.
This shows the fine reticulum network surrounding the acini.
523769 Gordon and Sweets Reticulum Stain X 230

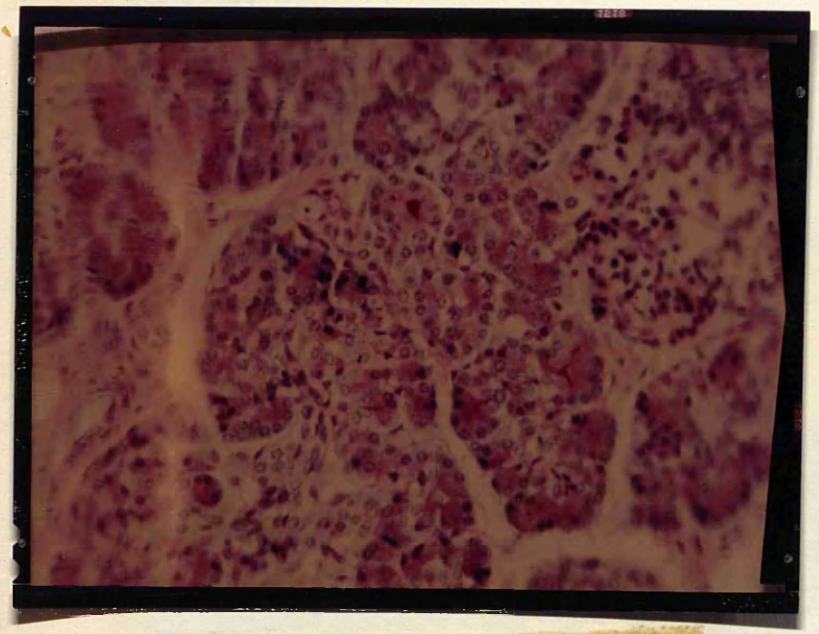


Fig.12. Normal pancreas.
The acinar cells are large and at their free border contain zymogen granules which stain red. Note that a small plug of mucus is present in the canaliculi.
8616 PAS & H X 250

Please remove the Ektachrome transparency for examination.

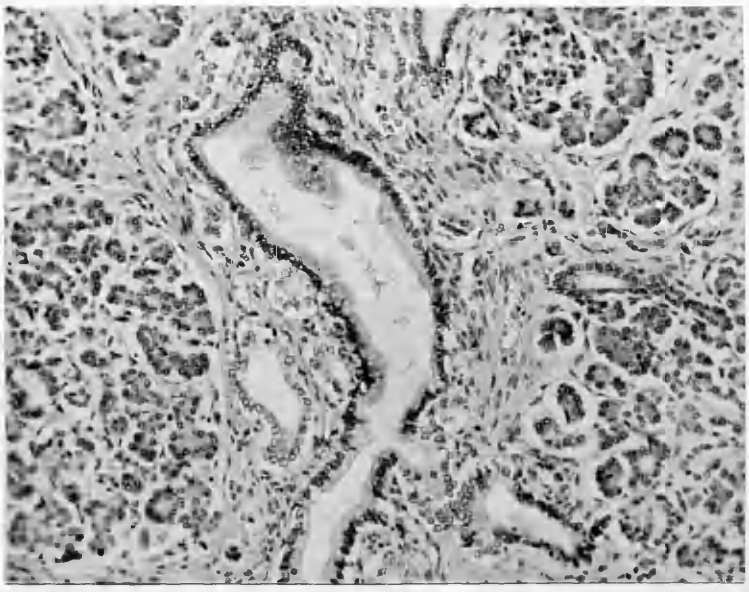


Fig.13. Normal pancreas. This shows a large duct which is lined by a tall mucus secreting epithelium.
9270 H & E X 150

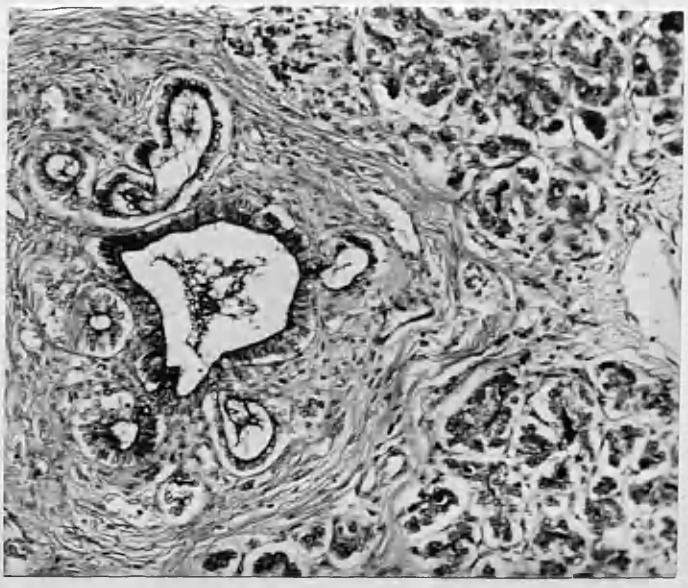


Fig.14. Normal pancreas. The same.
The epithelium lining this duct is mucus secreting. Mucus is seen as a thin film on the surface of the cells.
9270 PAS X 152

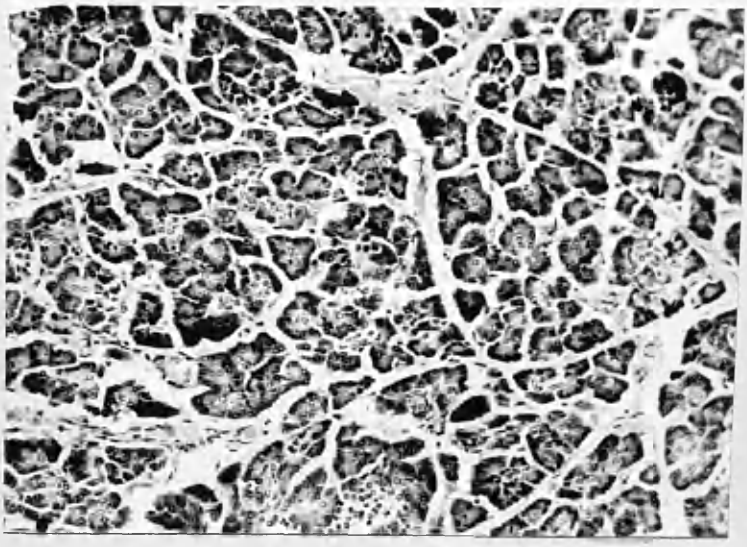


Fig.15. Pancreas from a child who died aged 11 months with acute gastro-enteritis. The acini are not tightly packed together. This is probably due to atrophy of the acinar cells which are small in size and do not contain zymogen granules.

8447 H & E X 200

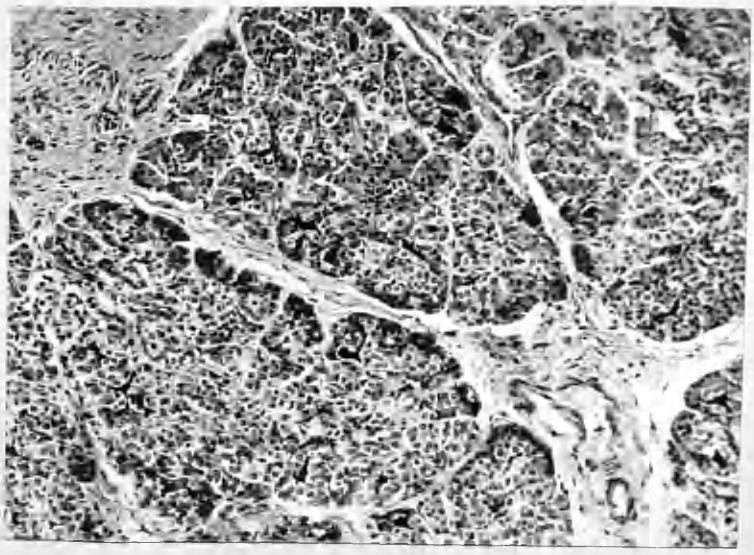


Fig.16. Pancreas from a child who died aged 6 weeks with pyloric stenosis. The pancreas is exhausted and contains no zymogen granules. Note that there is no dilatation of the canaliculi.
7754 PAS & H X 70

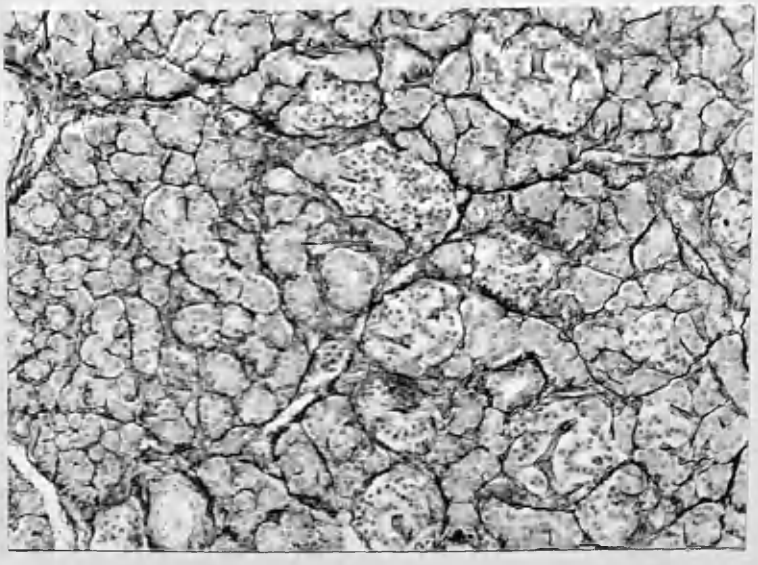


Fig.17. Pancreas from the same child as the preceding figure. The reticulum framework of the gland appears contracted but no real increase in the amount of reticulum is present.
7754 Gordon & Sweets Method X 70

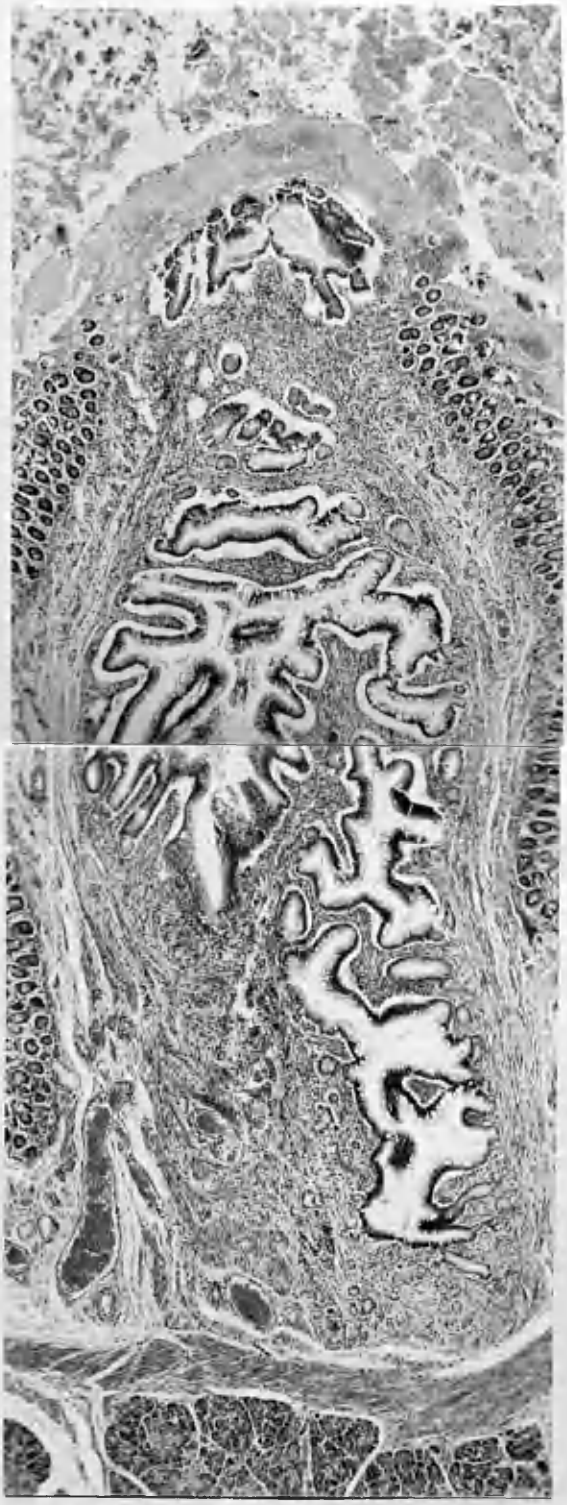


Fig.18. Pancreatic duct.
This shows a longitudinal section of the main pancreatic duct at its opening into the duodenum. Note the complex infolded lining which is composed of columnar cells many of which contain mucus. A considerable amount of smooth muscle surrounds the duct.

8549 H & E X 50

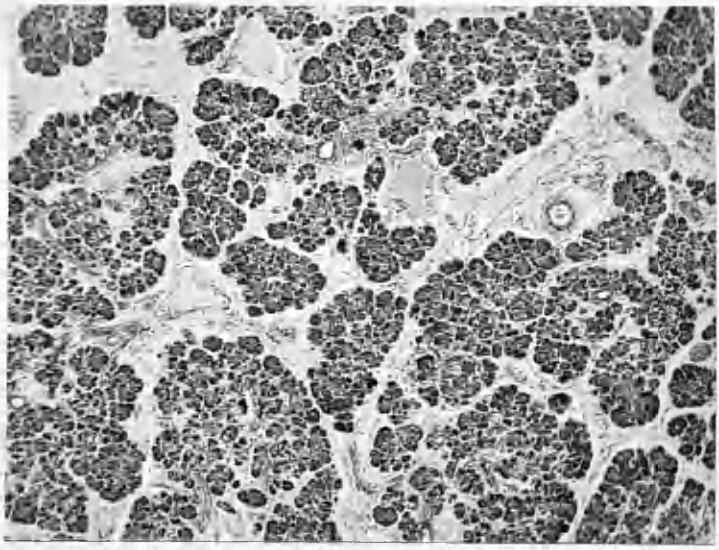


Fig.19. Pancreas from a child who died within 24 hours of birth with erythroblastosis foetalis. This general view shows that the lobules are small in size and have a rounded contour. The lobules are widely separated but the intervening tissue is oedematous and contains very little fibrous tissue.
8551 H & E X 50

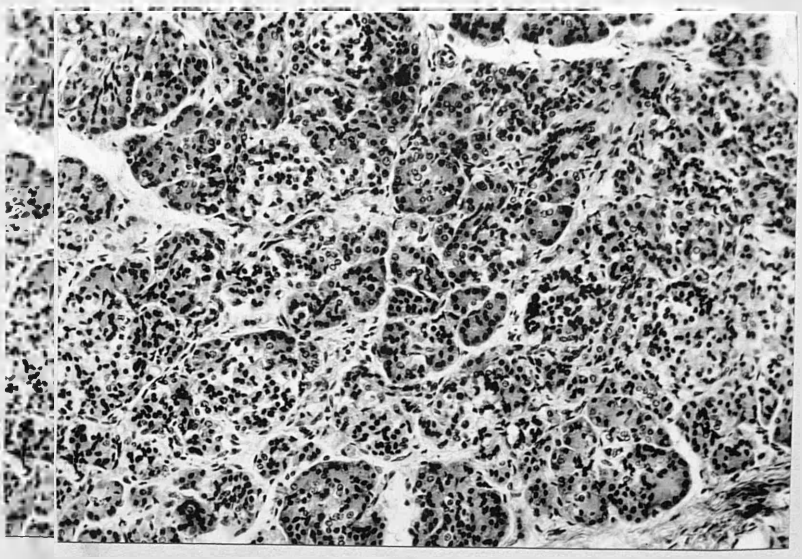


Fig.20. Normal pancreas from a child who died aged 2 days. This section shows a lobule the centre of which is filled with islet tissue. Only a thin zone of exocrine acini are present at the periphery.
8363 H & E X 100

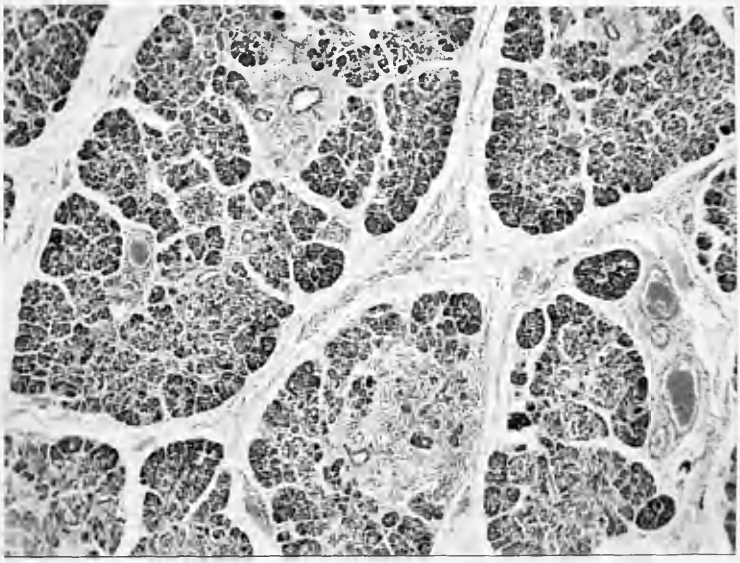


Fig. 21. Pancreas from a child who died aged 3 days. Some condensation of the lobules into larger units has occurred and the acini also appear more compact. The lobules still consist usually of a central islet of Langerhans bodies surrounded by a single row of exocrine acini.

8549 H & E X 50

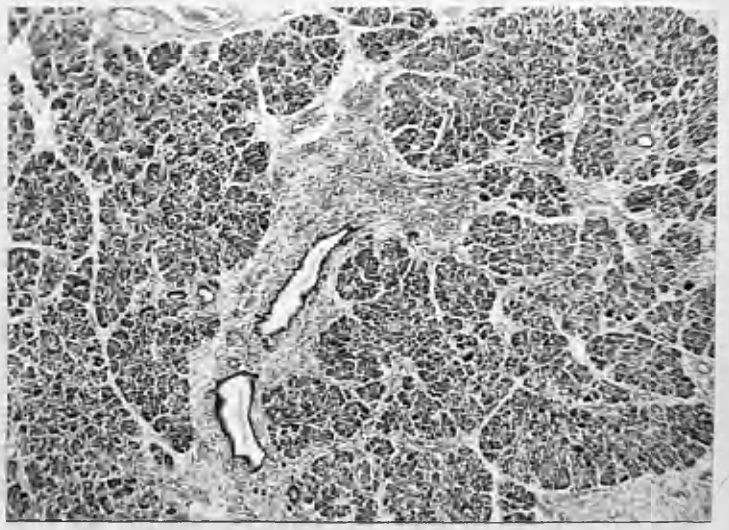


Fig.22. Pancreas from a child who died aged 2 weeks with a subdural haematoma. Although the pancreas is still essentially similar to that shown in Fig.21. The lobules are now enlarging and are being compressed together. The lobules to the right of the duct show a more adult angular contour.

8570 H & E X 50

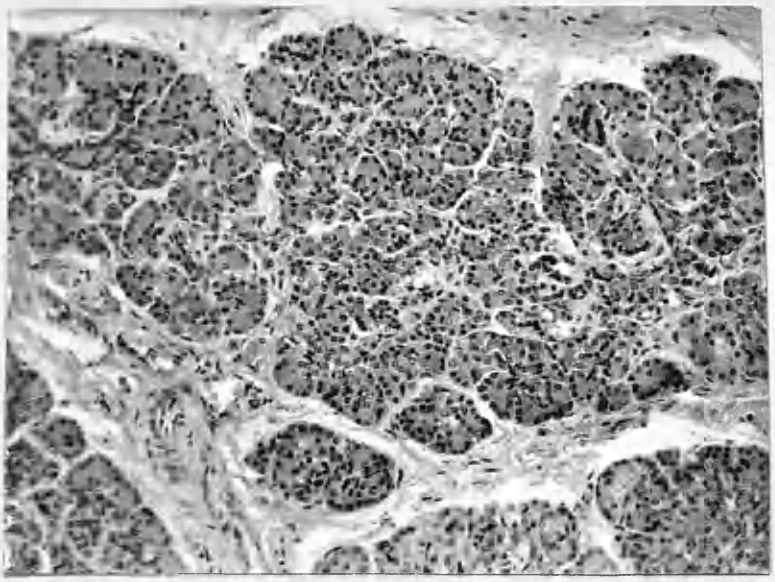


Fig.23. Normal pancreas from a child who died aged 10 days. The lobules are small and the acini are separated by connective tissue.
6263 H & E X 70

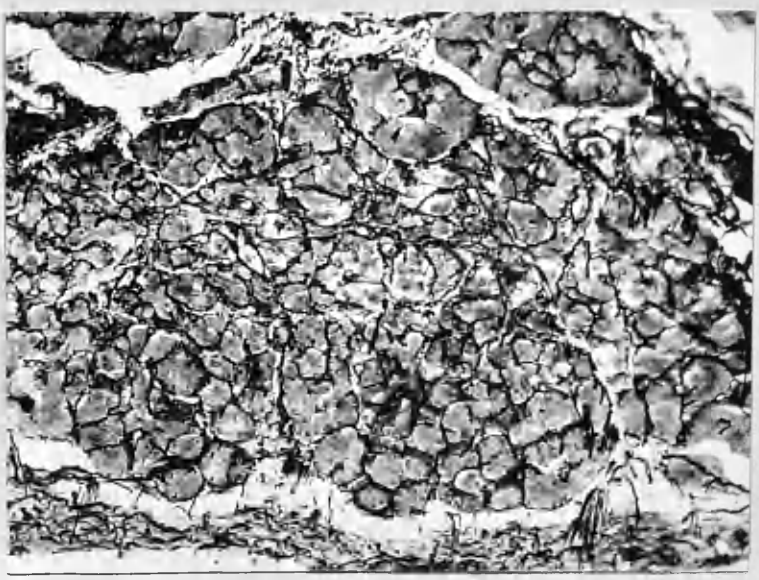


Fig.24. Normal pancreas from the same case as the preceding figure. In this preparation the apparent increase in the amount of reticulum present is seen. Compare with Fig.
6263 Gordon & Sweets Reticulum Stain X 70

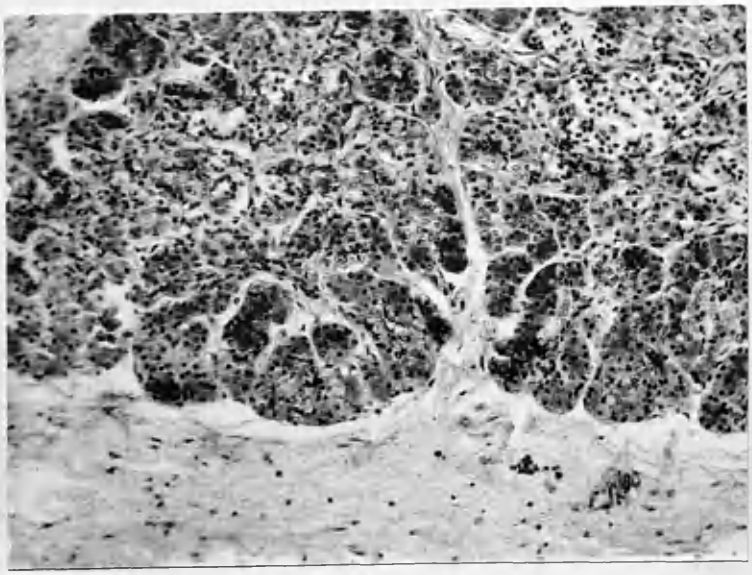


Fig. 25. Normal pancreas from the same case as the two preceding figures. This preparation has been stained to show mucus. No mucus plugs are present in the acini. The acinar cells contain zymogen granules.

6263 PAS X 70

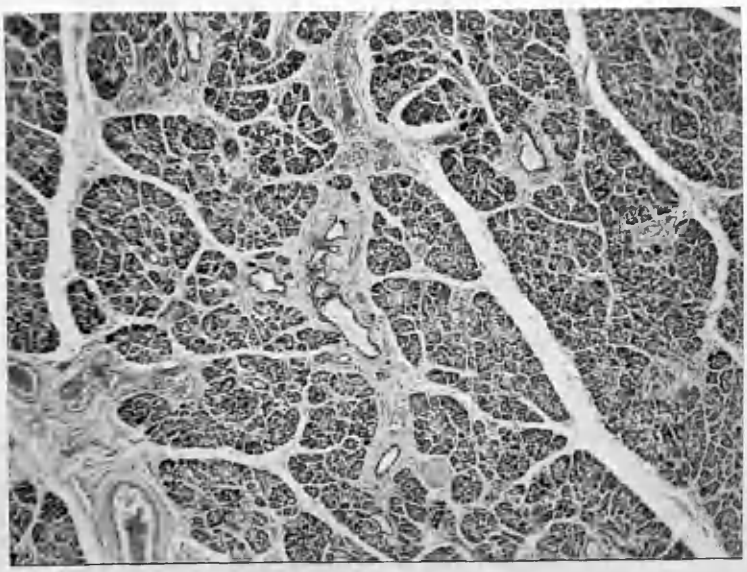


Fig. 26. Pancreas from a child who died from gastro-enteritis when almost one month old. Most of the lobules are now fairly well formed and the simple infantile pattern is lost. The lobules are however still separated by an increased amount of fibrous tissue.

8508 H & E X 60

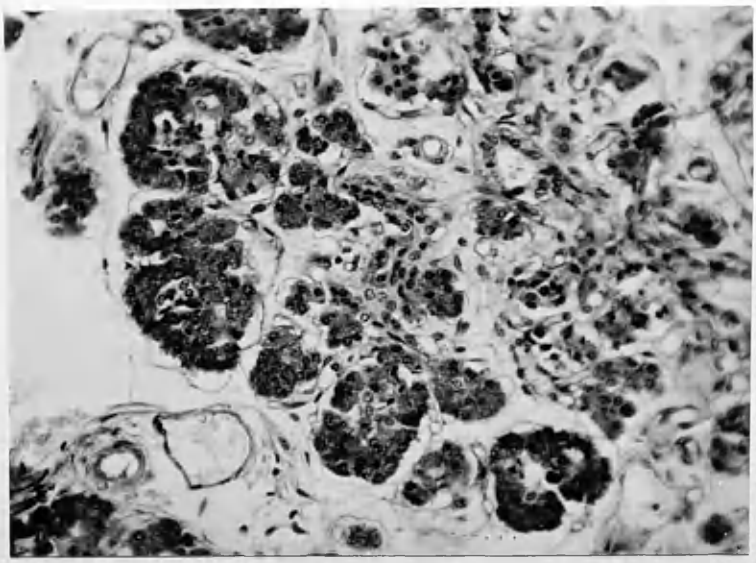


Fig. 27. Pancreas of a 7 month stillborn foetus. Note that the acinar cells are large and that they have a large amount of cytoplasm. They contain zymogen granules.

Kennedy PAS X 250

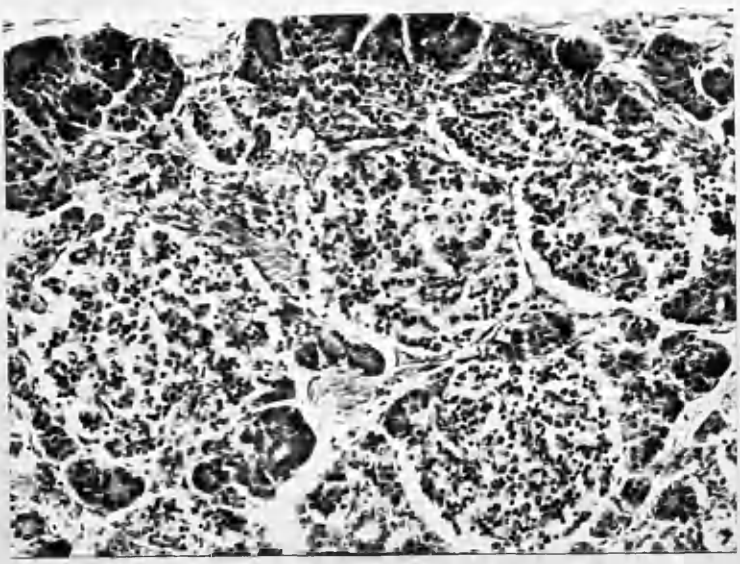


Fig. 28. Pancreas from a child who died aged 3 days because of asphyxia. Note the large size of the islets which are crowded together. The exocrine tissue appears normal.

8549 H & E X 150

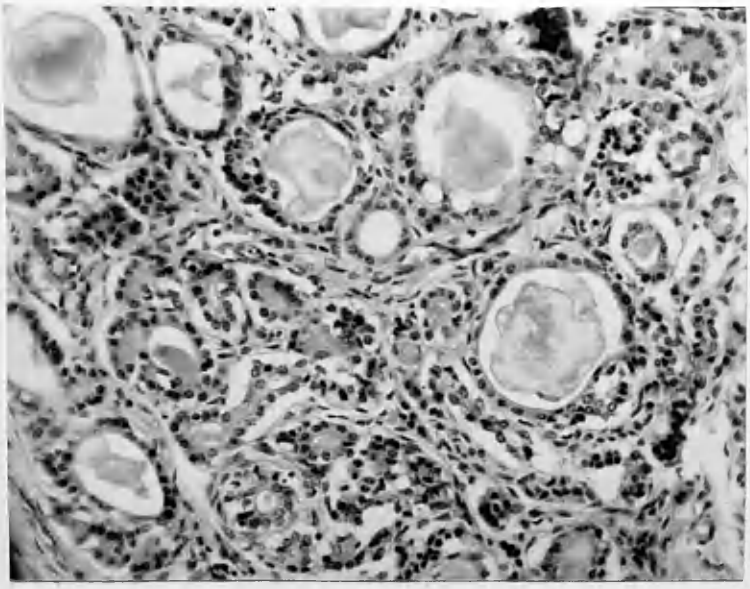


Fig. 30. Pancreas in fibrocystic disease.
This shows the typical appearance of fibrocystic disease. Both fibrosis and cystic change are moderately severe. The acini which do not show cystic change are small and atrophic.

Case 22 H & E X 230

Fig. 31. Pancreas.
The following 3 figures are from cases of fibrocystic disease. This shows slight fibrosis.

Case 22 Mallory X 50

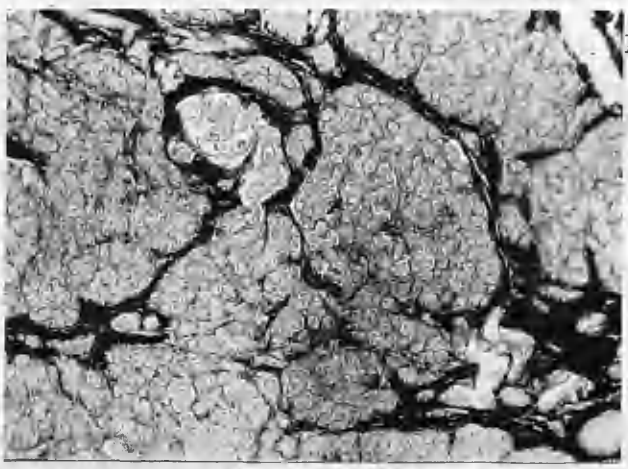


Fig. 32. Pancreas.

Moderate fibrosis.

Case 17 Mallory X 50

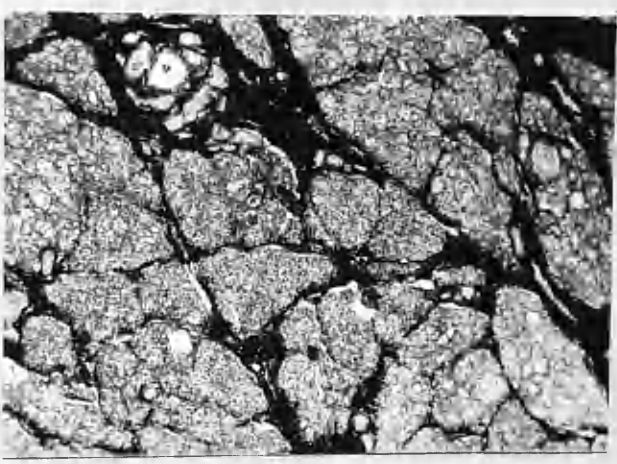


Fig. 33. Severe fibrosis.
Note that it is apparently confined to the inter-lobular tissue. No gross fibrosis of the lobules is seen.

Case 18 Mallory X 50

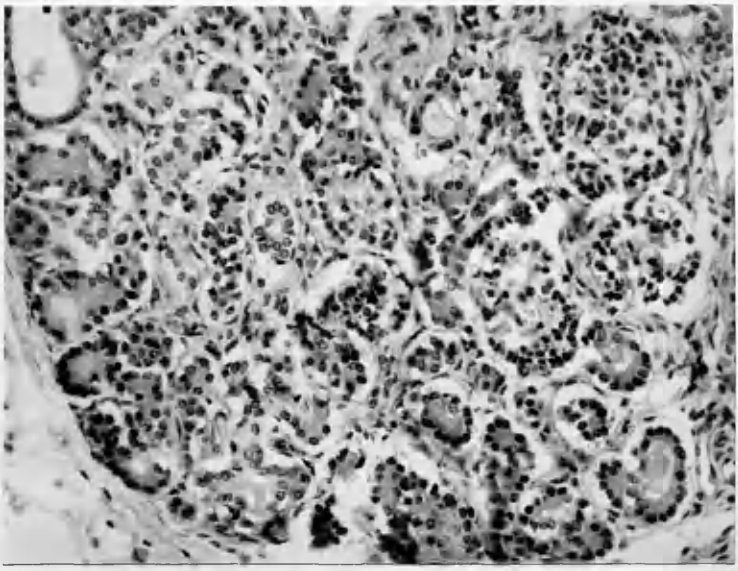


Fig. 34. Pancreas in fibrocystic disease. This and the 5 following illustrations are from the same case, a child who died aged 4 months. This section shows (compare with Fig. 30) neither gross fibrosis nor cystic change. The acini are small and the nuclei are surrounded by a scanty rim of cytoplasm. (Compare with Fig. 6)

Case 22 H & E X 230

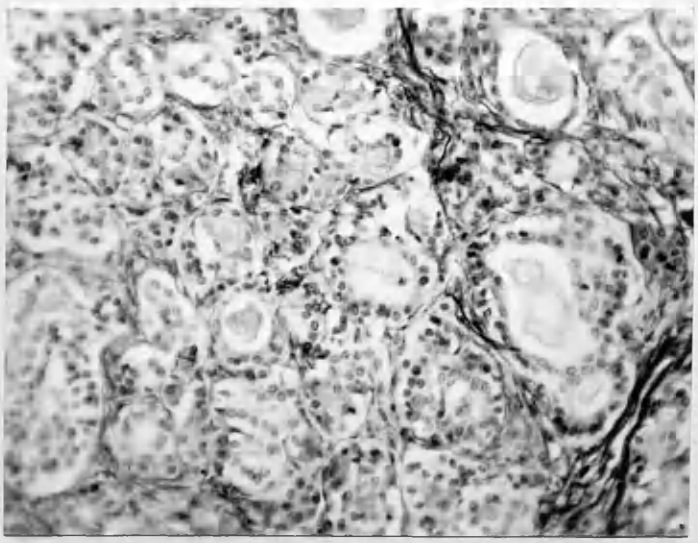


Fig. 35. Pancreas from the same case stained by Van Gieson's method. Although a few strands of fibrous tissue are present no evidence of generalised fibrosis can be seen.

Case 22 Van Gieson H X 230

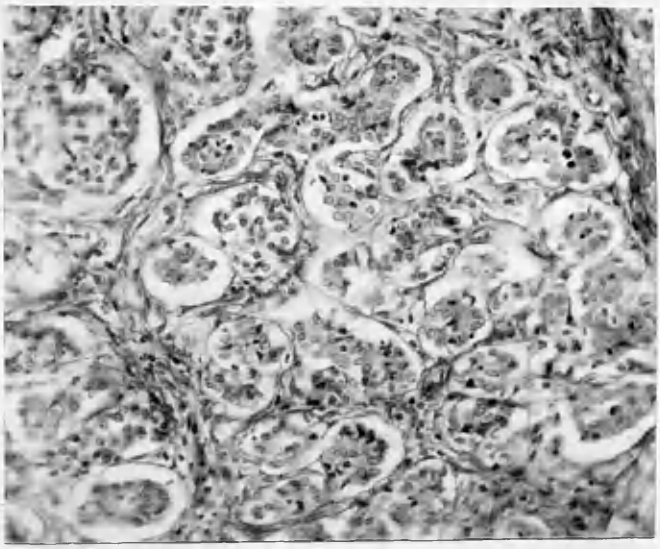


Fig. 36. Pancreas from the same case stained by Mallory's method. Fine fibrile can be seen running between the acini. These however are very pale in colour and do not give the usual blue colour of fibrous tissue.

Case 22 Mallory trichrome X 230

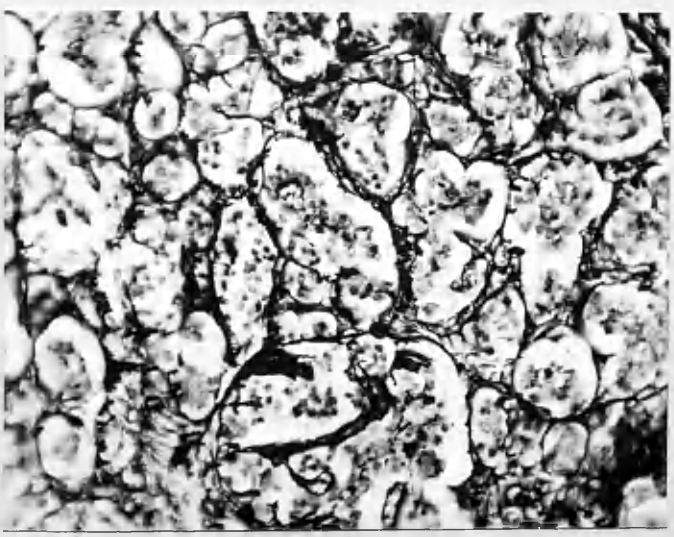


Fig. 37. Pancreas from the same case stained by a silver method for reticulum. Note the heavy coarse reticulum (compare with the two previous figures and with Fig. 24)

Case 22 Gordon & Sweet's method X 230

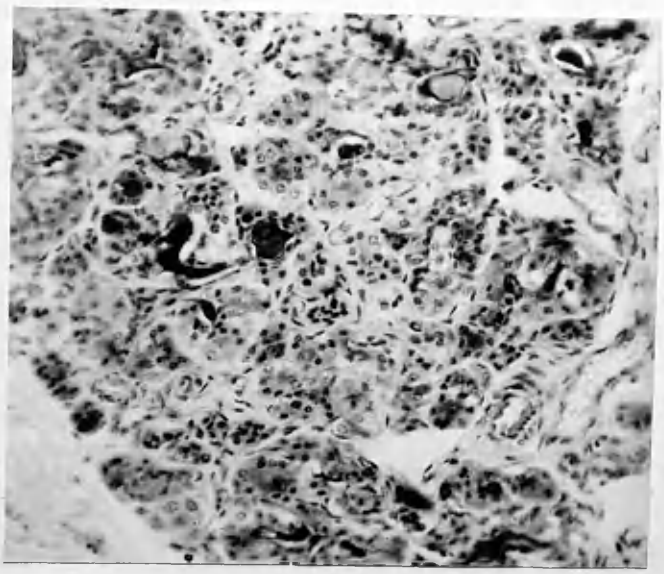


Fig. 38. Pancreas from the same case.
The plugs of mucus contained in the small and not obviously cystic acini are shown as dark sharply defined masses.

Case 21 PAS X 230

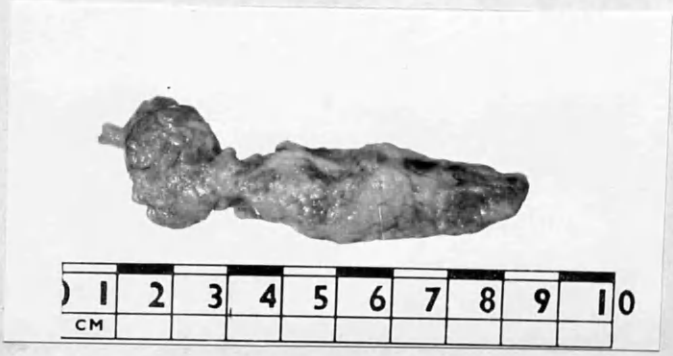


Fig. 39. Pancreas from a child who died, aged 8 months with fibrocystic disease. The pancreas weighed only 5 grams and is small, but no fibrosis or cystic change can be seen.

Case 63 X $\frac{3}{4}$

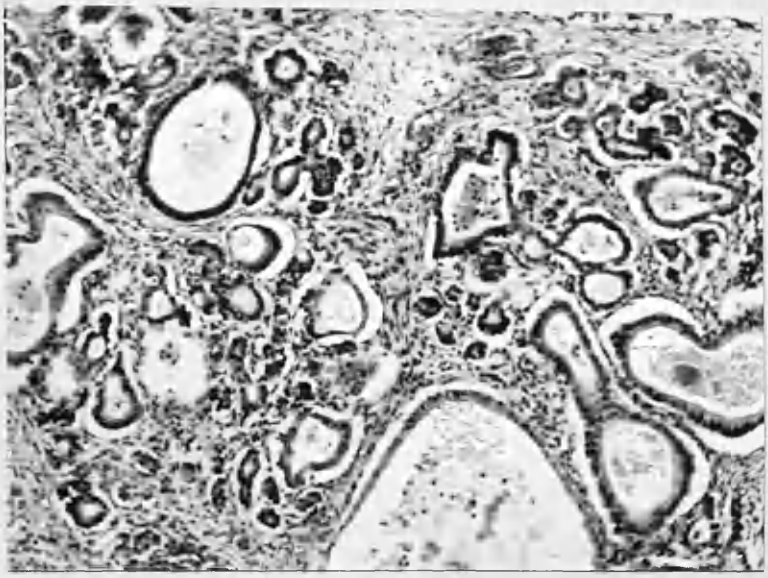


Fig. 40. Pancreas from a child who died aged 2 weeks with fibrocystic disease. Note the severe fibrosis and marked cystic change which is present.

Case 69 H & E X 100

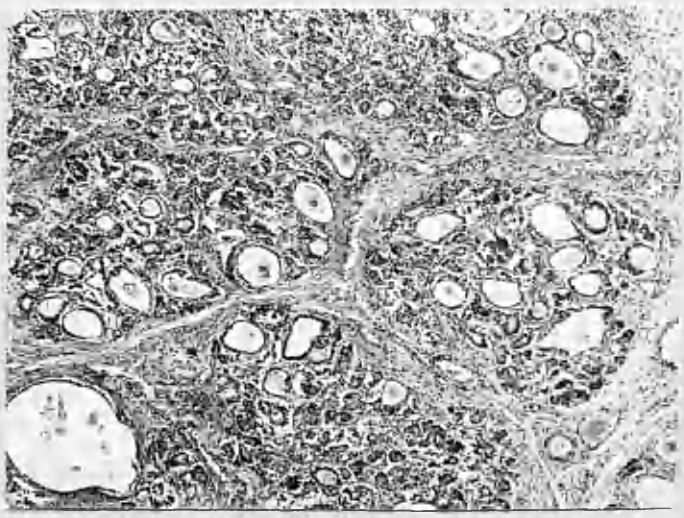


Fig. 41. Pancreas from a child who died aged 2 months with fibrocystic disease. Cystic change is well marked and wide bands of dense fibrous tissue are seen between the lobules.

Case 86 H & E X 50

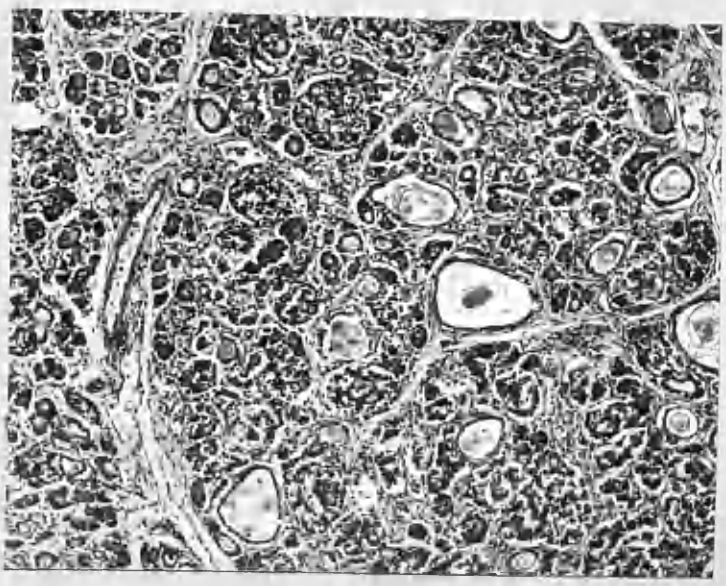


Fig. 42. Pancreas from a child 3 months old.
Although moderate cystic change is present fibrosis is slight compared to that seen in the two previous figures.
Case 65 H & E X 70

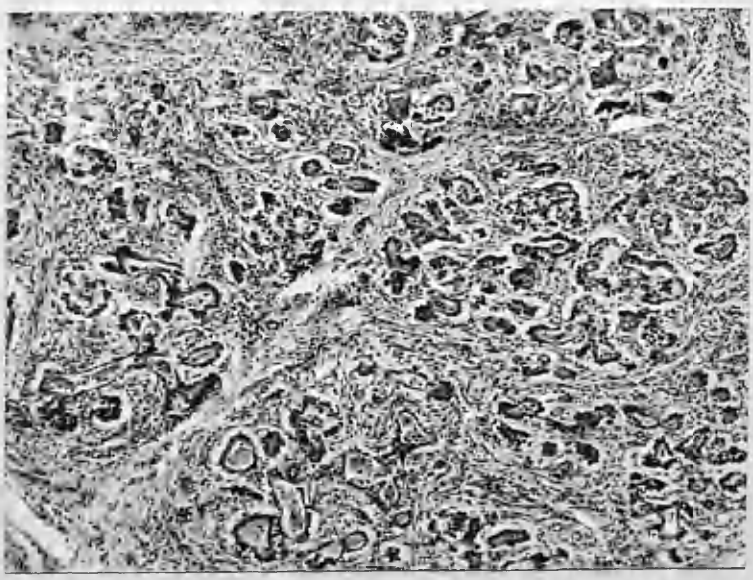


Fig. 43. Pancreas from a child who died aged 4 months.
In this case cystic change is minimal but fibrosis is severe. Strands of fibrous tissue extend between and separate the acini.
Case 71 H & E X 85

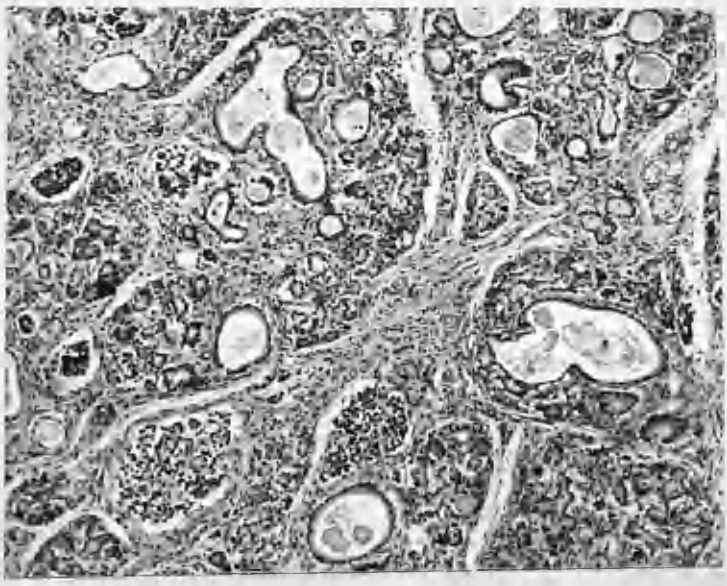


Fig. 44. Pancreas from a 4 month old child. Fibrosis is well marked throughout. Although most of the acini are small and atrophic, many contain small mucus plugs. Fairly extensive cystic change is present throughout the gland.
Case 60 H & E X 70

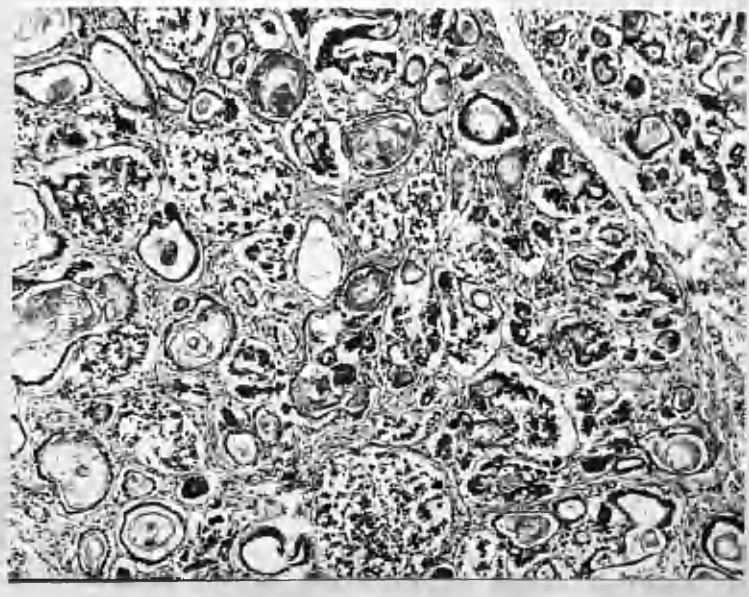


Fig. 45. Pancreas from a child aged 10 months. Although this child had trypsin in its faeces the pancreas shows undoubted fibrocystic disease. Cystic change is widespread but fibrosis is slight. A large amount of islet tissue is present.
Case 64 H & E X 70

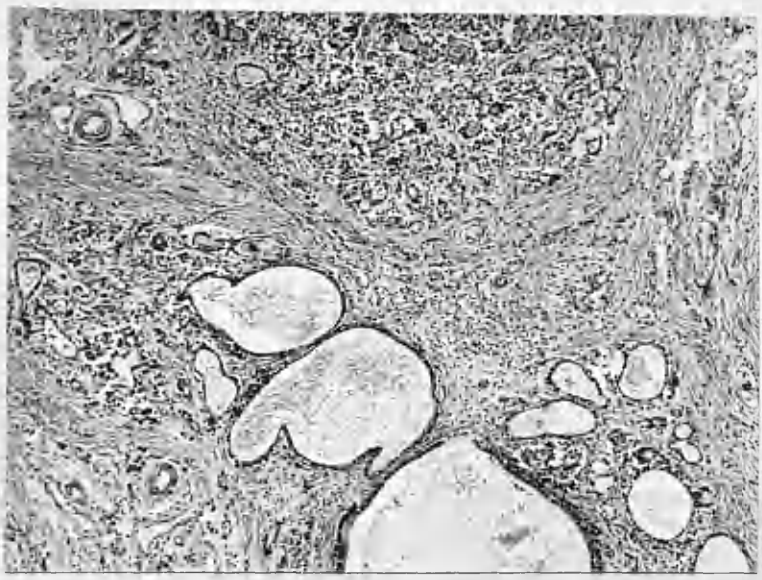


Fig. 46. Pancreas from a child 3½ years old. There is widespread fibrosis. In general the acinor tissue is atrophic and cystic change is relatively slight being present in isolated areas of the gland.
Case 67 H & E X 75

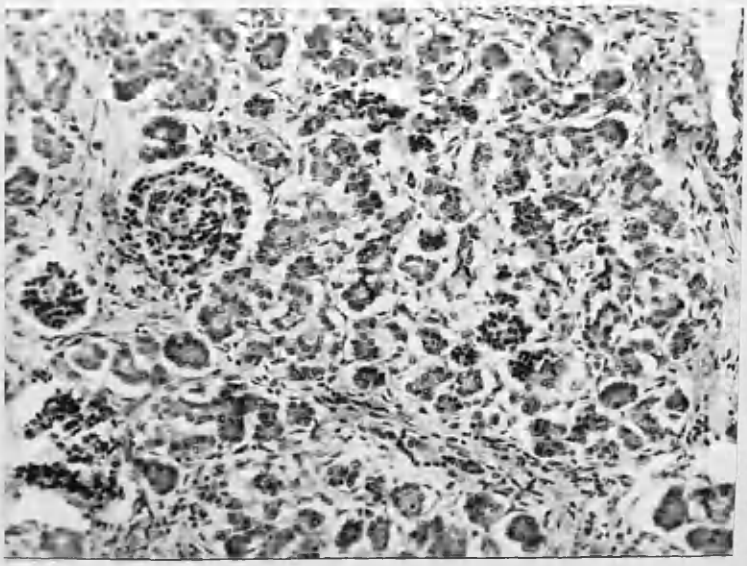


Fig. 47. Pancreas from a child who died aged 4 months.
No cystic change is present and fibrosis is very slight. The acini are very small in size and no cytoplasm is present on the inner part of the cells (compare with the preceding figures and with fig. 43)
Case 46 H & E X 150

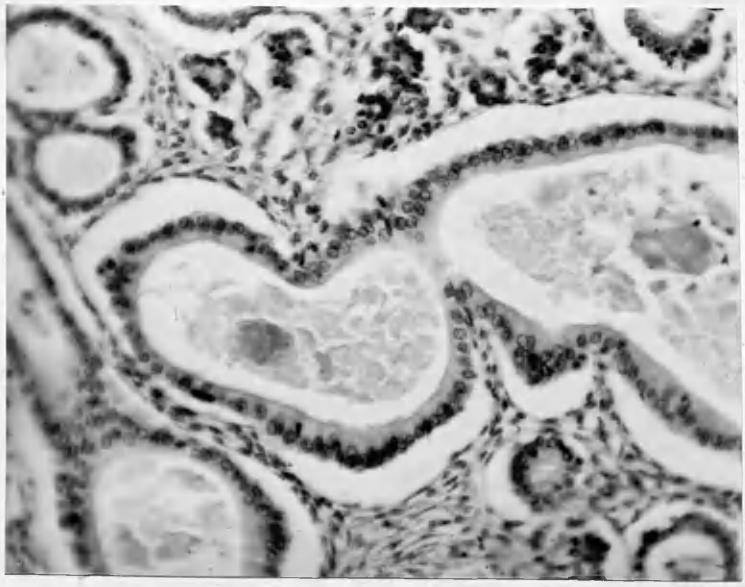


Fig. 48. Pancreas. This shows a cyst lined by tall columnar cells. Although mucus goblets are never seen in these cells a layer of stainable mucus is present on their surface. The material present in the cystic spaces is mucus.
Case 22 H & E X 250

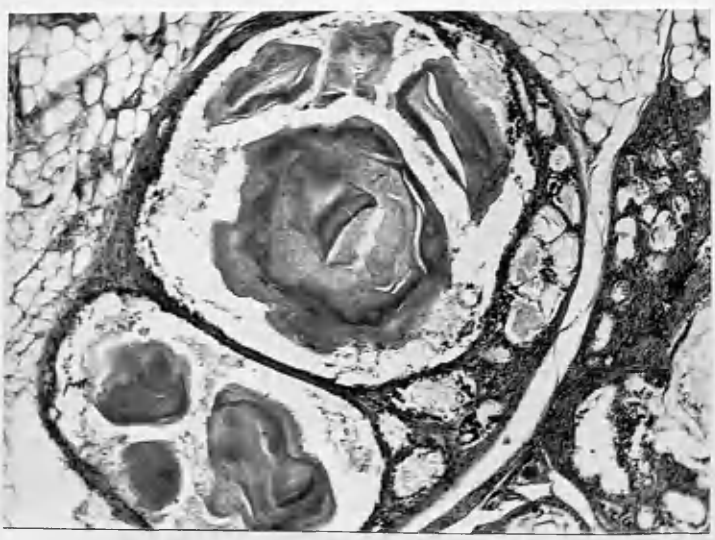


Fig. 49. Pancreas from a case of fibrocystic disease. This shows large cystic spaces which contain refractile eosinophilic laminated bodies which are regarded as inspissated secretion.
Case 78 H & E X 50

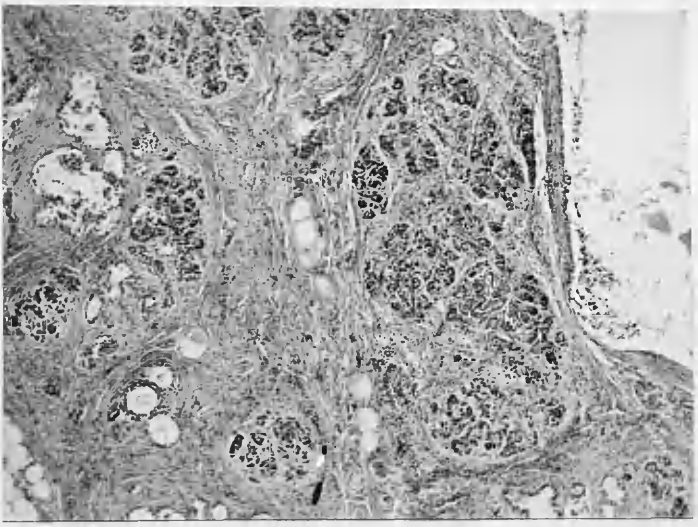


Fig. 50. Pancreas from the same case as the previous figure. This shows an area of severe fibrosis with a group of small atrophic acini. Some small cysts are also present.
Case 78 H & E X 50

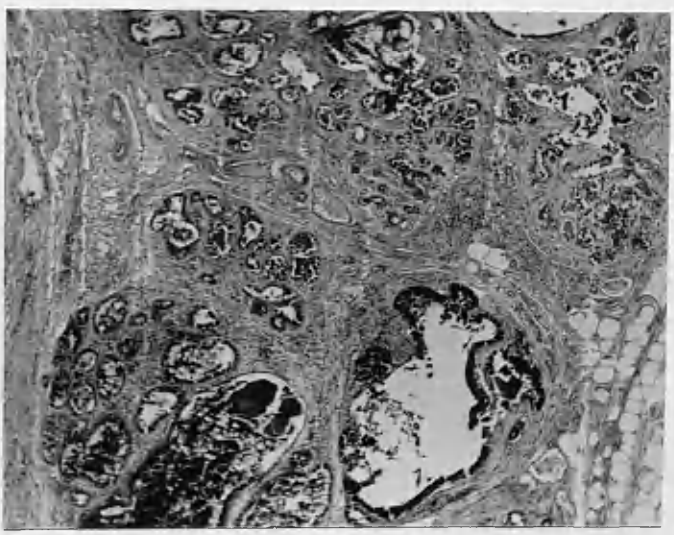


Fig. 51. Pancreas from the same case as the preceding figure. This section has been stained for mucus which appears black in the photograph.
Case 78 PAS X 50

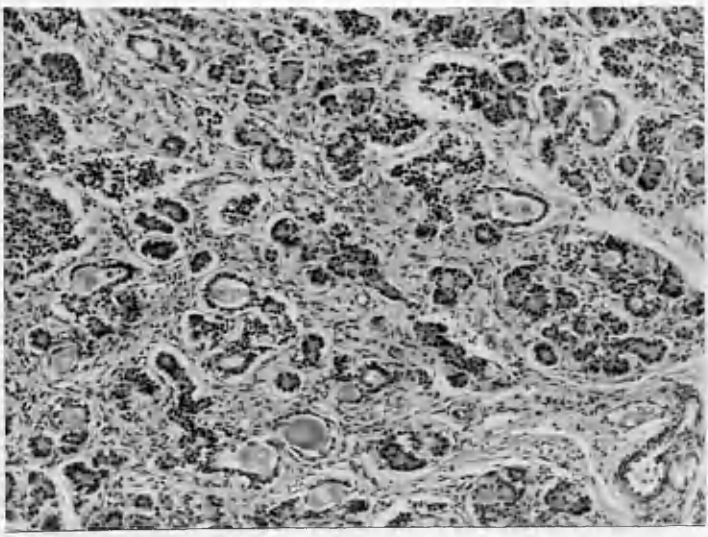


Fig. 52. Pancreas of a child 4 months old.
There is widespread fibrosis. Many of the small ducts or acini are dilated and contain mucus. The remaining acini are small and atrophic.

Case 68 H & E X 100

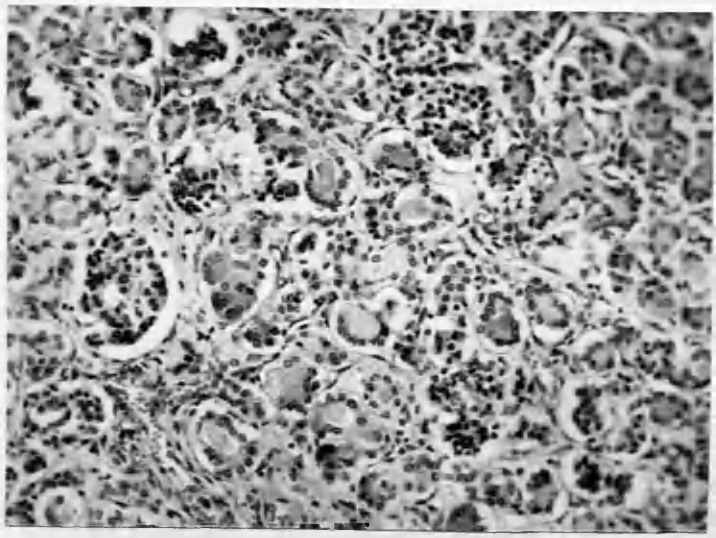


Fig. 53. Pancreas from a child who died aged 3 months with fibrocystic disease. No fibrosis or cystic change is present and abundant acinor tissue is present. The individual acini however are small. The cells contain only scanty cytoplasm and the free border of the acinar cells does not stain with acid dyes.
Case 29 H & E X 250

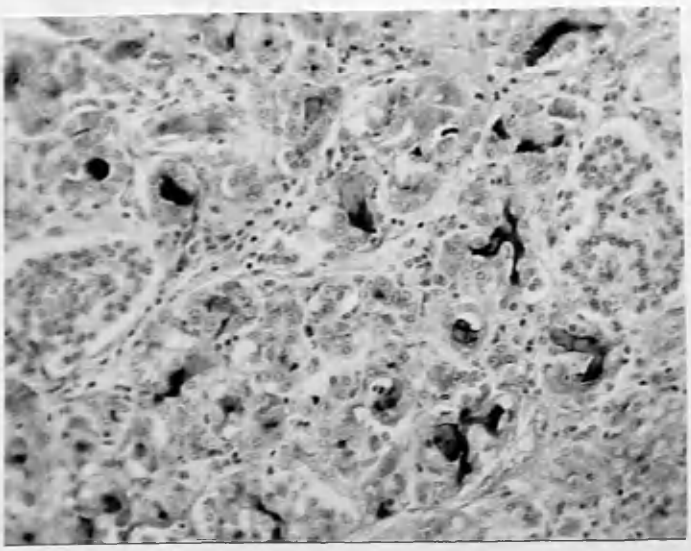


Fig. 54. Pancreas from a case of fibrocystic disease. The acinar cells are small and contain very little cytoplasm. No zymogen granules are present. The mucus plugs in the acini are PAS positive and are clearly shown.
Case 18 PAS. H X 230

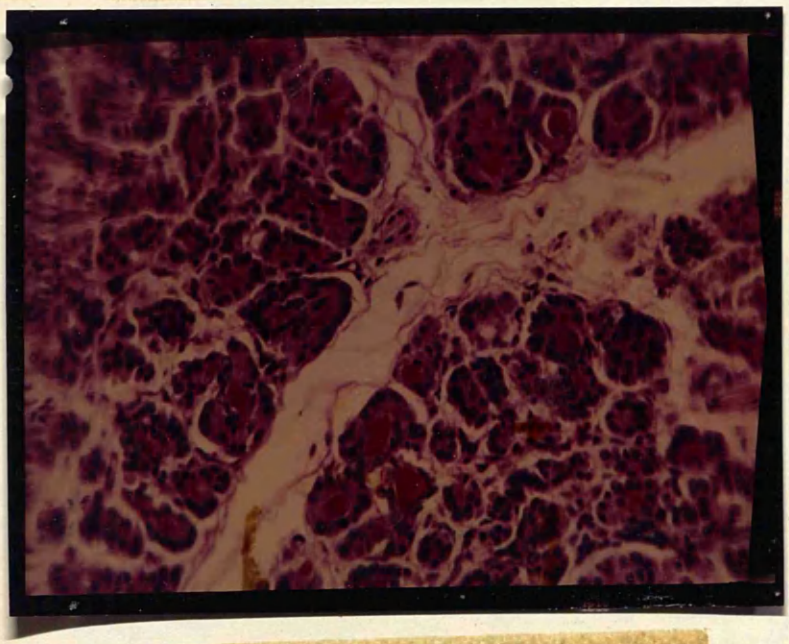


Fig. 55. Pancreas from a child with meconium ileus. This shows the mucus plugs in the acini. The acinar cells are small and contain no granules. Compare with Fig.

Case 45 PAS H X 250

Please remove the Ektachrome transparency for examination.

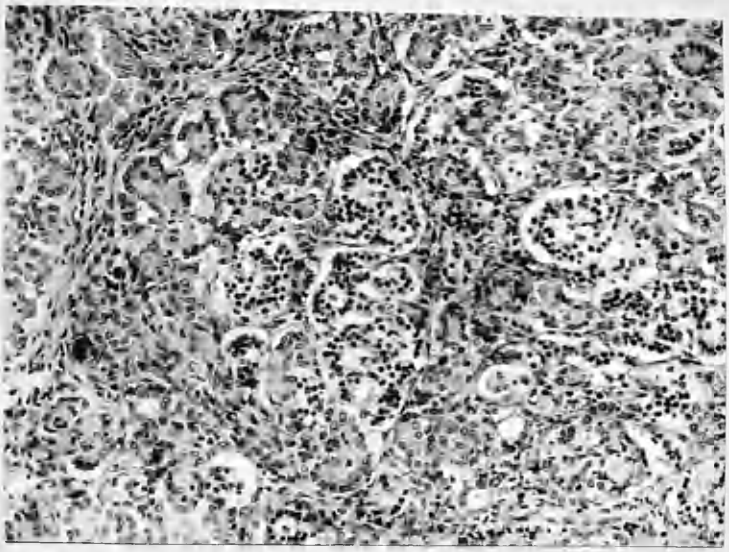


Fig. 56. Pancreas from a child who died aged 3 months. No cystic change is present and fibrosis appears slight. The individual acini are small and the cells forming them contain only a very little cytoplasm. Suitable staining shows a complete absence of zymogen granules. The islets appear normal but are crowded together.

Case 40 H & E X

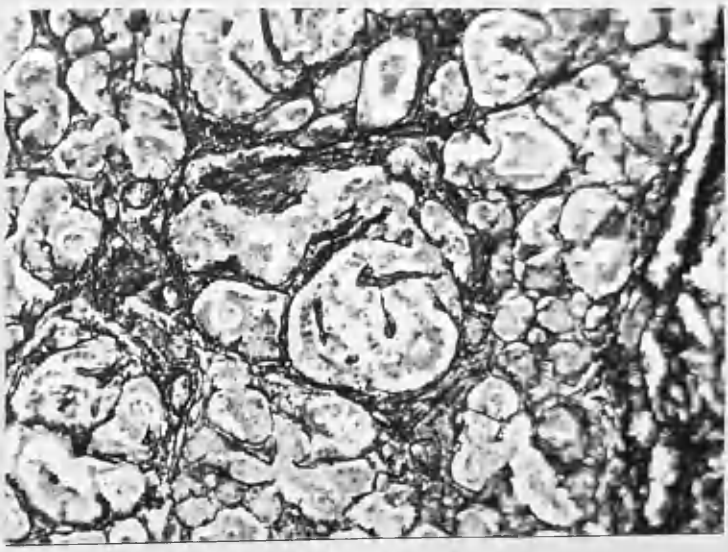


Fig. 57. Pancreas. Although there is no gross increase in fibrous tissue in the inter acinar tissues suitable staining shows a great increase in the amount of reticulum which is present. Compare with figs.

Case 40 Gordon & Sweet's reticulum stain X 200

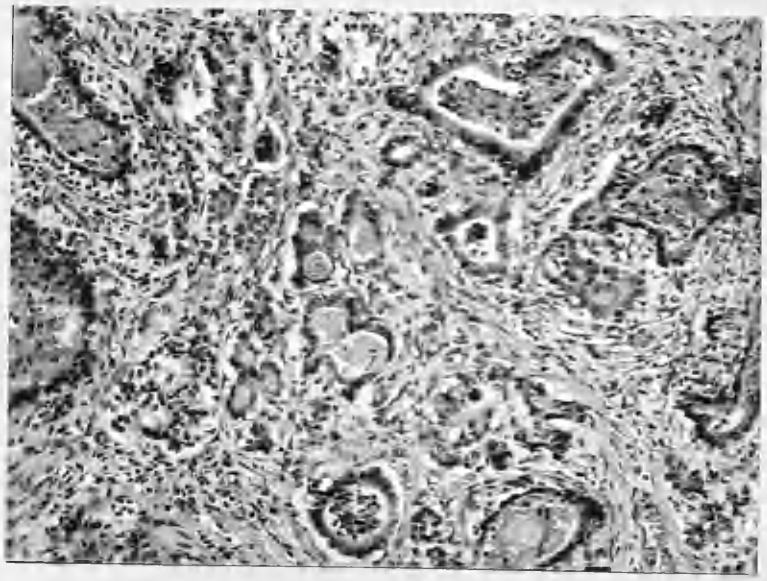


Fig. 58. PANCREAS. This is an example of a severe lesion. There is practically no remaining acinar tissue. There is considerable cystic change and fibrosis is gross.

Case 51 H & E X 160

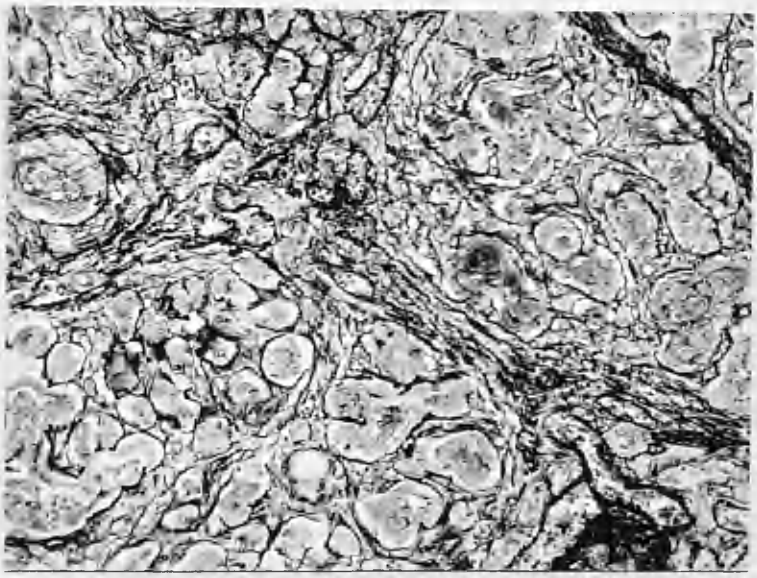


Fig. 59. Pancreas from the same case as the preceding illustration. The normal acinar pattern is completely lost and there is a gross increase in the amount of reticulum present.

Case 51 Gordon & Sweet's method X 160

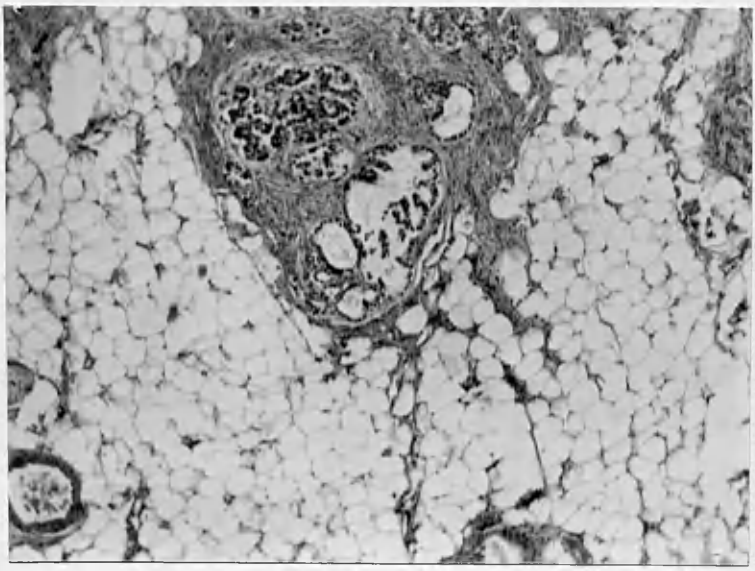


Fig. 60. Pancreas from a case of fibrocystic disease of the pancreas in a girl aged 17 years. This case is unusual as the pancreas shows extensive fatty change. A small group of atrophic acini surrounded by dense fibrous tissue is seen.

Case 78 H & E X 50

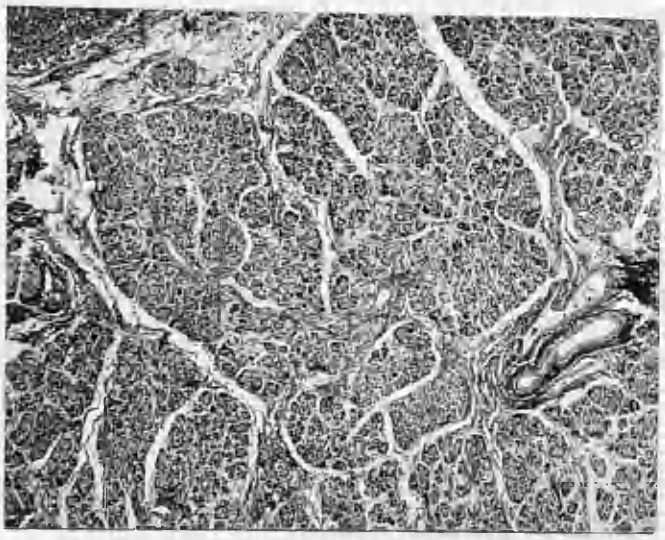


Fig. 61. PANCREAS. This pancreas from a case of meconium ileus shows little gross change in architecture.

Case 41 H & E X 50

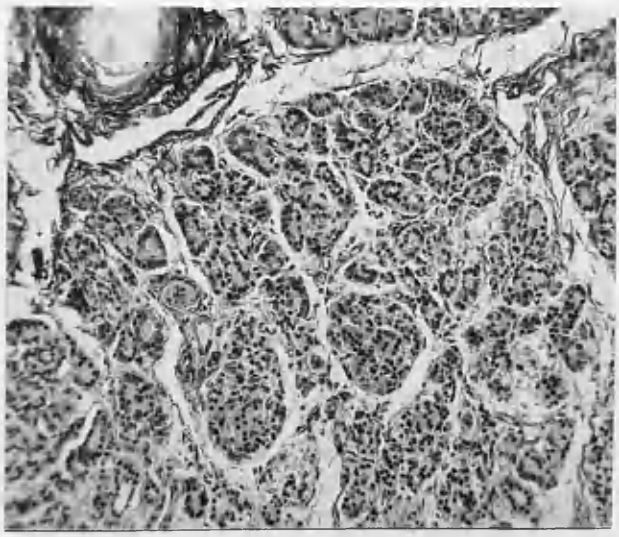


Fig. 62. PANCREAS. The same at a higher magnification. The individual acini are swollen in size and the exocrine cells have only a small amount of cytoplasm. No cystic change is seen.

Case 41 H & E X 150

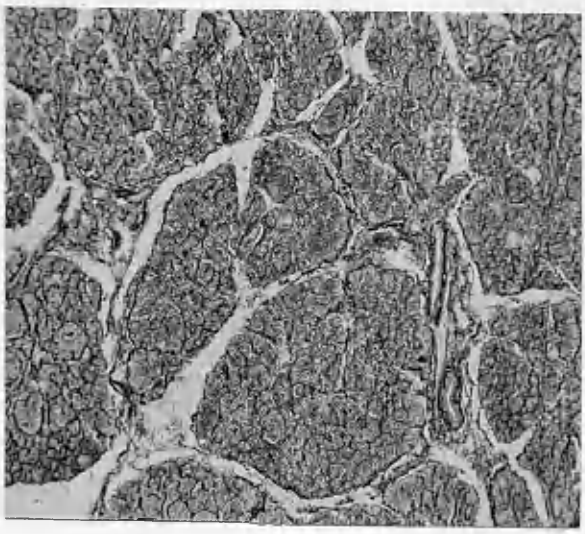


Fig. 63. PANCREAS. The same section as the two previous illustrations. No very gross increase in reticulum is apparent.

Case 41 Gordon & Sweet's Reticulum Stain X 50

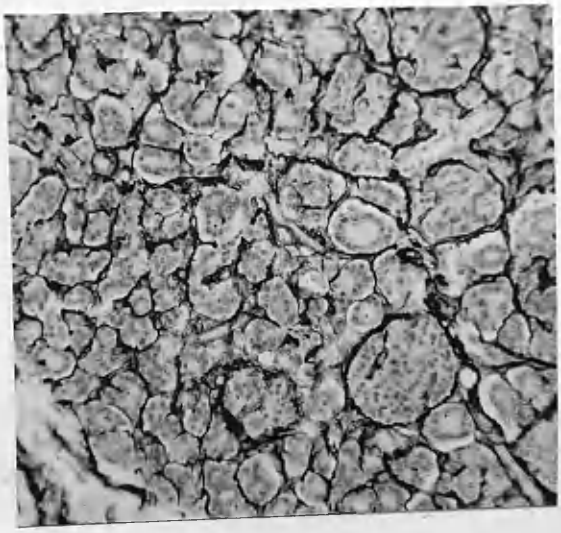


Fig. 64. PANCREAS. The same at a higher magnification to show the slight but definite increase in the reticulum.

Case 41 Gordon & Sweet's reticulum stain X 150

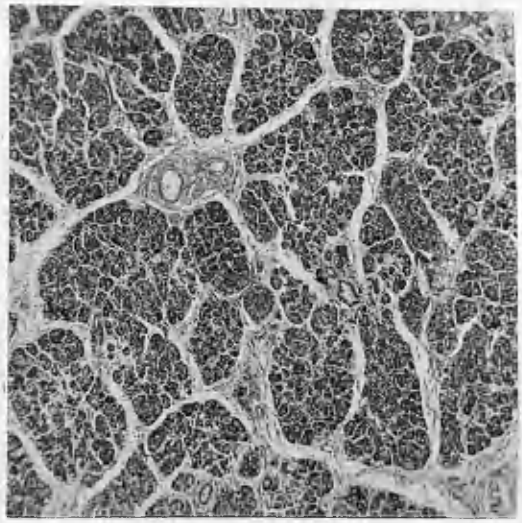


Fig. 65. PANCREAS. This pancreas from a child who died, aged 5 days, with meconium ileus shows no gross abnormality. (Compare with fig.

Case 43 H & E X 50

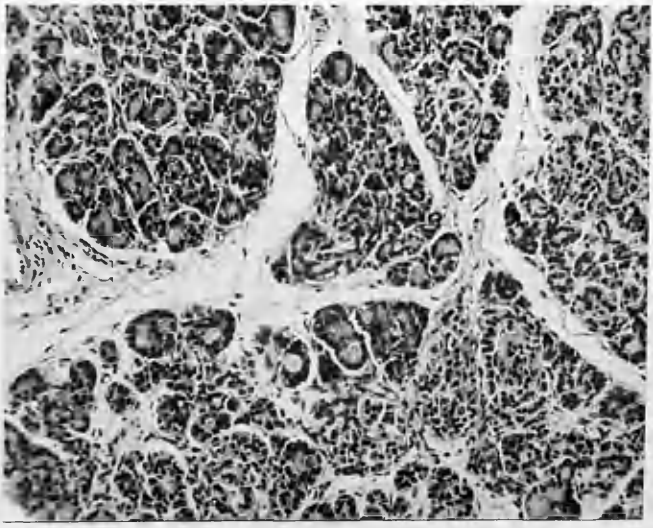


Fig. 66. This higher magnification of the section shown above shows that the acini are distended and contain small mucus plugs.

Case 43 H & E X 150

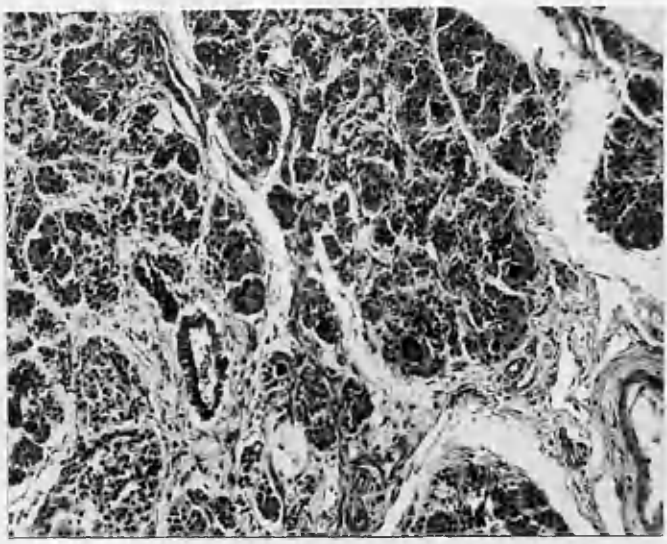


Fig. 67. PANCREAS. This is the same section as that shown in the two preceding illustrations. Small mucus plugs, which appear dark, are present in many of the acini. The small duct seen on the left is not dilated and does not contain mucus.

Case 43 H & E & H X 150

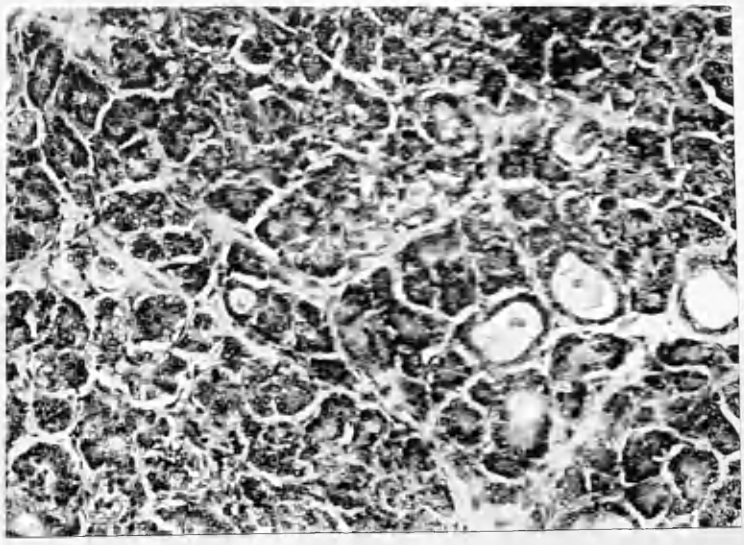


Fig. 68. PANCREAS from a case of rectal atresia. There is cystic dilatation of the acini on the right and these contain mucus plugs. No zymogen granules are present.

Case 42 H & E X 80

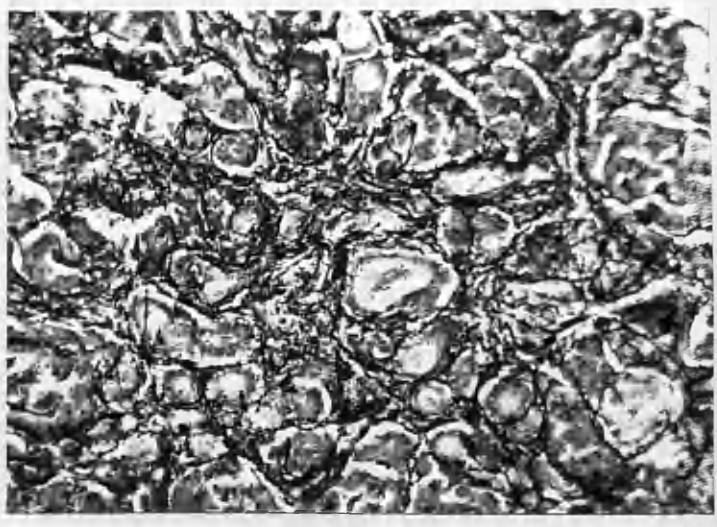


Fig. 69. Pancreas from the same case as the above. Although no obvious fibrosis is present there is considerable increase in reticulum fibres.

Case 42 Gordon & Sweet's reticulum stain X 80

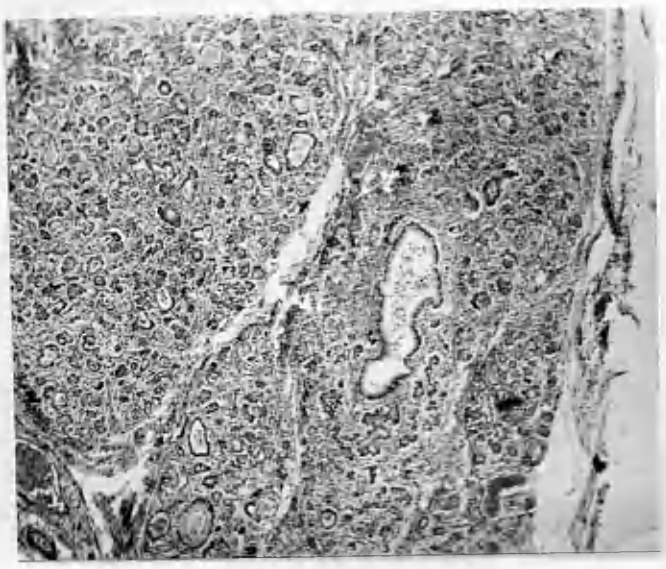


Fig. 70. Pancreas from a child who died aged 4 months with fibrocystic disease. Although the pancreas shows moderately severe change the large duct shown is not distended and indeed appears normal.

Case 64 H & E X 50

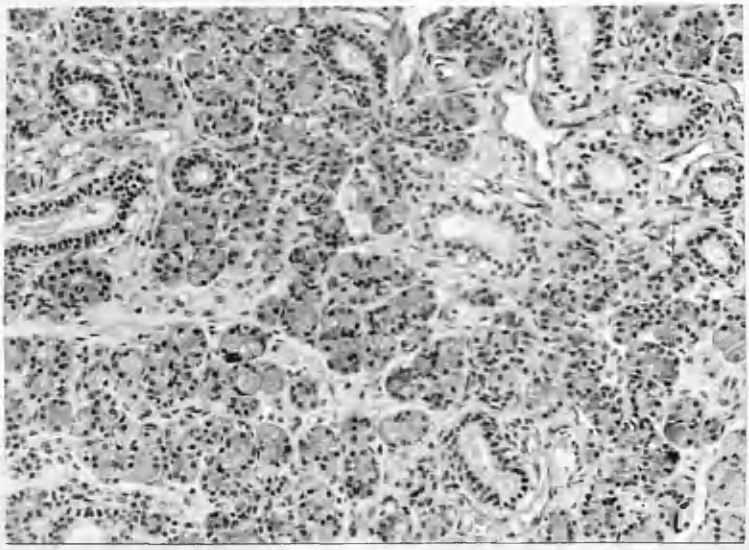


Fig. 71. Parotid gland from a child who died aged 3 months. This shows no gross abnormality.

Case 51 H & E X 160

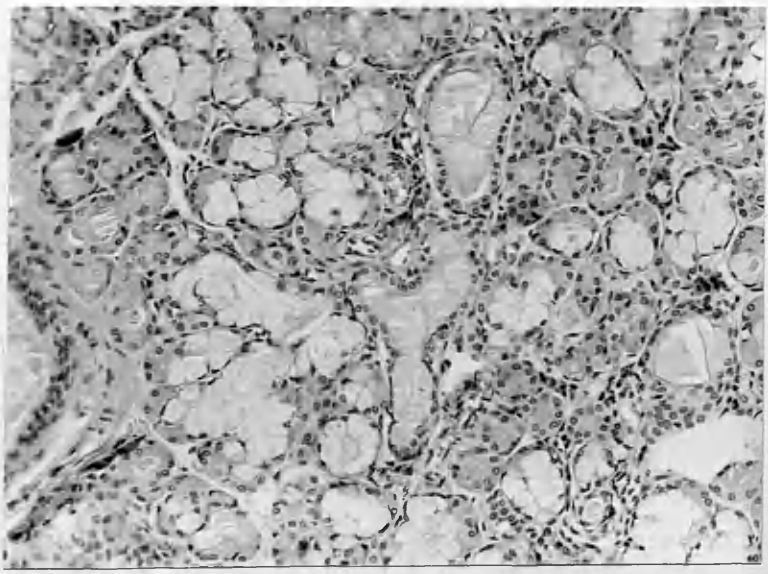


Fig. 72. Mandibular gland. This shows a moderate increase in the amount of mucus present in the acini. A duct seen in the centre is dilated with mucus. (Compare with fig. 76)

Case 51 H & E X 230

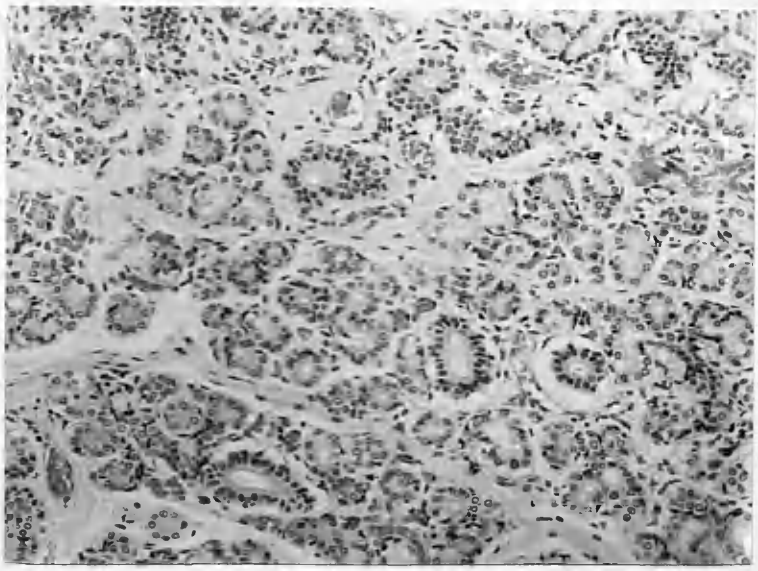


Fig. 73. Parotid gland from a case of meconium ileus. No gross structural abnormality is present.
Case 43 H & E X 160

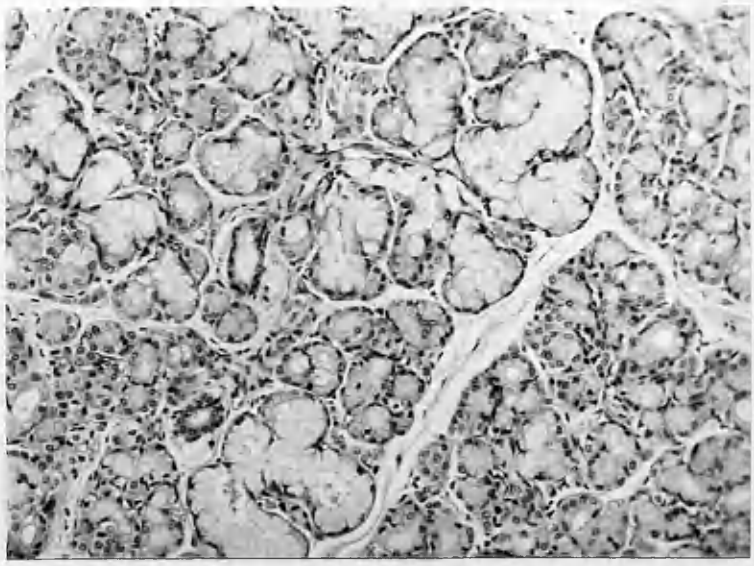


Fig. 74. Mandibular gland from the same case as the above. There is possibly slight overfilling of the mucus secreting cells but no dilatation of the ducts is present.
Case 43 H & E X 160

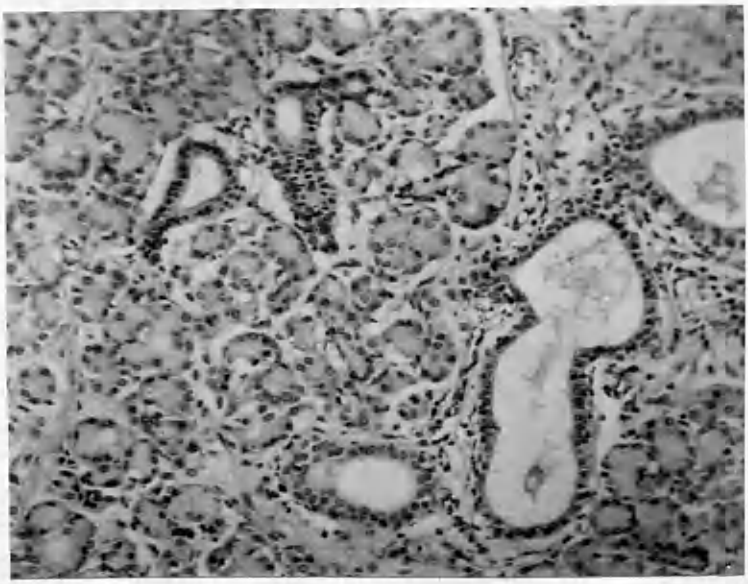


Fig. 75. Parotid gland from a child aged 10 months. No gross abnormality is seen.

Case 29 H & E X 170

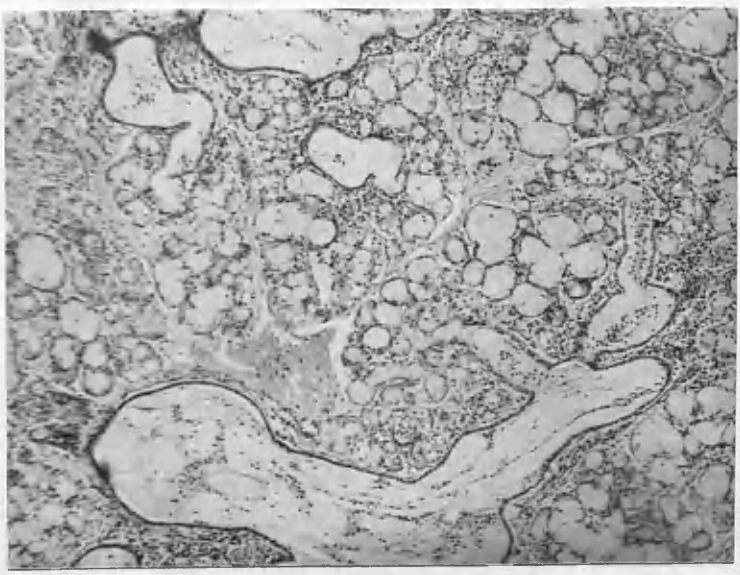


Fig. 76. Mandibular gland from the same case as the preceding section. The main ducts are greatly distended with mucus and many of the gland acini are also seen to be overfilled.

Case 29 H & E X 70

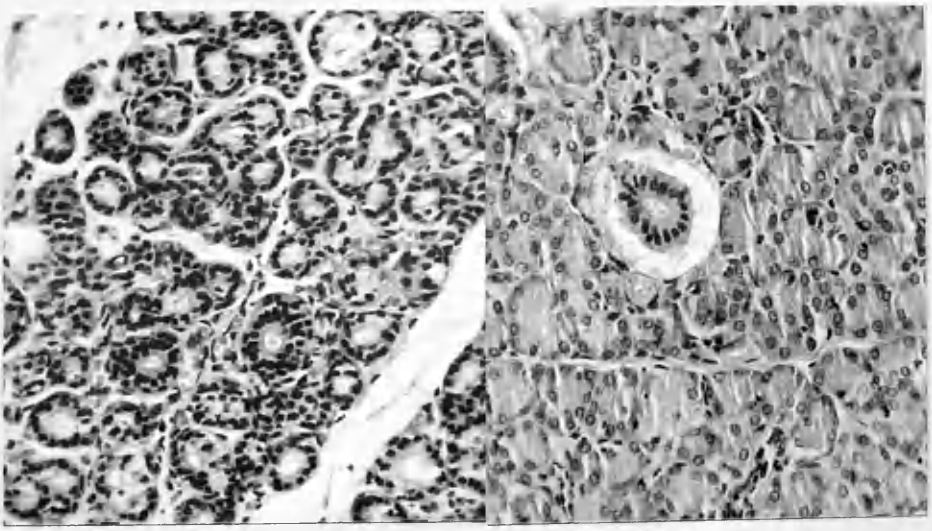


Fig. 77. Parotid gland from a case of fibrocystic disease. The gland acini are small and the cells contain only a small amount of cytoplasm. The lumen of the acini are distended. A portion of a normal parotid gland is mounted on the right for comparison.
Case 99 H & E X 240

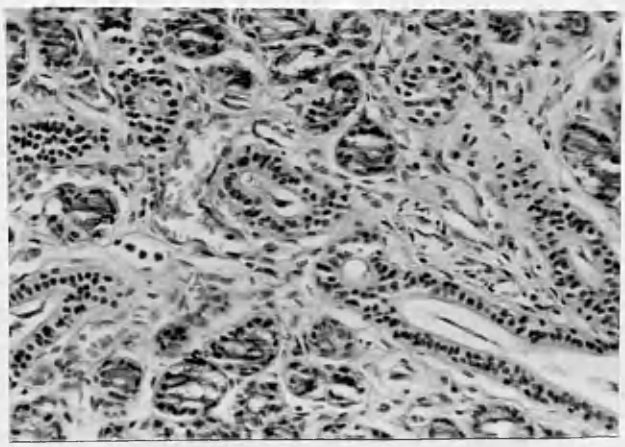


Fig. 78. Parotid gland. Practically no zymogen granules can be seen in the acinar cells. A small amount of PAS positive material is present in the dilated lumina of the acini.
Case 99 H & E X 240

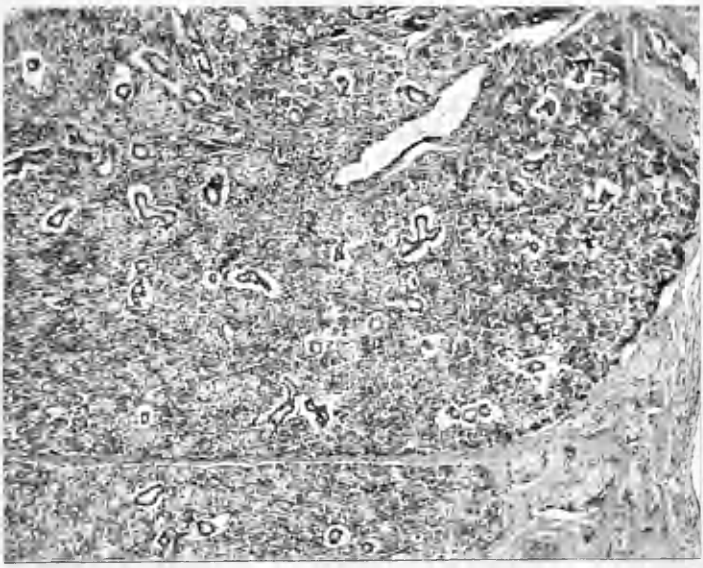


Fig. 79. Parotid gland from a child with fibrocystic disease. This shows no gross abnormality.

Case 94 H & E X 70

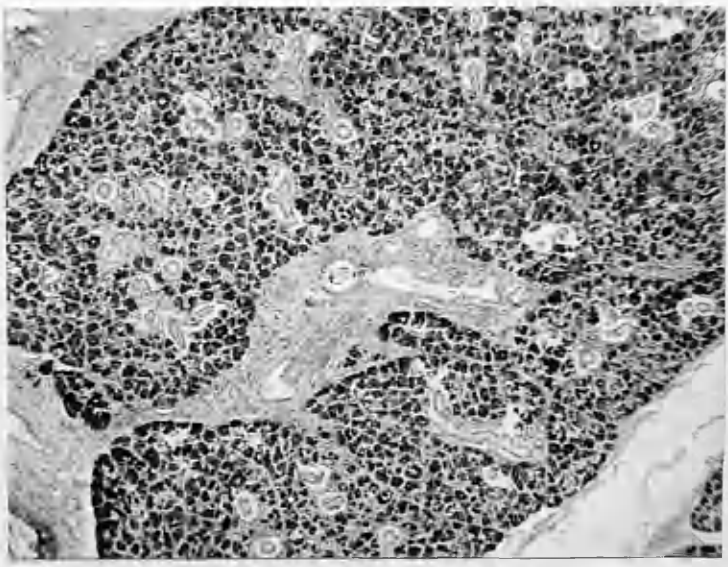


Fig. 80. Parotid gland from the same case as the preceding figure. Abundant zymogen granules are present in the acinar cells (making the whole of the acini appear dark in the photograph).

Case 94 PAS & H X 70

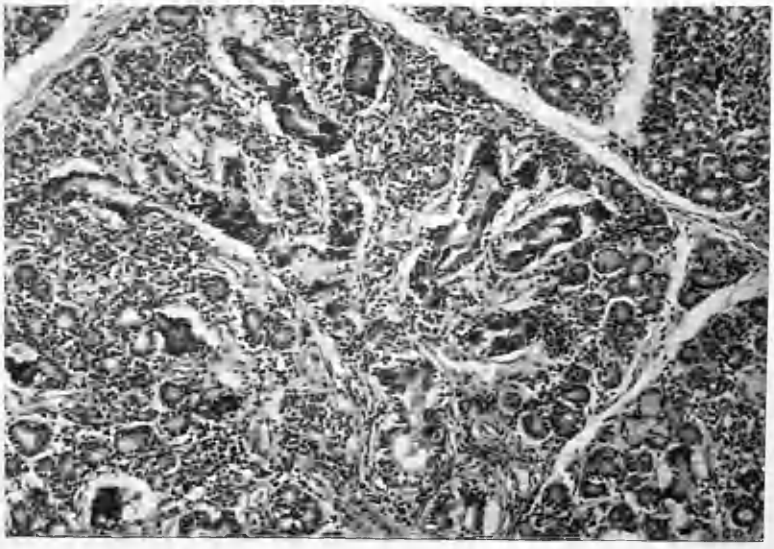


Fig. 81. Parotid gland from a child who died aged 4 months, with fibrocystic disease. The acinar tissue is atrophic and there is a widespread infiltration with chronic inflammatory cells.

Case 68 H & E X 100

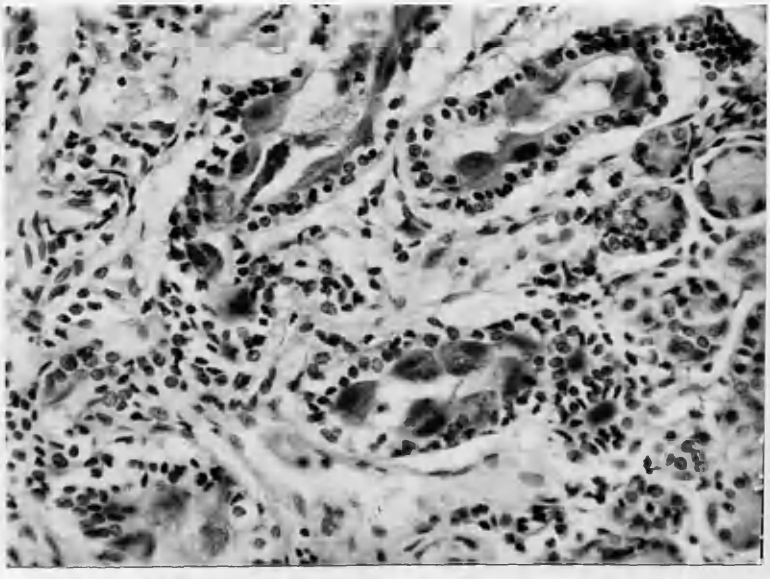


Fig. 82. Parotid gland from the same case as the previous figure. Note the great enlargement of many of the cells lining the ducts. These cells contain large acidophilic inclusions.

Case 68 H & E X 300

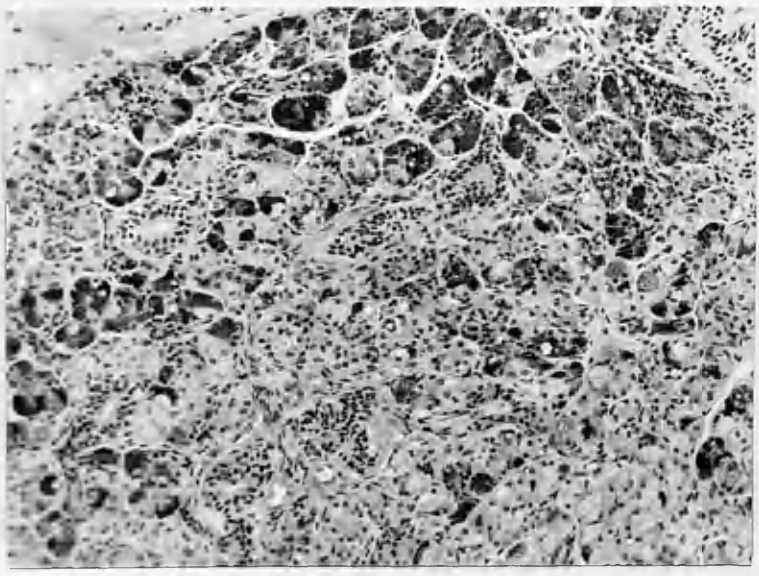


Fig. 83. Parotid gland from a case of fibrocystic disease. Many of the serous cells are packed with large coarse basophilic cells. The nature of these granules was not determined.

Case 51 H & E X 150

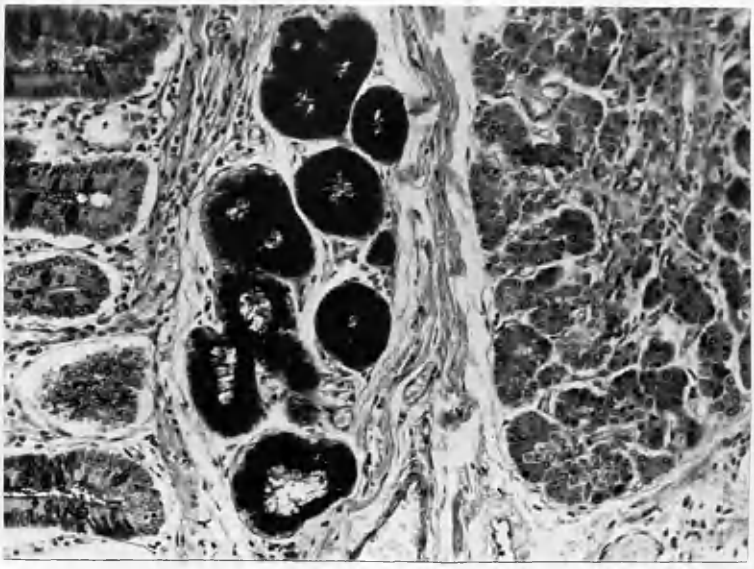


Fig. 84. Normal pancreas and duodenum in a child 3 days old. The Brunner's glands are normal in size and show no dilatation or overfilling of the individual cells with mucus.

8697 PAS & H X 70

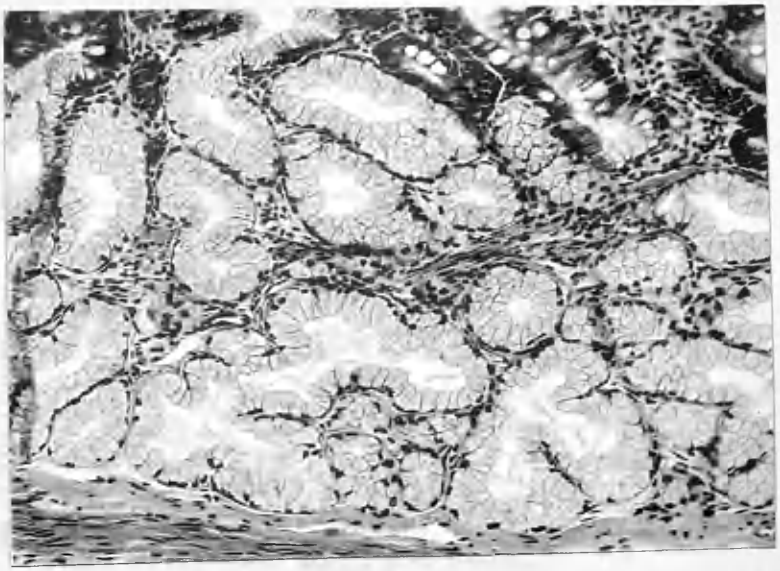


Fig. 85. Duodenum from a case of fibrocystic disease. This shows a group of Brunner's glands which show evidence of moderate over-secretion. The cells are distended with mucus and the lumen of the glands are dilated.

Case 51 H & E X 80

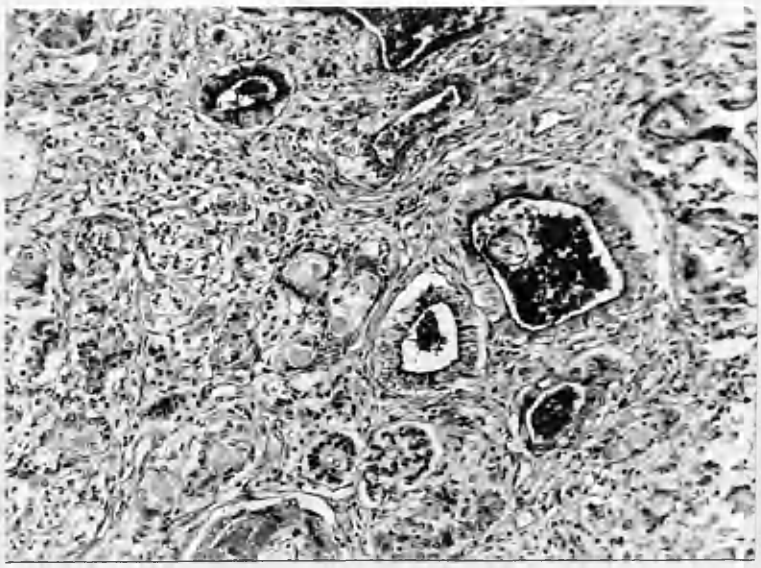


Fig. 85B Pancreas from the same case as the above illustration. The pancreas is very severely affected. There is extensive fibrosis which has caused extensive destruction of the acinar tissue.

Case 51 P A S X 80

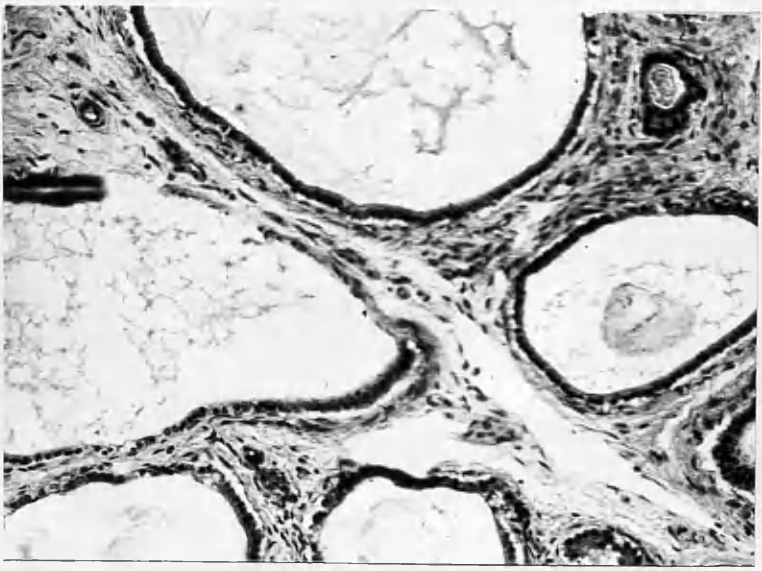


Fig. 86. DUODENUM. This section shows a portion of Brunner's glands. The gland acini are grossly dilated and the cells lining them are of a low cubical type. The acini are distended with mucus which is not stained in this preparation. (Compare with fig. 85).

Case 41 H & E X 200

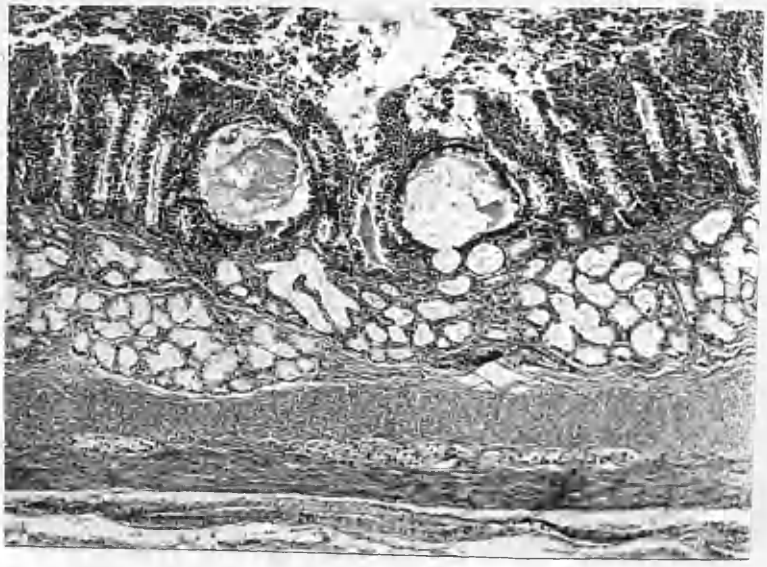


Fig. 87. Duodenum from a case of fibrocystic disease which died aged 2 months. The Brunner's glands are moderately distended. There is gross cystic distension in the glands in the mucosa. The pancreas (Fig.41) shows considerable cystic change.
Case 86 H & E X 50

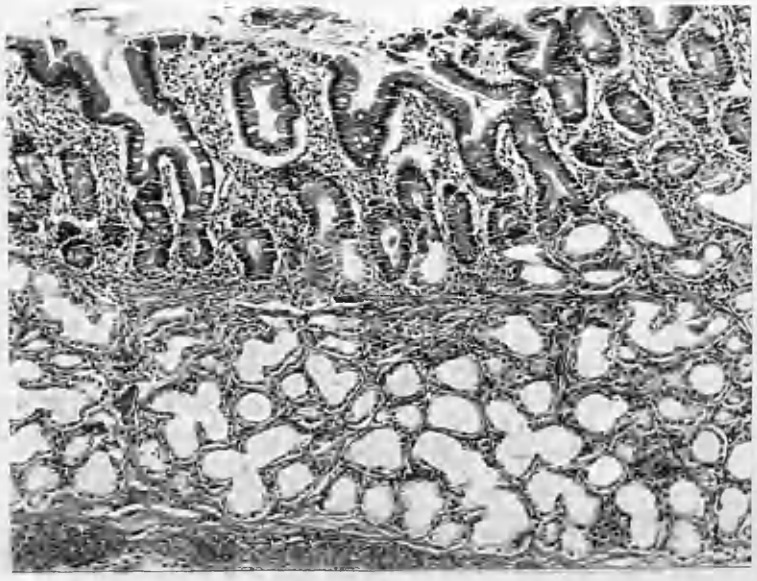


Fig. 88. Duodenum from a case of fibrocystic disease who died aged 3 months. The glands are distended with mucus and the nuclei are pressed against the bottom of the cells by the secretion.
Case 88 H & E X 80

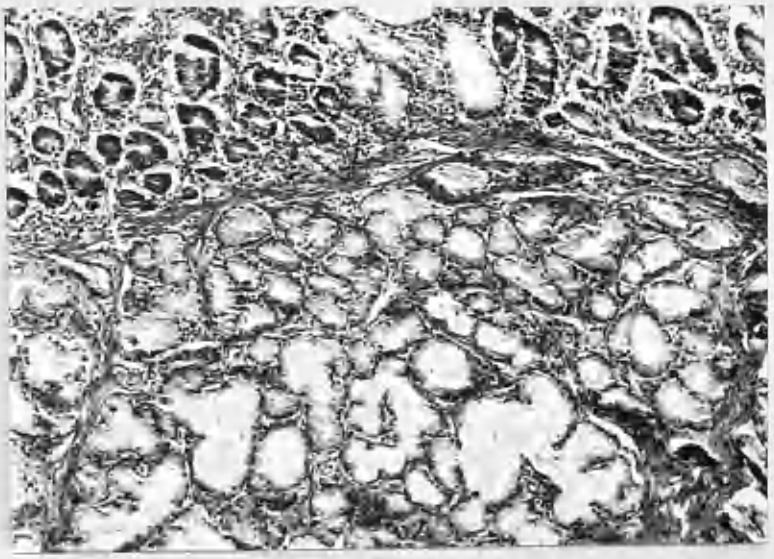


Fig. 89. Duodenum from a child aged 4 months. The gland acini are greatly distended. The pancreas (Fig. 43) shows considerable fibrosis but no cystic change.

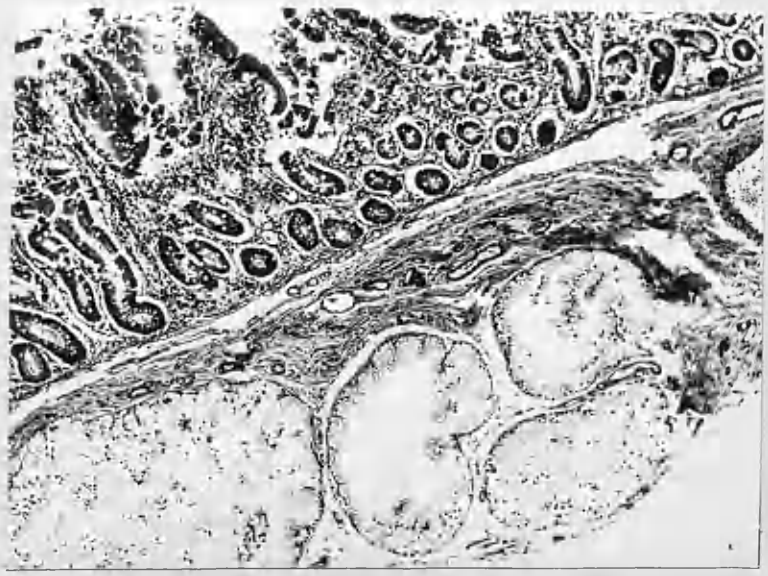


Fig.90. Duodenum from a child who died aged 11 months with fibrocystic disease. This shows exceptionally gross dilatation of the Brunner's glands. The pancreas (Fig. 45) showed widespread cystic disease.

Case 64 H & E X 65

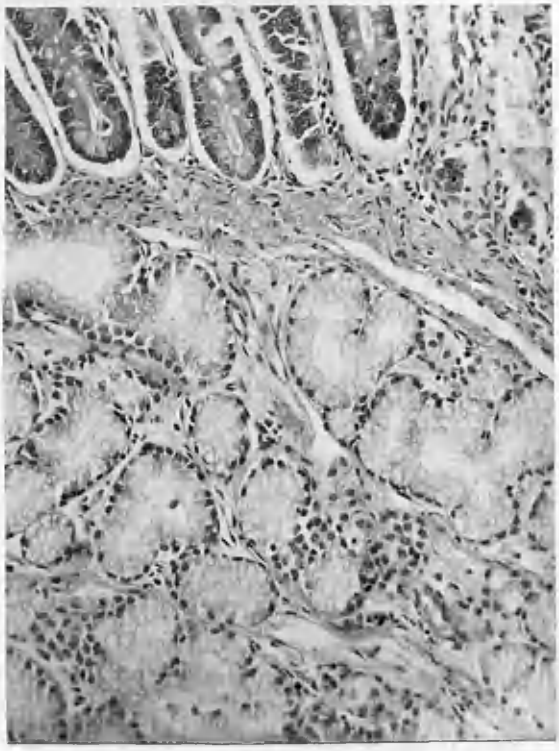


Fig. 91. Duodenum.
The Brunner's glands shown are moderately dilated with mucus.

Case 44 H & E X 150
8554

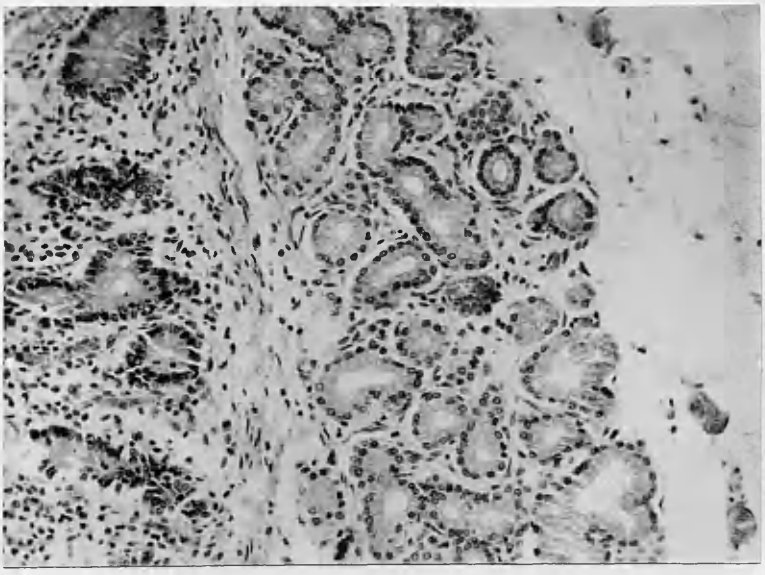


Fig. 92. Brunner's glands appear normal although the pancreas was very severely affected by fibrocystic disease.

8567 Case 46 H & E X 100

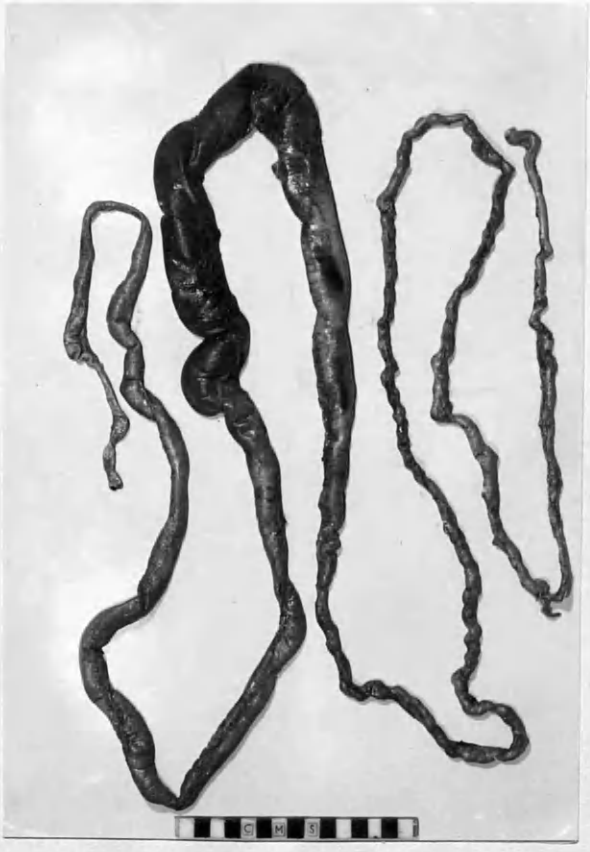


Fig. 93. Intestine. This picture of the excised intestine from a case of meconium ileus shows that the dilatation is maximal in the middle of the small intestine. The whole large intestine is present on the extreme right of the illustration. It is easy to appreciate how this was regarded as micro-colon.

Case 41.

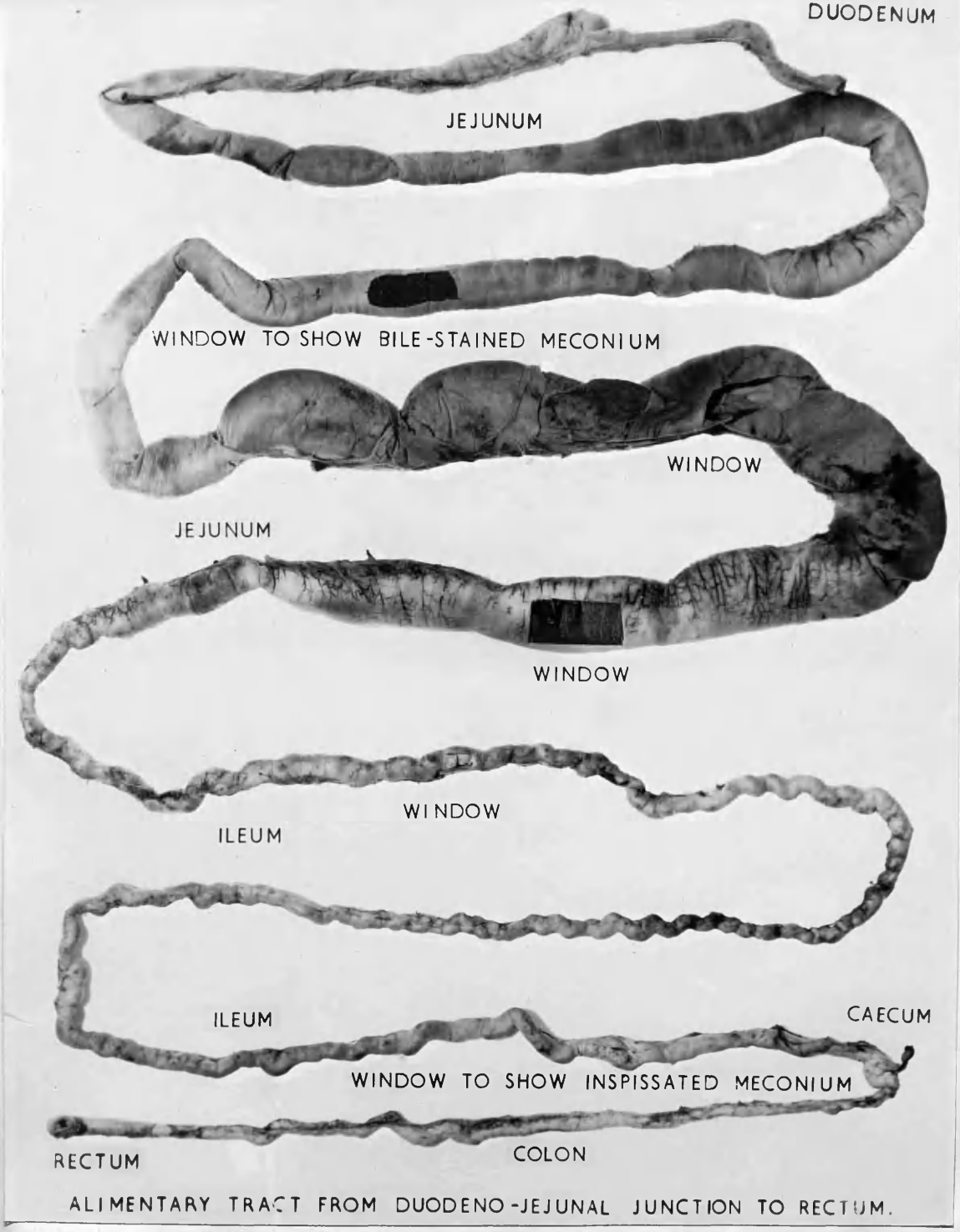


Fig. 94. Case 41. Intestine from a case of meconium ileus. This shows the gross dilatation of the small intestine. Apertures have been cut in the wall to show the green meconium in the proximal portion of the bowel and the greyish white material in the colon.

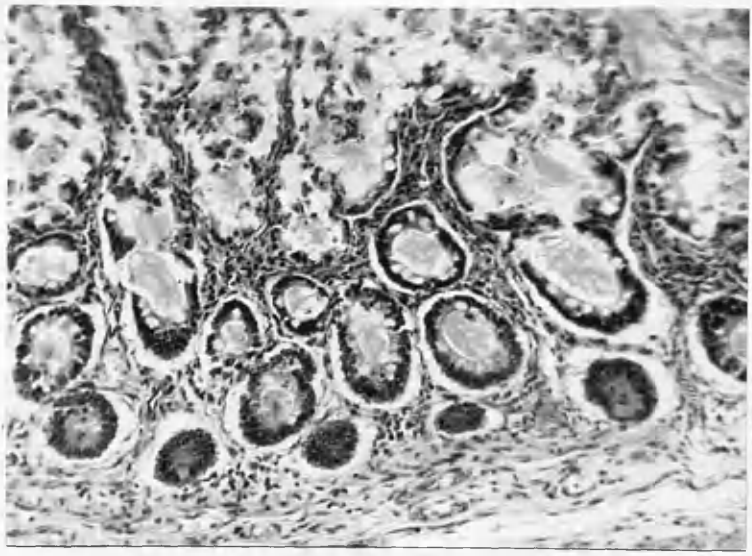


Fig. 95. Small intestine from a case of meconium ileus. Note gross overfilling of the glands with mucus.
Case 43 H & E X 160.

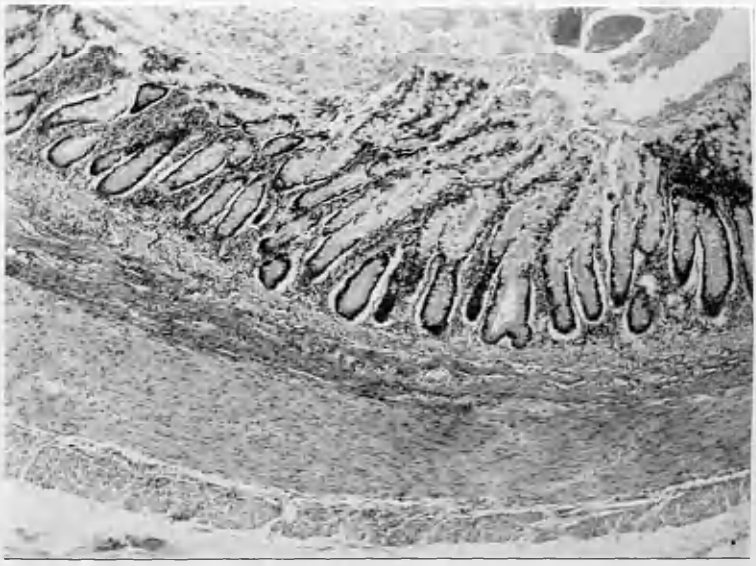


Fig. 96. Large bowel from a case of meconium ileus. This section shows over-activity of the mucus glands many of which are distended with mucus. The lumen of the bowel is filled with mucus.
Case 43 H & E X 50

Fig. 97. Spleen from a case of meconium peritonitis. The surface of the spleen is covered by a very thick layer of material which is composed largely of mucus, and some organisation is seen on the surface.

Case 93 H & E X 70

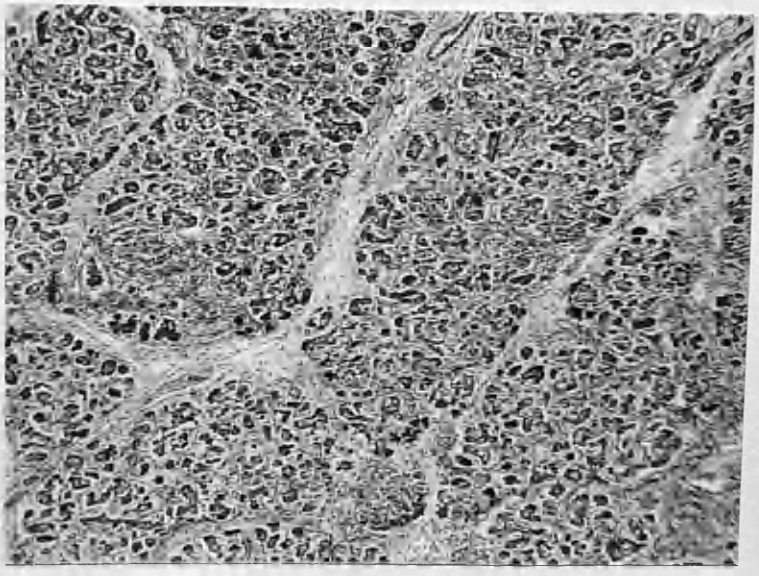


Fig. 98. Pancreas from the same case as the preceding figure. This shows the changes of fibrocystic disease as seen in meconium ileus.

Case 93 H & E X 70

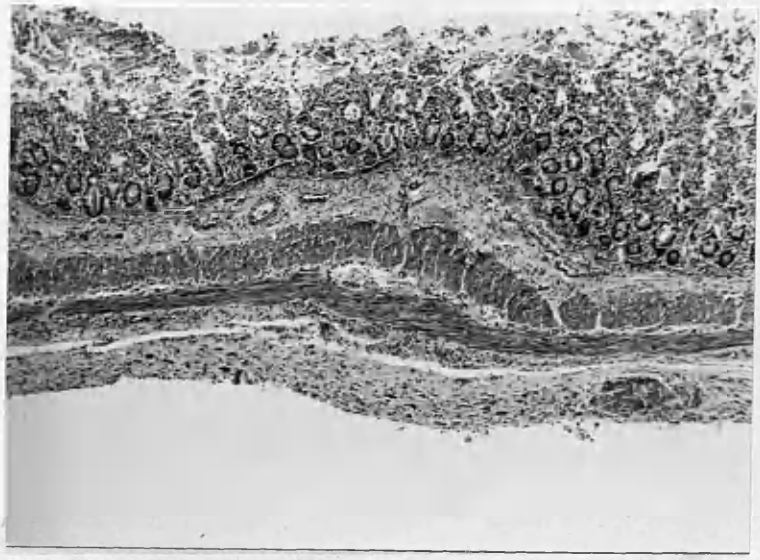


Fig. 99. Small intestine from the same case as the two preceding figures. The crypts of Lieberkuhn are distended with mucus. The appearance is practically identical with that seen in meconium ileus (Compare with fig. 95).
Case 93 H & E X 70

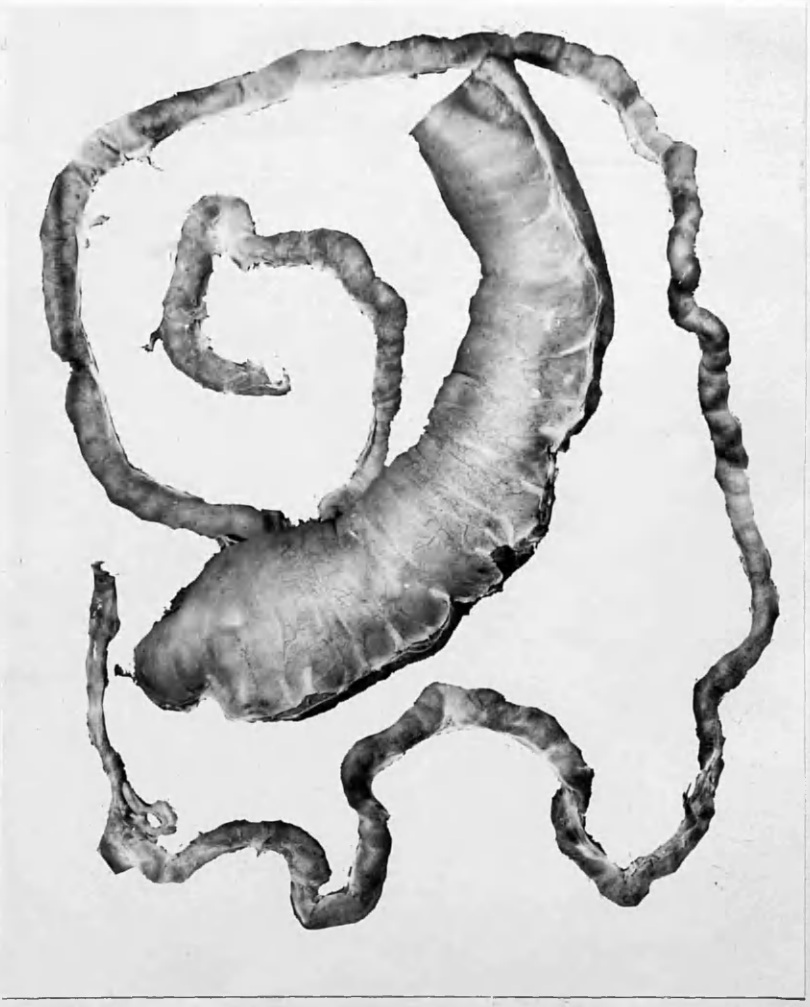


Fig.100. 8378. Atresia of bowel. The atretic segment was situated in the jejunum, which is greatly distended and has been anastamosed to the ileum. Note that the lumen of the colon is very narrow.

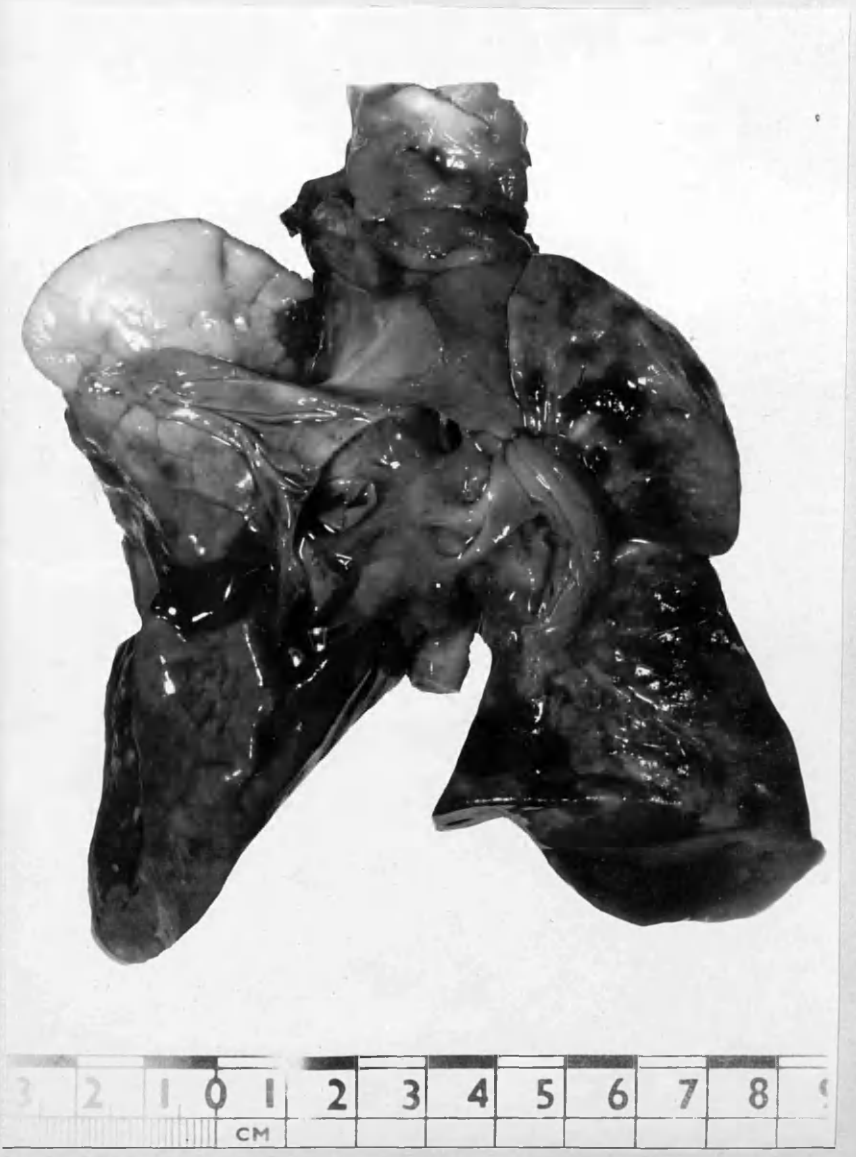


Fig.101. Lungs from a child who died aged 3 months with fibrocystic disease. The lower lobes are dark in colour and contain areas of haemorrhage. The upper lobes are emphysematous.
Case 65.

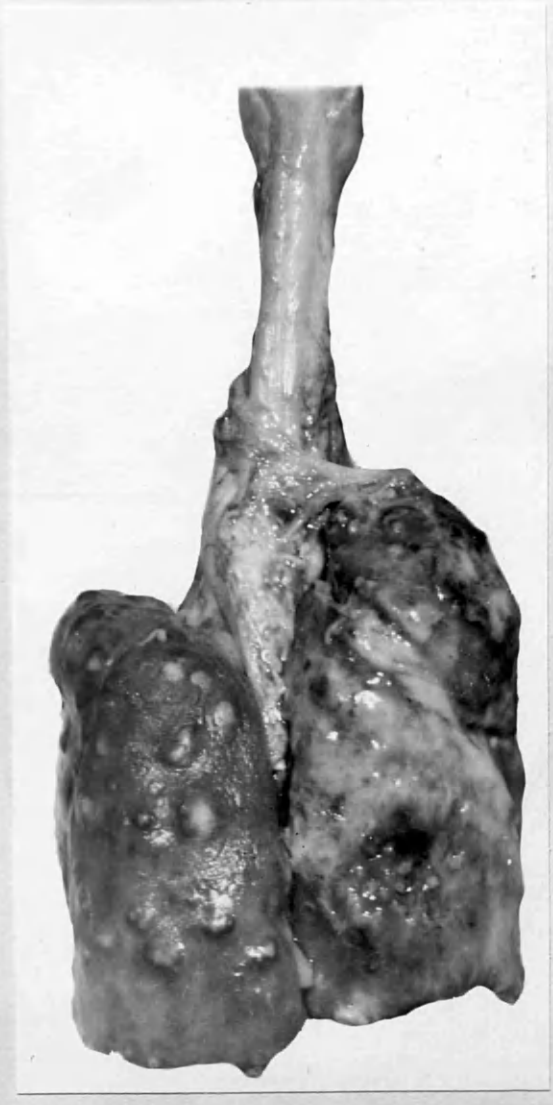


Fig. 102. Lung from a child who died at the age of 8 months with fibrocystic disease. This posterior view shows the large abscesses which are present in both lungs. In the right lower lobe an abscess has extended through the pleural cavity and an extensive pyogenic pleurisy is present.
Case 63.

Fig. 103. Lung from a child who died at the age of 4 months with fibrocystic disease. Respiratory infection had been present for 6 weeks. Note the extensive destruction of the lung parenchyma by abscess formation. Both upper lobes are emphysematous.
Case 37 X 1½

Fig. 104. Lung from a child who died at the age of 3½ years. The lung shows extensive destruction due to widespread abscess formation. Bronchiectasis is also present in both upper and lower lobes.

Case 67 X 1½

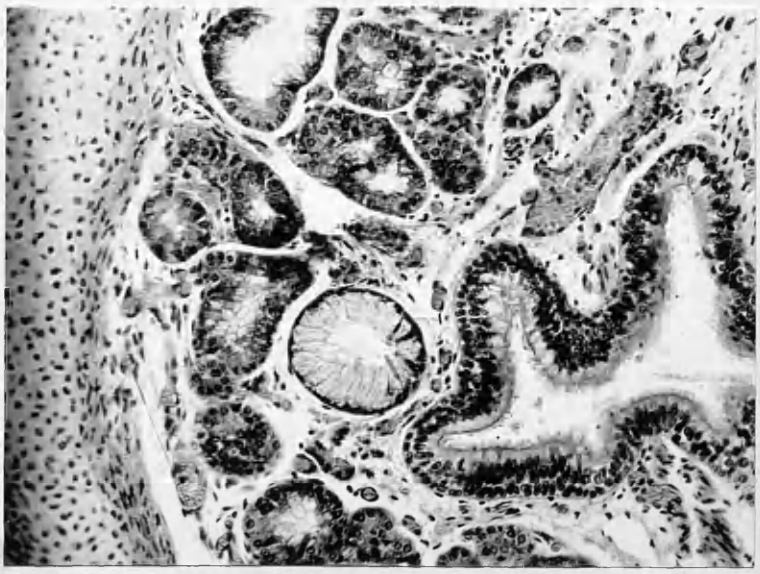


Fig. 105. Trachea from a child who died aged 8 days with meconium ileus. Although evidence of excessive mucus secretion was seen throughout the alimentary tract, the mucus secretory glands in the trachea and bronchi appear normal.
Case 41 H & E X 80

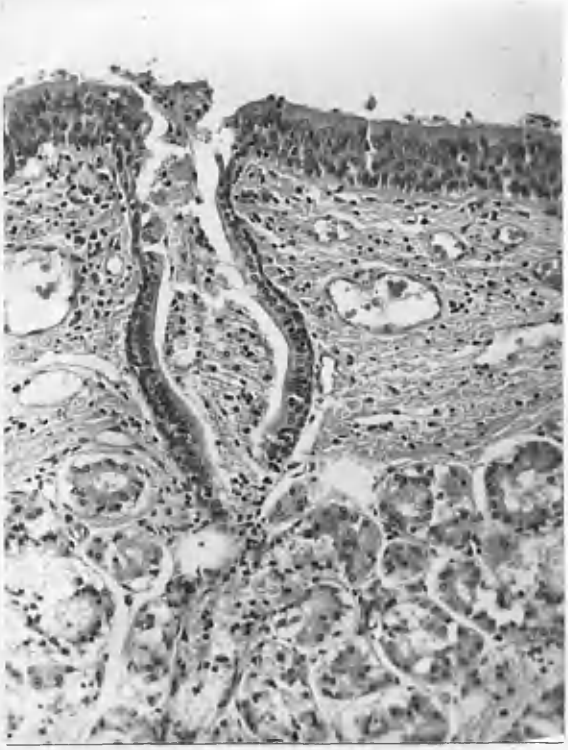


Fig. 106. Trachea from a case of fibrocystic disease. The duct of the submucus gland shown is dilated with mucus.

Case 46 H & E

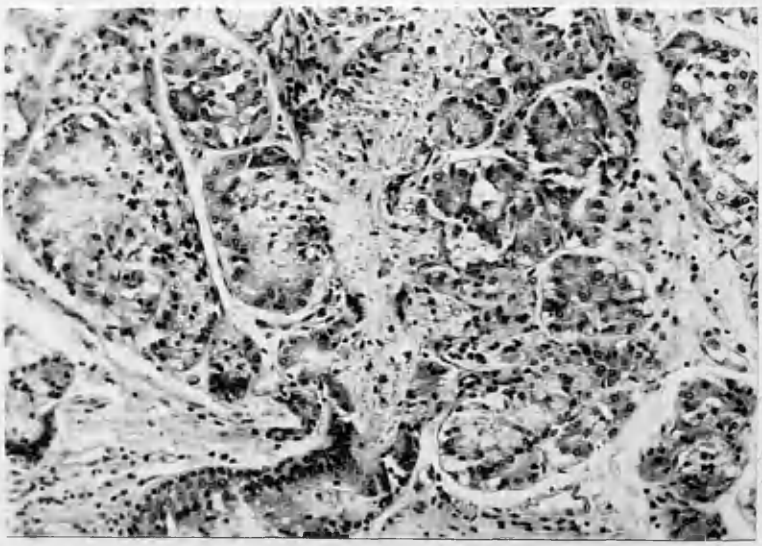


Fig. 107. Trachea. The mucus glands seen are overfilled with mucus and and are opened up so that they communicate freely with the collecting duct.

Case 46 H & E X 75

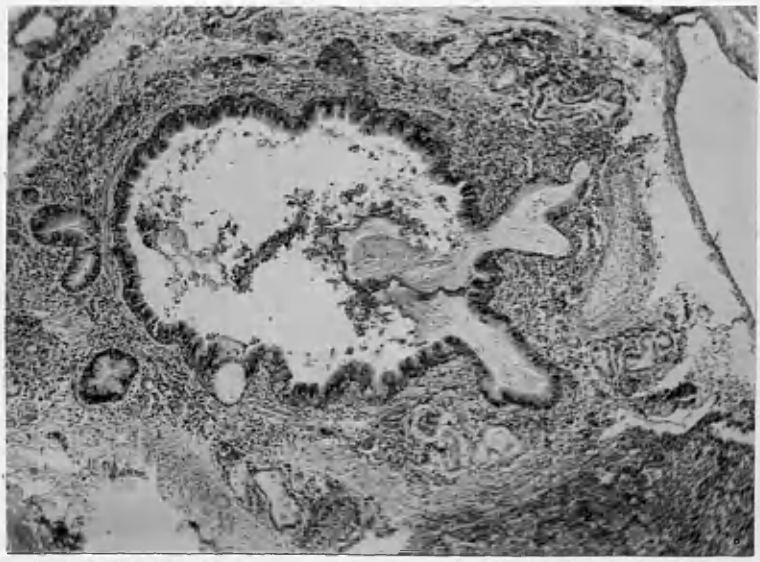


Fig. 108. Lung from a child who died at the age of 4 months with fibrocystic disease. This section through a bronchus shows the opening of two ducts from a group of submucous glands (this relationship was confirmed in serial sections). Both ducts are distended with mucus which is seen extending into the lumen of the bronchus.

Case 77 H & E X 50

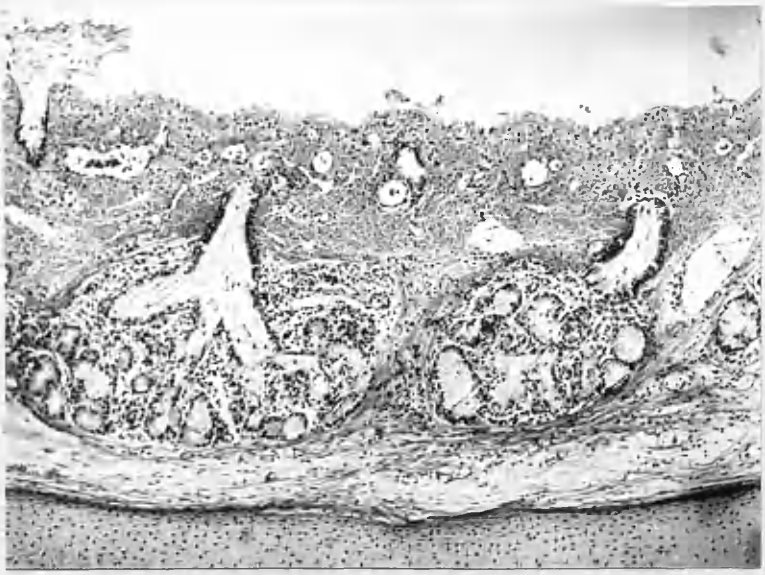


Fig.109. Lung. This portion of the wall of a main bronchus shows distension of the collecting ducts with mucus. There is mild chronic inflammation of the bronchial wall. Considerable infiltration of the submucosa by chronic inflammatory cells has occurred and the covering epithelium is lost.
Case 68 H & E X 70

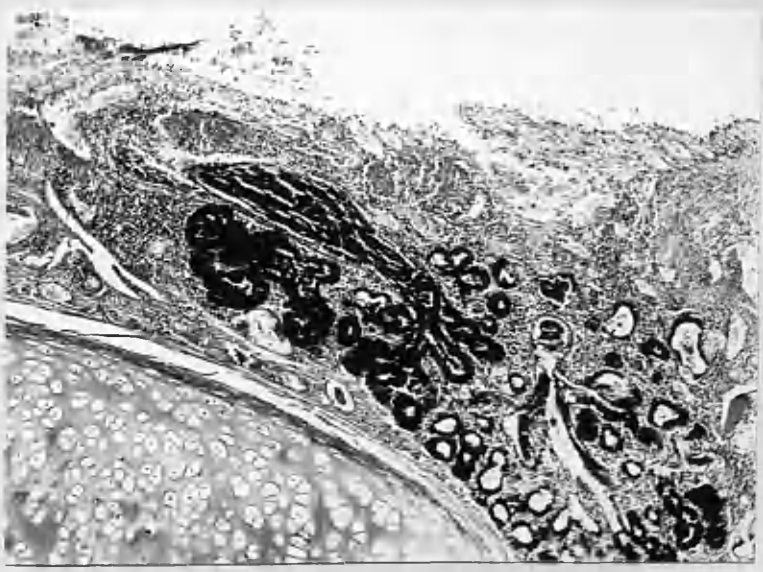


Fig.110. Bronchus from a case of fibrocystic disease. The mucus glands show evidence of over activity and the collecting ducts are filled with mucus which appears black. A severe infection is present which has produced desquamation of the covering epithelium.
Case 78 PAS X 50

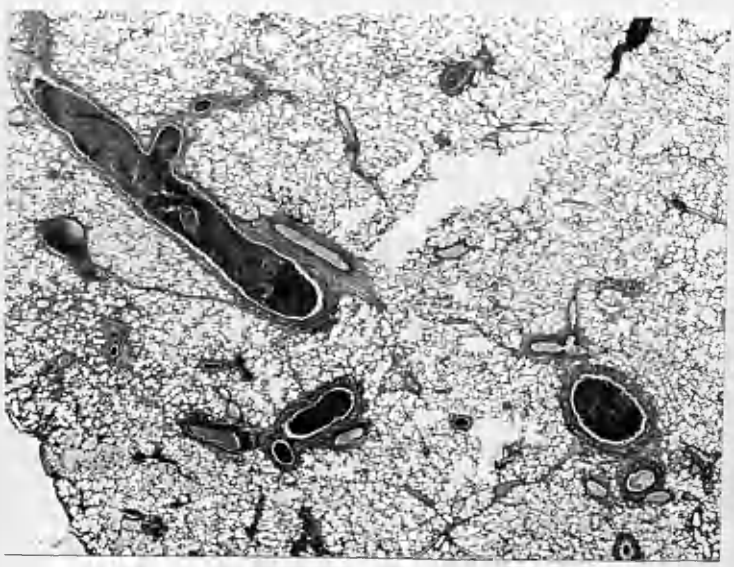


Fig. 111. Lung from a child with fibrocystic disease. In this section several bronchi are seen to be completely filled with mucus. The intervening alveoli are emphysematous.

Case 39 H & E X 8

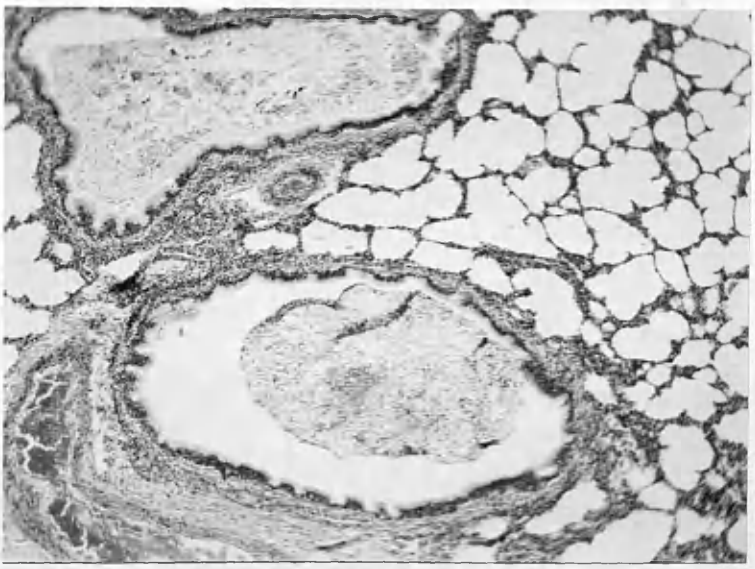


Fig. 112. Lung. This shows two small bronchi which are distended with mucus. The lung epithelium is composed of tall columnar cells and it appears redundant and infolded.
Case 77 H & E X 50

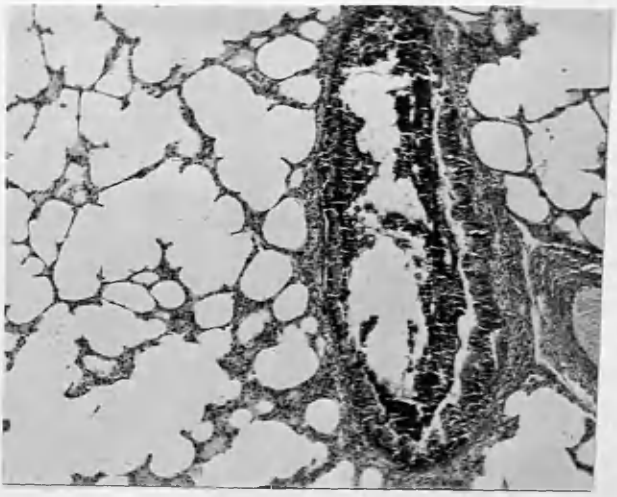


Fig. 113. Lung from the same case as the previous figure. The material in the bronchus gives a positive reaction when treated by the PAS technique.
Case 77 PAS X 70

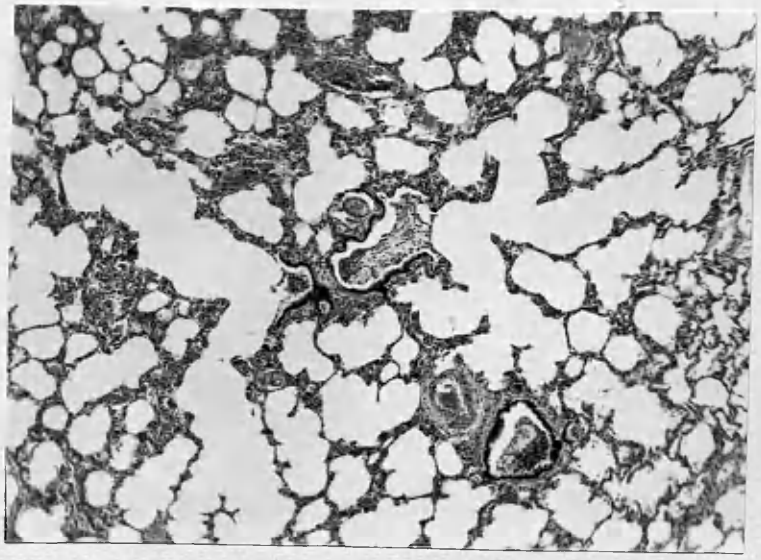


Fig.114. Lung.
In this section a terminal respiratory bronchiole is seen filled with mucus. The related alveoli are emphysematous.

Case 77 H & E X 50

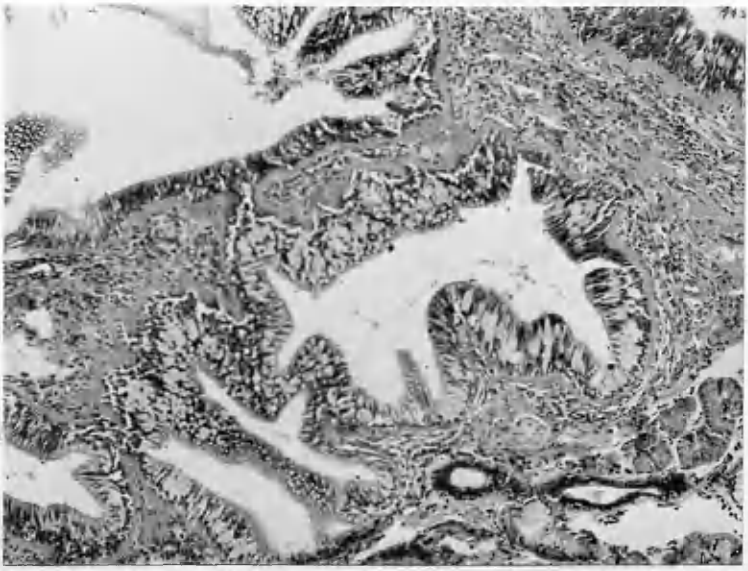


Fig. 115. Lung from a case of bronchiectasis. Note that the dilated bronchi are lined by an epithelium which contains large numbers of goblet cells.
RR 0725 H & E X 70

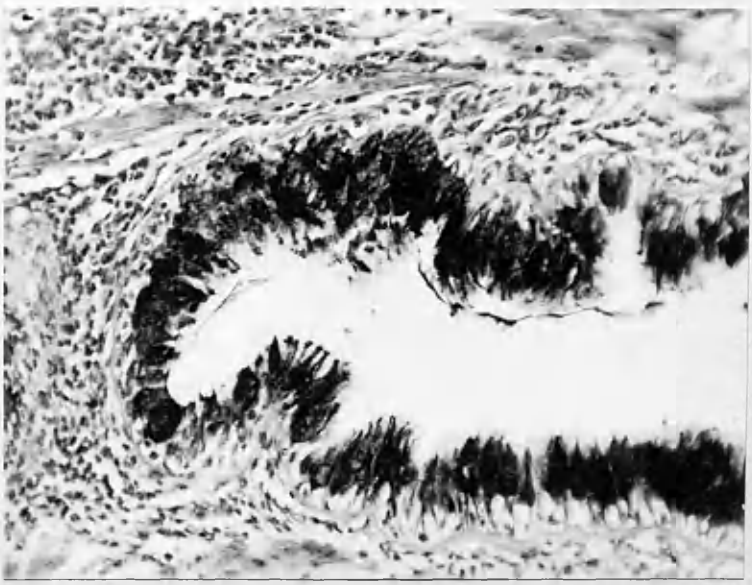


Fig. 116. Lung from a case of bronchiectasis. The cells in the epithelium lining the bronchus are filled with mucus. Compare with the following figure.
RR 0725 PAS X 230

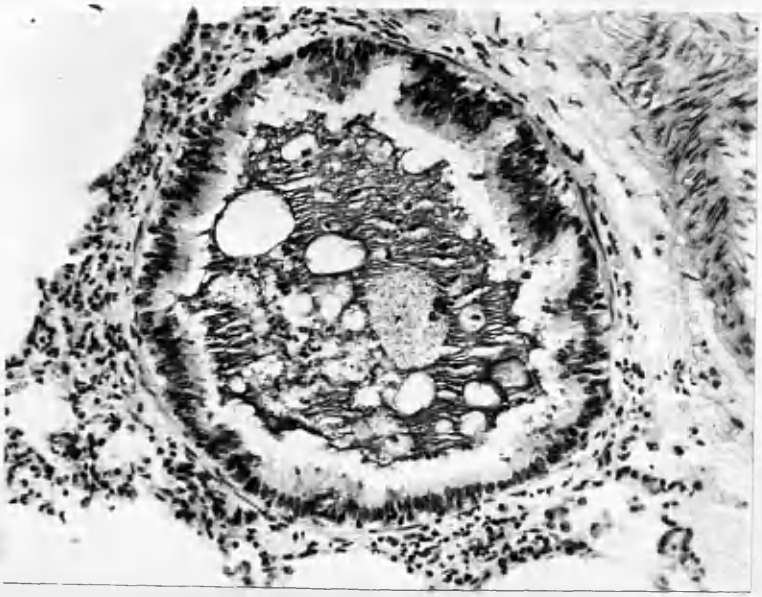


Fig. 117. Lung from the same case as the preceding figure. This shows a bronchiole filled with mucus which appears dark in this preparation. Note that only a few small goblets of mucus are present in the epithelial cells. The ciliated border of the cells is seen on the right.

Case 77 PAS & H X 230

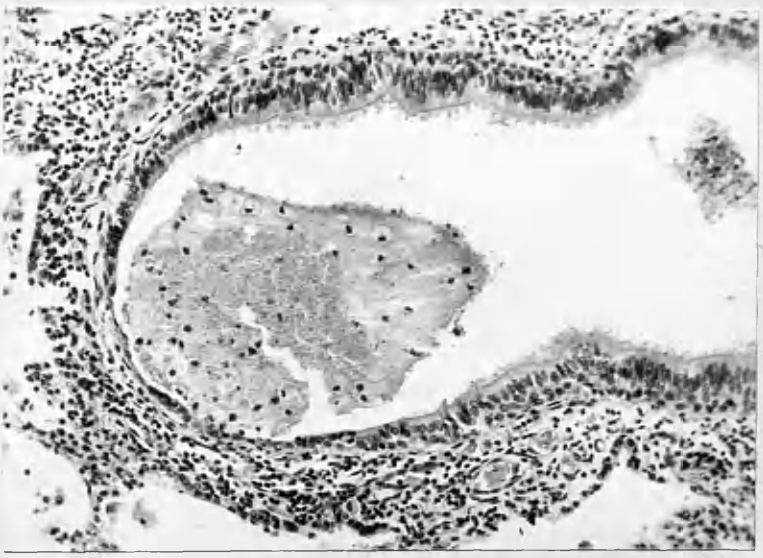


Fig. 118. Lung in fibrocystic disease. This shows an aggregation of mucus lying in a terminal bronchiole which is lined by a normal ciliated epithelium. Some mucus containing macrophages are present.

Case 46 H & E X

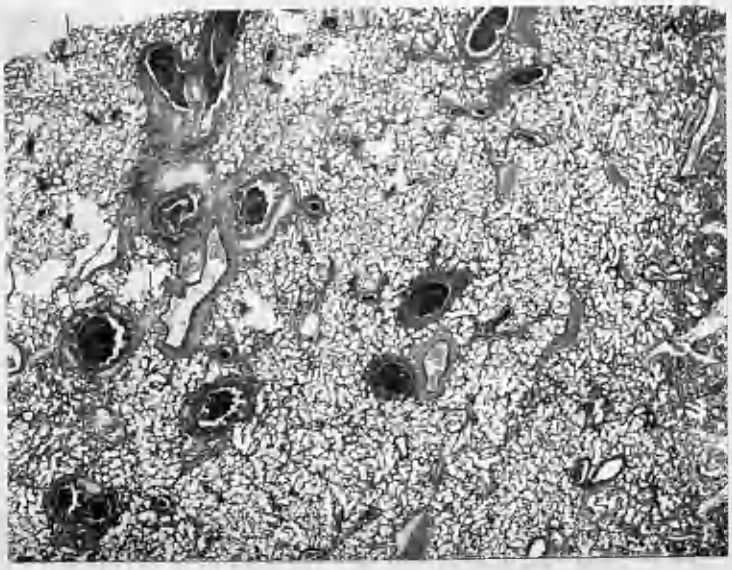


Fig. 119. Lung. This section from the anterior segment of an upper lobe shows several small bronchi filled with pus. There is no collapse and the lung alveoli are moderately emphysematous.
Case 43 H & E X 8

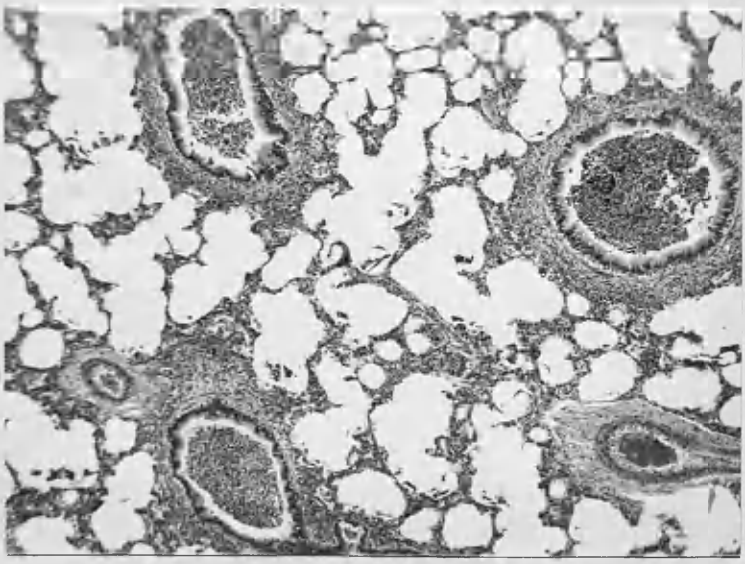


Fig. 120. Lung. Three small bronchioles are seen filled with pus. The normal bronchial epithelium is well preserved and shows no ulceration. The alveoli are emphysematous.
Case 77 H & E X 50

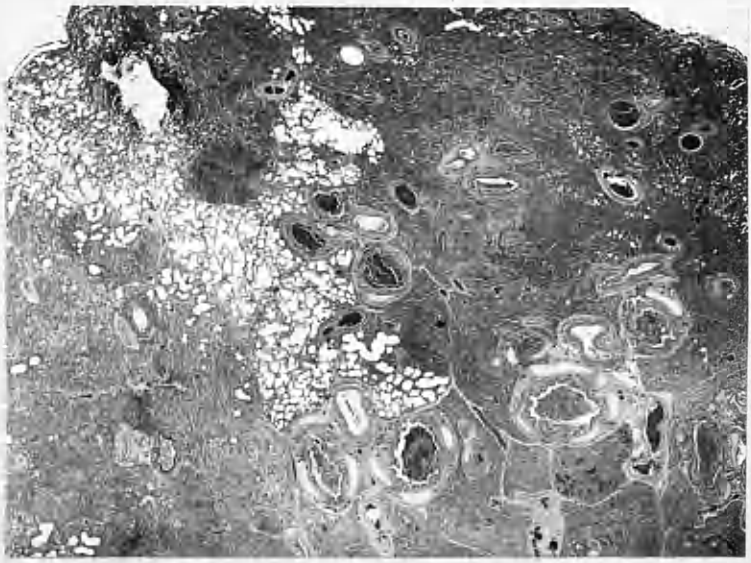


Fig. 121. Lung from a child with fibrocystic disease. In this section of the posterior portion of the lower lobe the bronchi are filled with mucopurulent material. Most of the section seen is consolidated. This is mainly due to collapse of the lung although there is some pneumonia present.
Case 37 H & E X 8

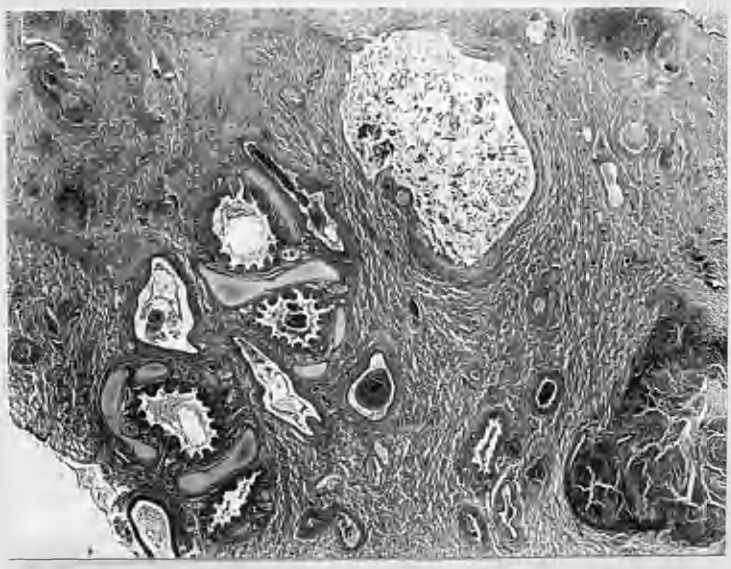


Fig. 122. Lung. In this section most of the bronchi seen are clear of infection or mucus probably as a result of chemotherapy. Nevertheless two large abscess cavities are present.
Case 37 H & E X 8

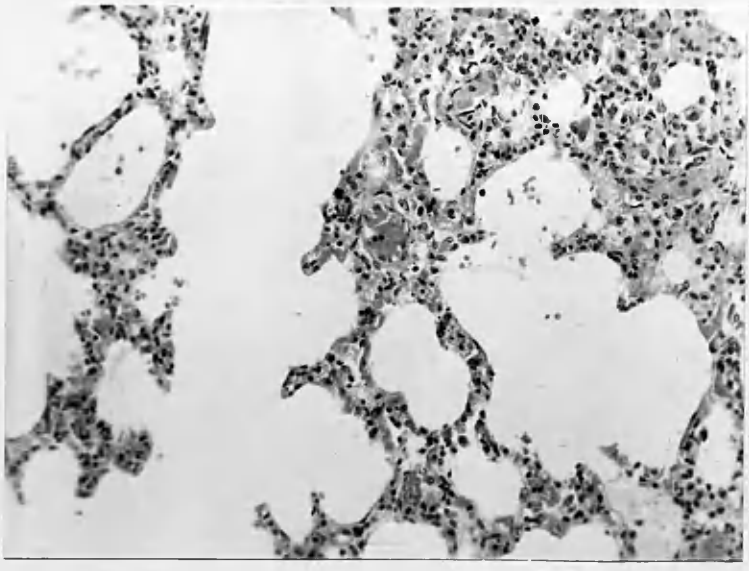


Fig. 123. Lung. This portion of aerated lung shows severe emphysema which is often present in fibrocystic disease.

Case 44 H & E X 160

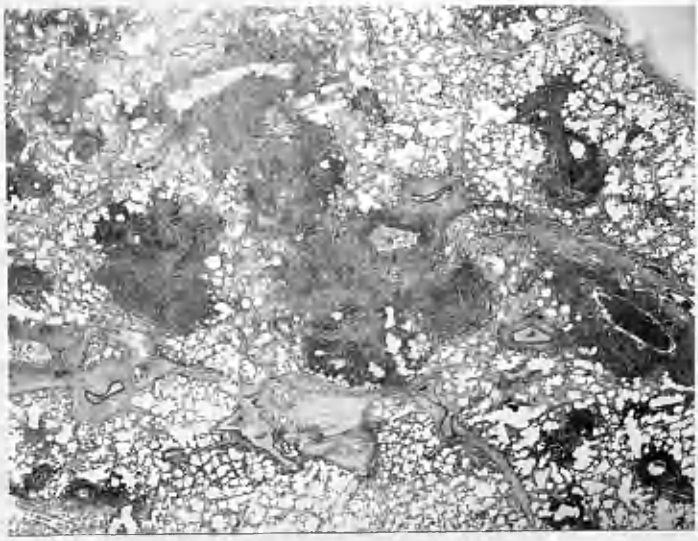


Fig. 124. Lung from a child suffering from fibrocystic disease. In this instance infection has spread through the bronchial walls into the adjacent alveoli and has produced bronchopneumonia.
Case 34 H & E X 8

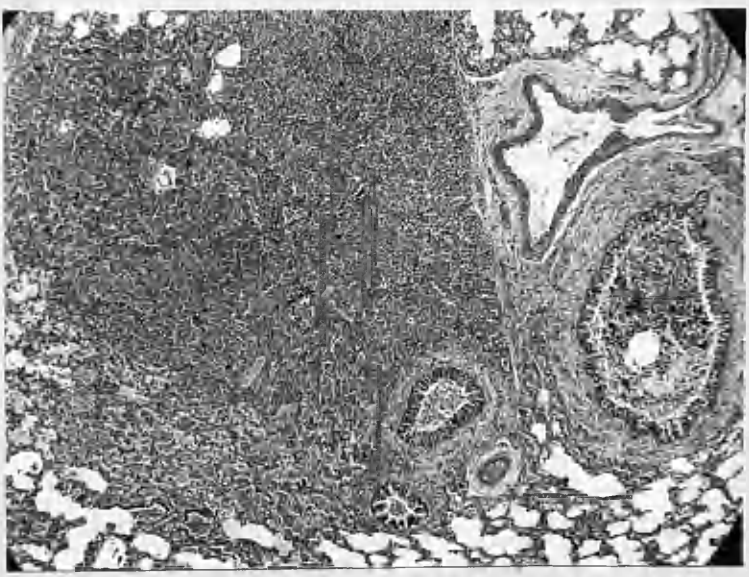


Fig. 125. Lung from a child. This shows a bronchus completely filled with pus. The lung on the right shows consolidation due to bronchopneumonia.
Case 95 H & E X 50

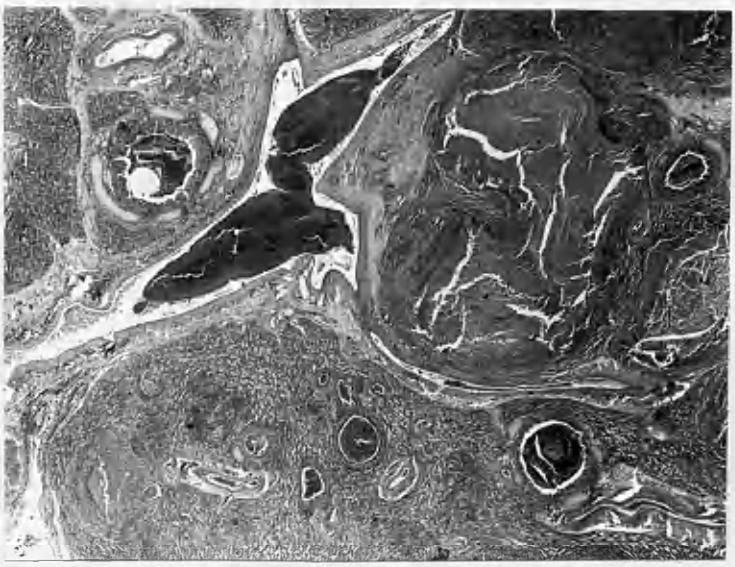


Fig. 126. Lung. Several bronchi are seen filled with pus. In the left centre infection has spread into the lung and has resulted in abscess formation. Much of the lung seen in this section shows portal collapse.
Case 24 H & E X 8

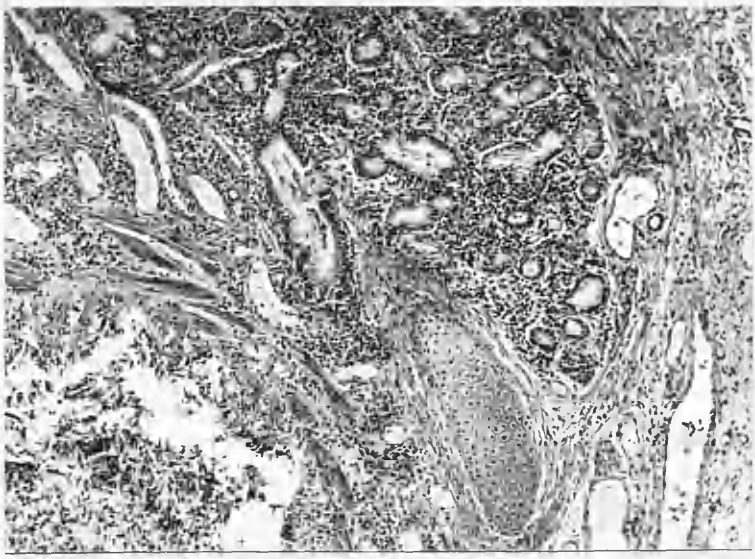


Fig. 127. Lung from a child aged 4 months. This section of a bronchus shows loss of the surface epithelium and widespread infiltration of the submucosa by inflammatory cells.
Case 67 H & E X 70

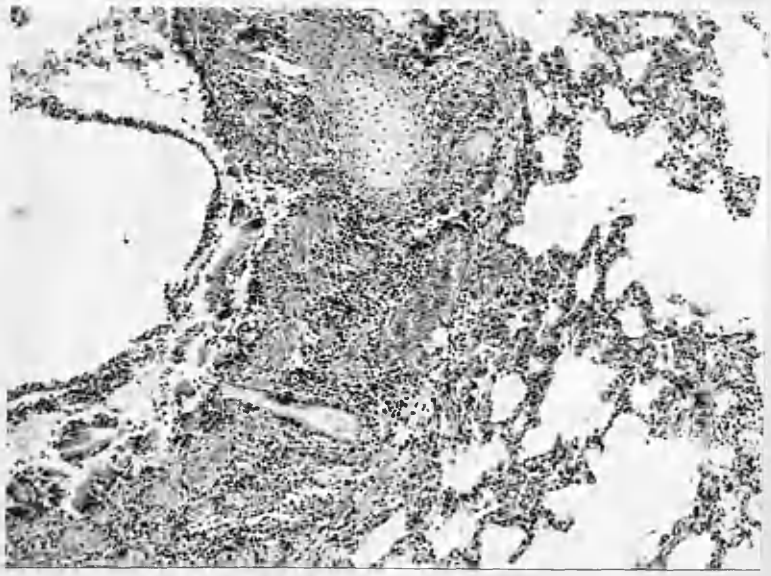


Fig. 128. Lung. This shows a portion of the wall of a small bronchus from a case in which infection was present for a long time. Extensive destruction and loss of the normal tissue has occurred.
Case 71 H & E X 85

Fig. 129. Lung from a child with fibrocystic disease. Pulmonary infection had been present for a considerable time but was kept under control by antibiotics. The muscle in the bronchial wall has been destroyed and although there is peribronchial fibrosis the bronchi have become dilated and show early bronchiectasis.

Case 39 H & E X 8

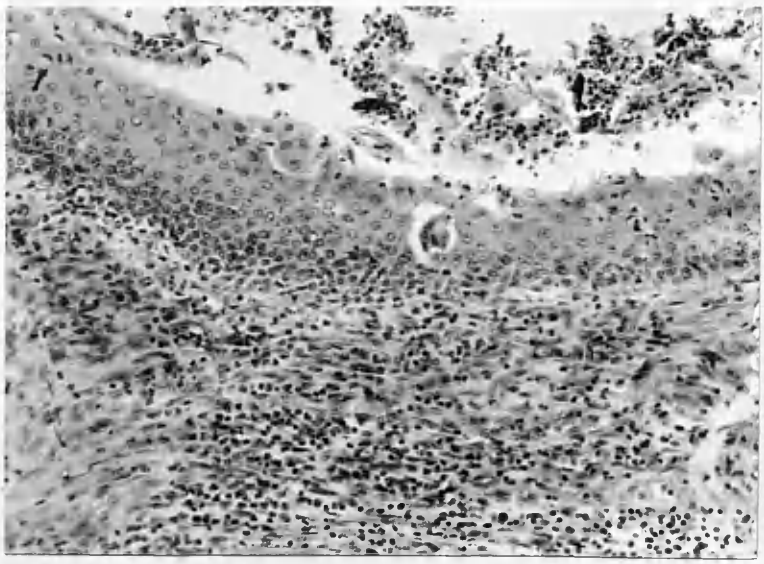


Fig. 130. Portion of bronchus lined by squamous epithelium. It was not possible to determine if this squamous metaplasia was due to long continued infection or vitamin A deficiency or a combination of both factors.
Case 51 H & E X 150

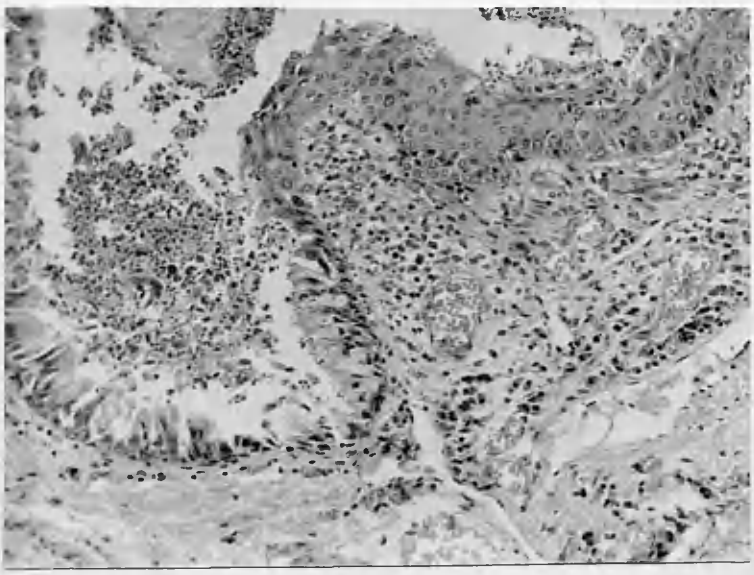


Fig. 131. Lung in fibrocystic disease. This shows a portion of a large bronchus. The lumen is filled with pus cells. The lining epithelium is still present and is composed of tall columnar cells which contain abundant mucus and are not ciliated.
Case 51 H & E X 150

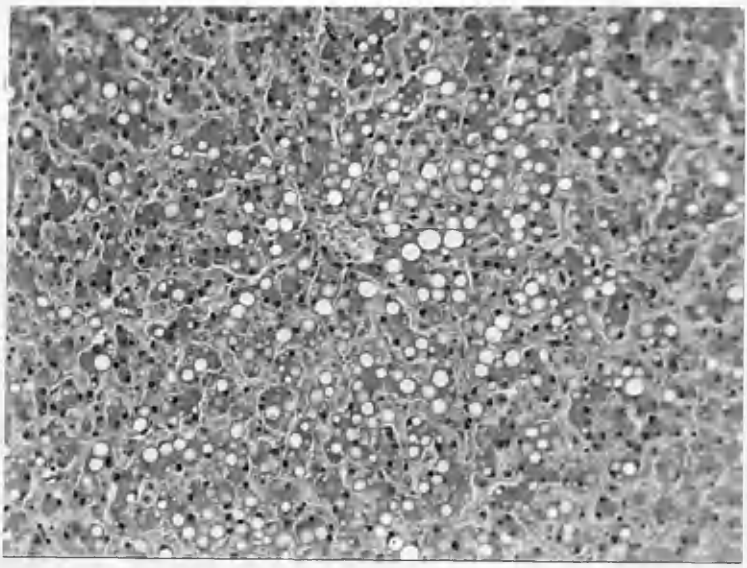


Fig. 132. Liver from a case of fibrocystic disease. This shows a moderate degree of fatty degeneration which is most marked towards the centre of the lobules. This change is often much more severe than in the case illustrated above.
Case 18 H & E X 60

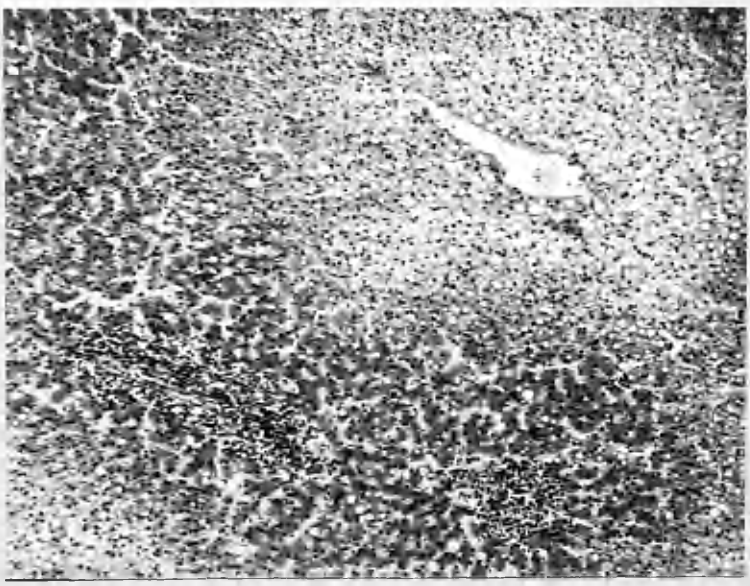


Fig. 133. Liver from a case of fibrocystic disease. A moderately severe fatty change is present in the centre of the lobules. There are aggregations of lymphocytes around the portal tracts.
Case 60 H & E X 70

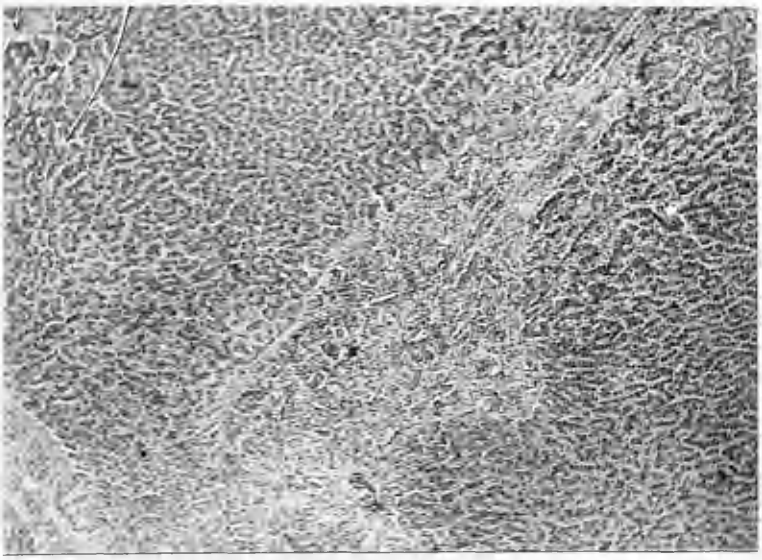


Fig. 134. Liver from a case of fibrocystic disease. A gross lesion is present in the portal tract which contains many small bile ducts. There is a considerable increase in the amount of fibrous tissue present.

Case 78 H & E X 50

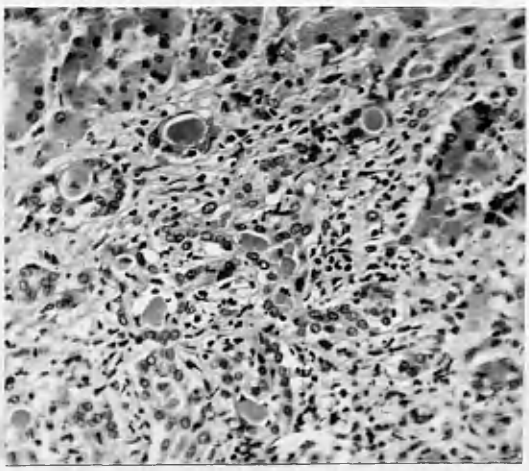


Fig. 135. Liver from the same case as the preceding figure. This higher power view shows the fibrous tissue in the portal tracts. A number of small bile ducts distended with bile are present.

Case 78 H & E X 230

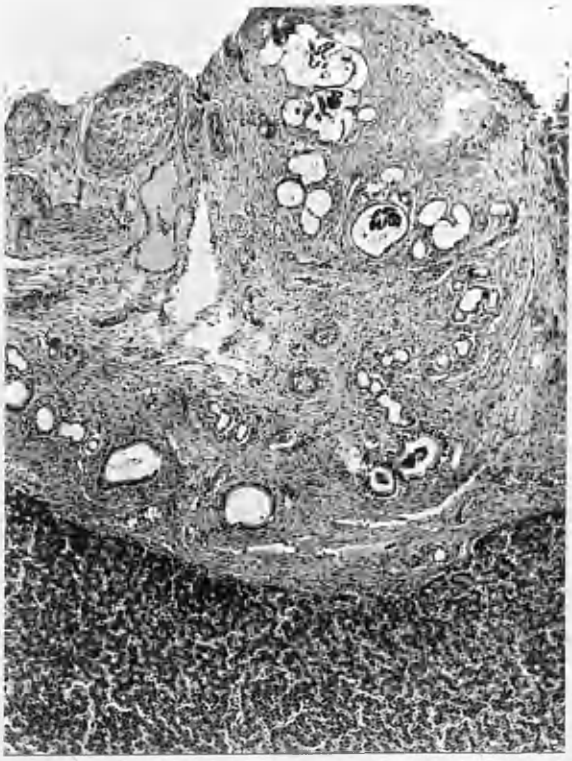


Fig. 136. Liver from a case of fibrocystic disease.
This section shows a portion of the neck of the gall-bladder.
Cystic change is seen in many of the glands.
Case 86 H & E X 50

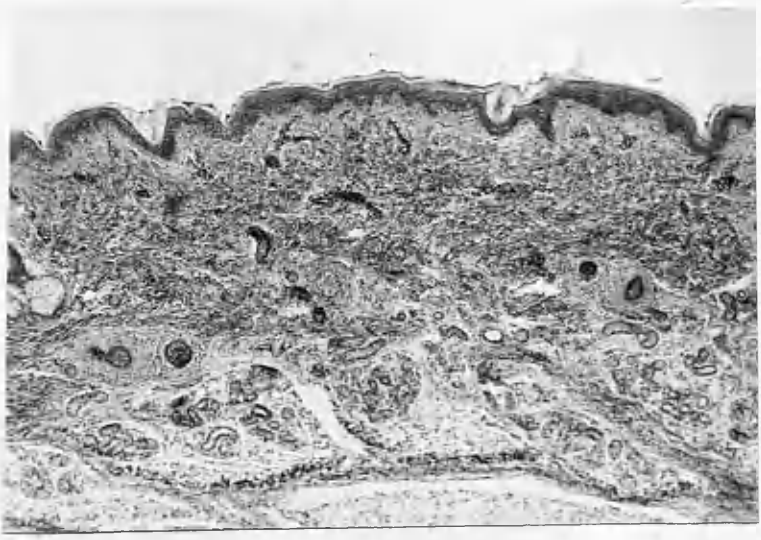


Fig. 137. Section of skin from axilla from a case of fibrocystic disease of the pancreas. The skin appears normal. There is no structural abnormality of the sweat glands which appear to be present in normal numbers.

Case 72 H & E X 50

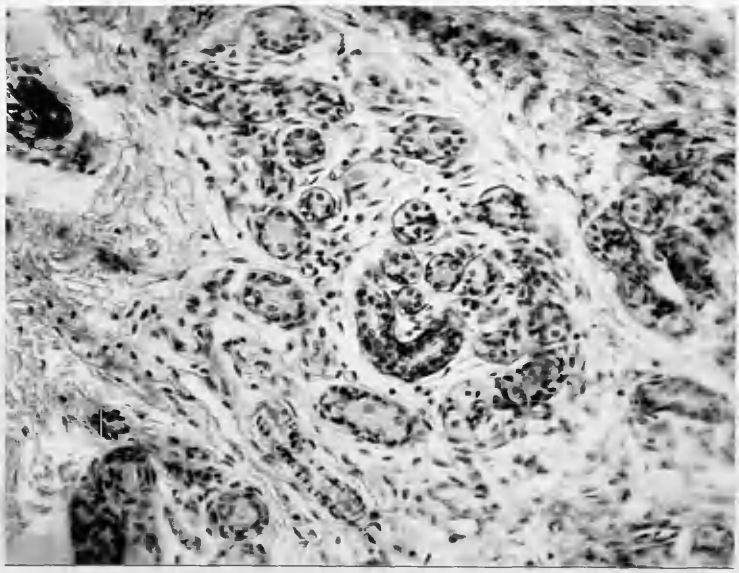


Fig. 138. Skin of axilla from the same patient as the previous figure. This shows a group of sweat glands which show no abnormality.

Case 72 PAS & H X 230

The following illustration (Figs. 139 to 153 inclusive) are from cases of Coeliac Disease. (Cases C1 to C6).

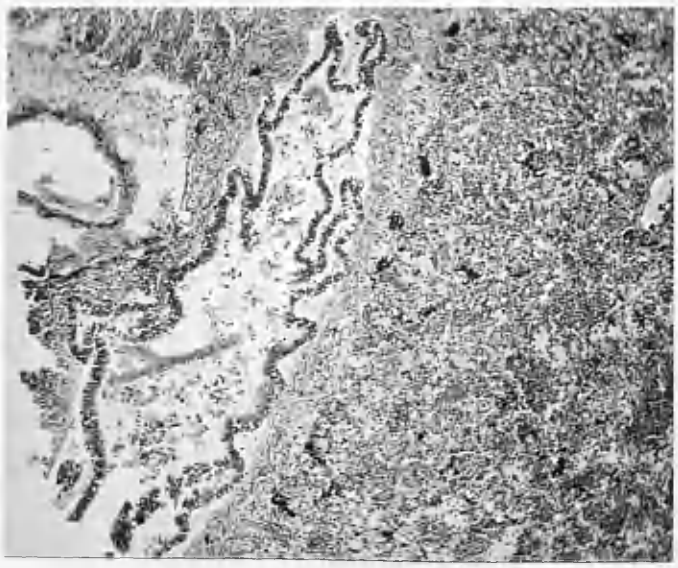


Fig. 139. Lung from a fatal case of coeliac disease. Although there is widespread pneumonia, the majority of the bronchi are not severely infected. No evidence of excessive secretion of mucus is seen in the bronchus illustrated.
Case C6 H & E X 50

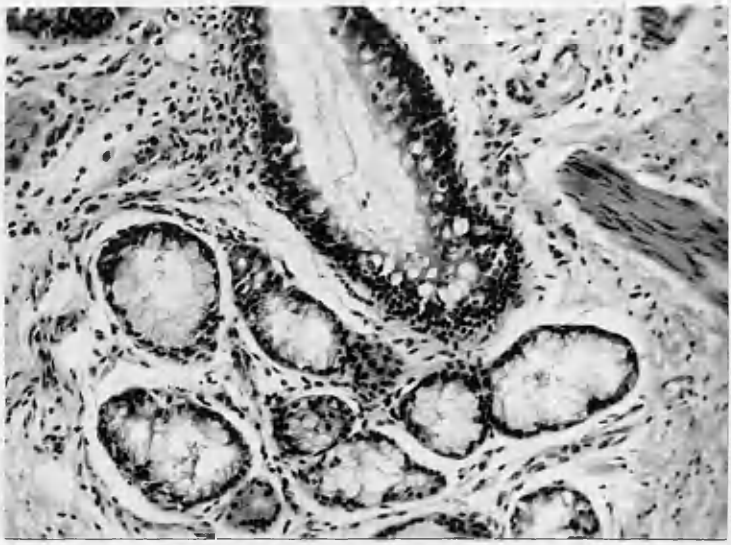


Fig. 140. Trachea from a fatal case of coeliac disease. The submucous glands are not dilated with mucus (Compare with Fig. 106)
Case C5 H & E X 150

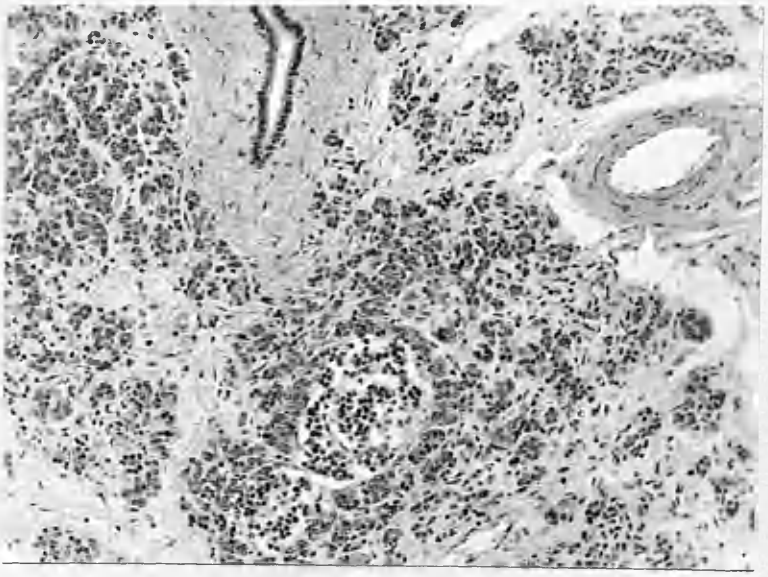


Fig. 141. Section of pancreas. Note the small size of the lobule shown. The individual cells are small in size and there is an increase in the interstitial fibrous tissue.
Case C1 H & E X 60

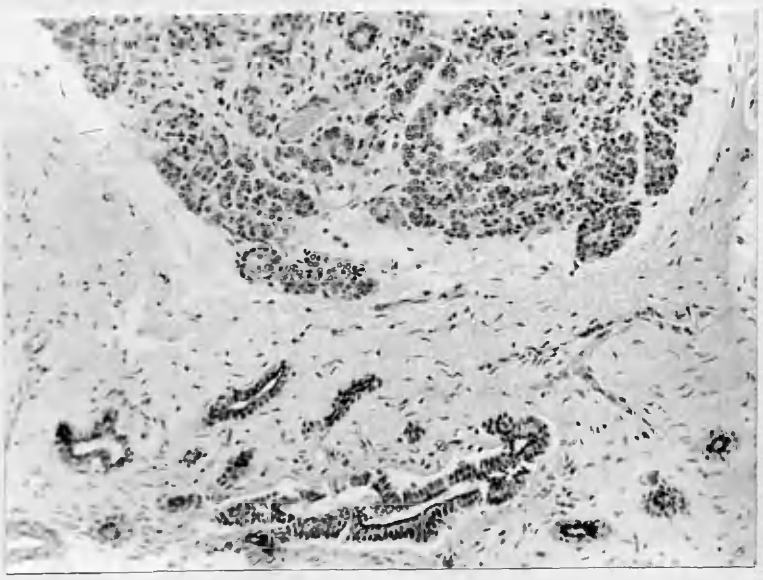


Fig. 142. Pancreas. The general increase in interlobular fibrous tissue is marked. No zymogen granules are present in the acinar cells. The ducts are not dilated and only a small amount of mucus is present along the free border of the cells.
Case C1 PAS X 60

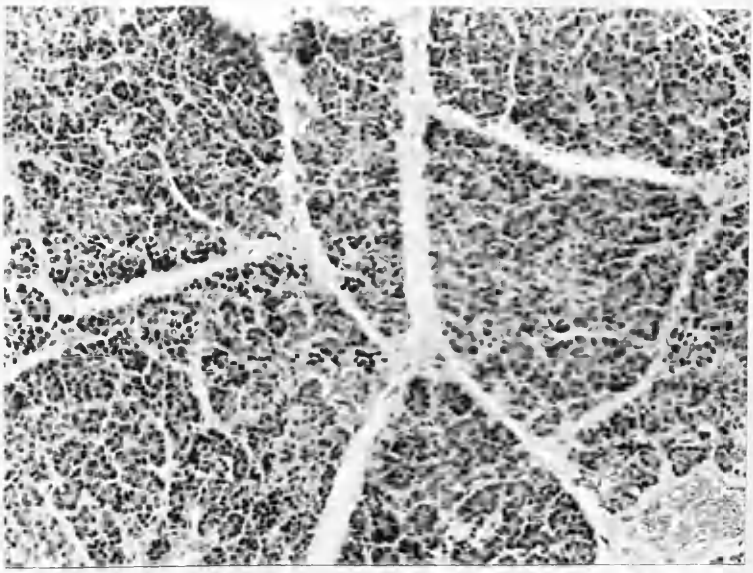


Fig. 143. PANCREAS. The general architecture in this case is normal and the lobules are large. The individual acinar cells are small.

Case C5 H & E X 50

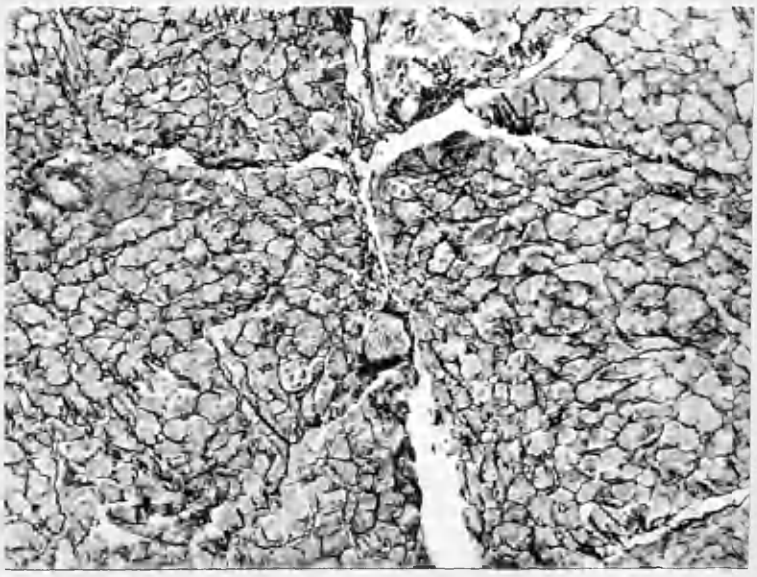


Fig. 144. PANCREAS. There is a slight increase in the amount of reticulum present.

Case C5 Gordon & Sweet's Reticulum Stain X 50

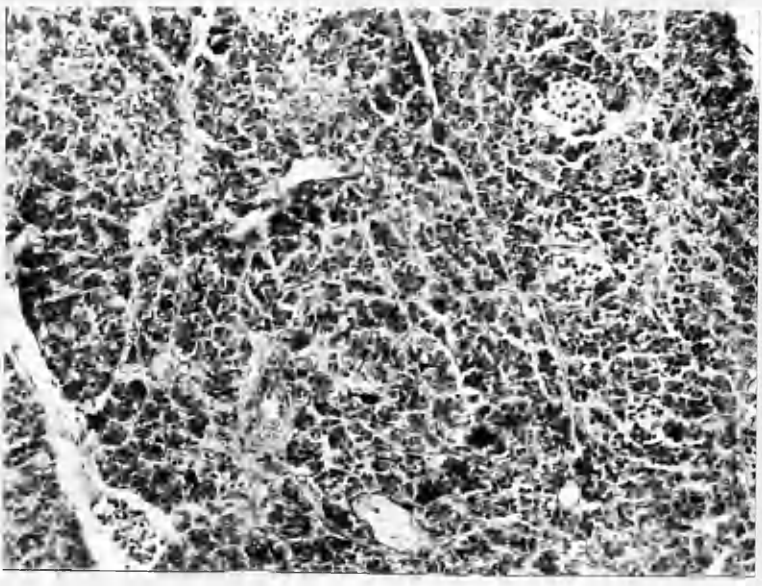


Fig. 145. Pancreas. Note absence of mucus plugs. There are only very few zymogen granules present.
Case C5 PAS X 50

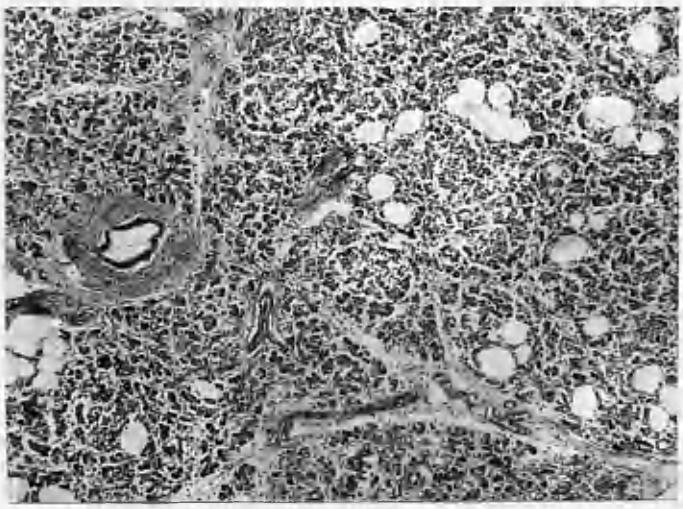


Fig. 146. Pancreas from a case of coeliac disease. There is no gross disturbance in the architecture of the organ. The acini are small and there is some increase in interstitial tissue. No cystic dilatation of either acini or ducts is present.
Case C6 H & E X 50

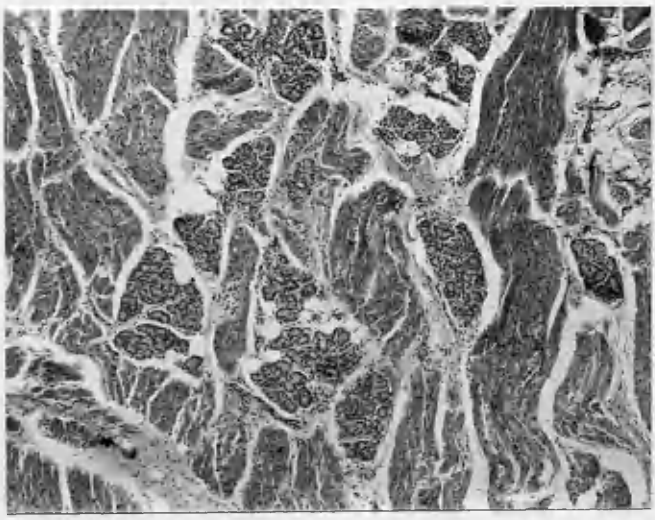


Fig. 147. Tongue from the same case as the above, showing a group of serous acini. These show no abnormality.
Case C6 H & E X 50.

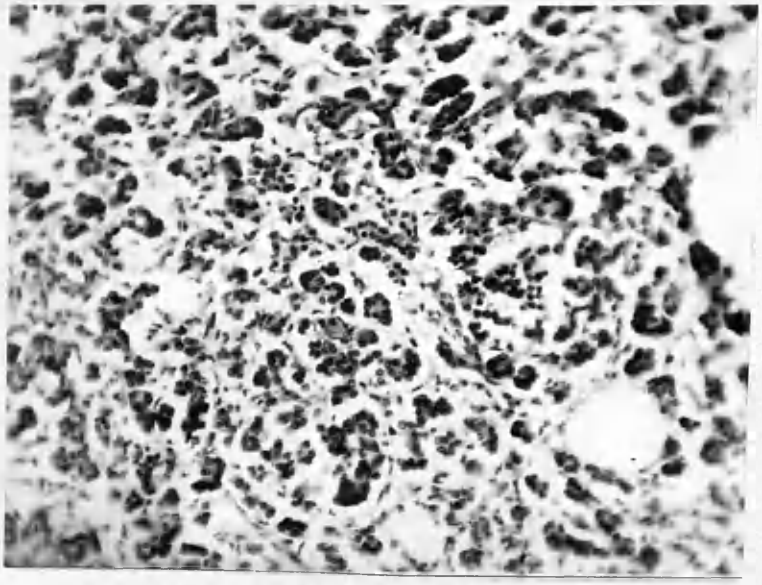


Fig. 148. Pancreas from the same case as the preceding figure. Notice how small the acini are (Compare with fig.10 which is taken at the same magnification). No zymogen granules are present in these cells. The stroma appears abnormally prominent.
Case C 6 H & E X 230

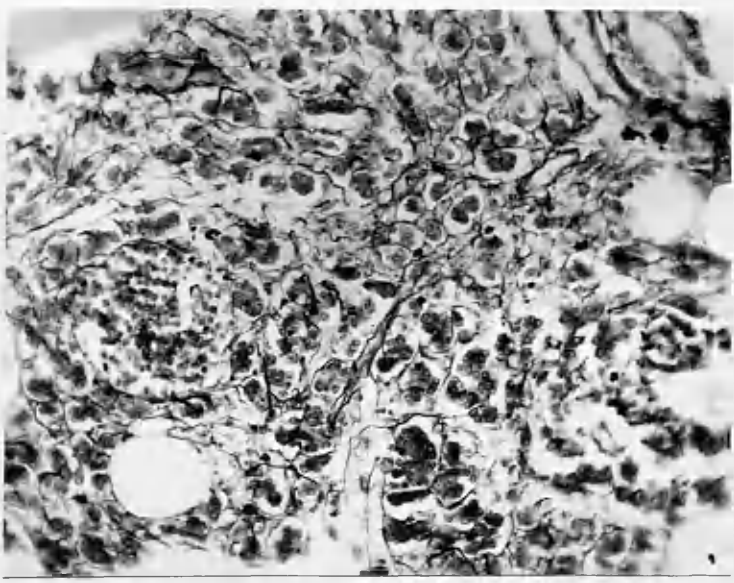


Fig. 149. Pancreas from the same case as the preceding figure. Note that the reticulum fibres are fine and show no evidence of "fibrosis".
Case C 6 Gordon & Sweets Reticulum Stain X 230

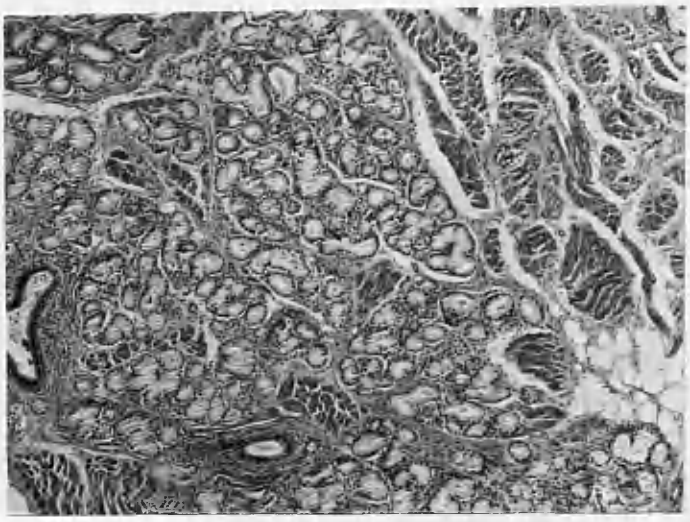


Fig. 150. Tongue from coeliac disease. This shows a group of mucous glands which show no gross lesion.
Case C 6 H & E X 50

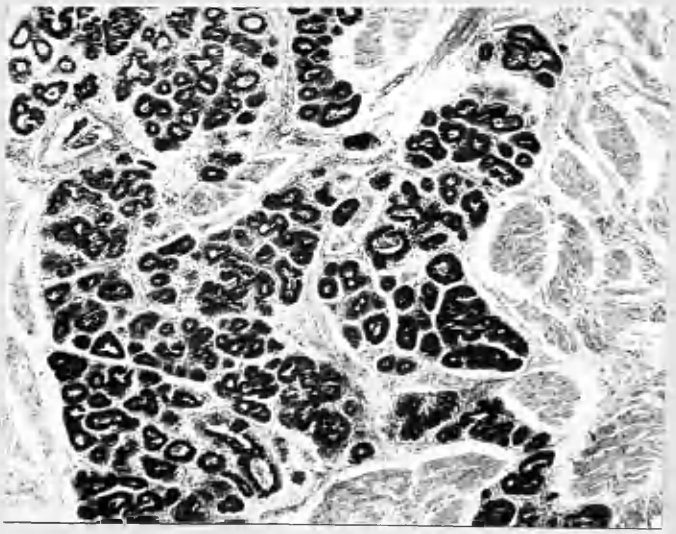


Fig. 151. The same stained to show mucus. No overfilling of the gland acini is present.
Case C 6 PAS X 50.

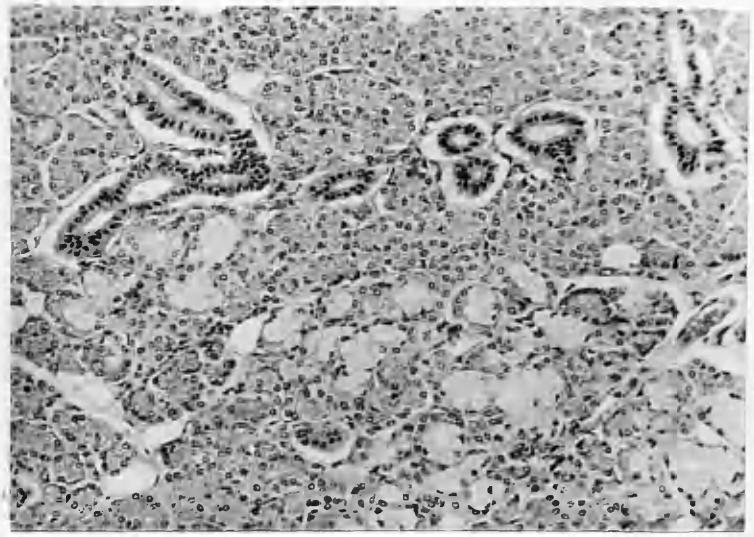
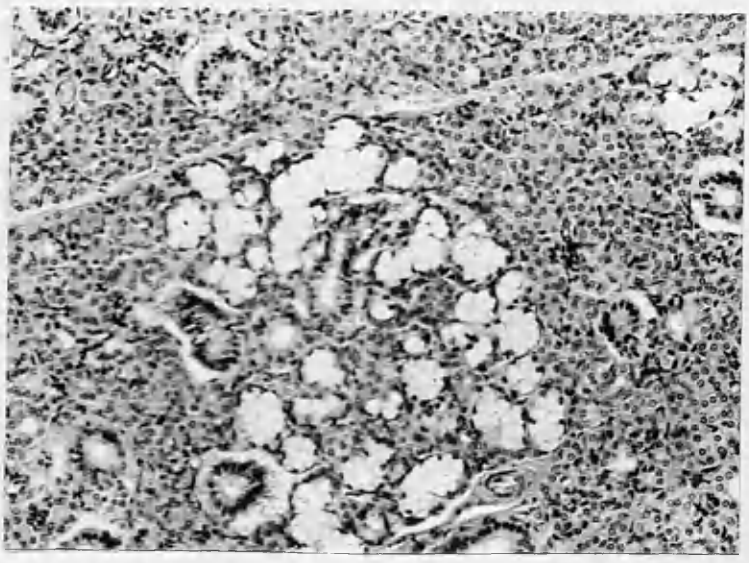


Fig. 152. Salivary gland. This appears hormal. No evidence of excessive secretion of mucus is present.
Case C 4 H & E X 100



Case 153. Salivary gland. This appears normal. There is no evidence of oversecretion of mucus.
Case C 5 H & E X 100

FIBROCYSTIC DISEASE

OF THE PANCREAS

VOLUME III

G. B. S. Roberts

VOLUME III

APPENDIX II

Reports on the clinical and pathological features of 96 fatal cases of fibrocystic disease of the pancreas.

APPENDIX III

Reports on the clinical and pathological features of 6 fatal cases of coeliac disease.

APPENDIX II

REPORTS ON THE CLINICAL AND PATHOLOGICAL FEATURES OF CASES OF FIBROCYSTIC DISEASE OF THE PANCREAS

This appendix consists of brief clinical, postmortem and histological reports on cases of fibrocystic disease which have been collected by me and which form the basis of this thesis. The clinical features have been abstracted from the case sheets of the patients and are, therefore, mainly from the records of the Royal Hospital for Sick Children, Glasgow. Details of courses of chemotherapy which were given to these patients are not recorded here as this thesis is not primarily concerned with the therapy of the condition. Although, in general, most antibiotics produced a temporary improvement in the patient's condition, I could find no evidence that any specific antibiotic gave results that were significantly better than average.

The post mortem reports which are given in rather greater detail were either written by myself at the time I carried out the post mortem or were abstracted from the reports of the Pathology Department. In every case all the histological material has been re-examined and the description given has been modified or supplemented as required. In quite a number of instances the diagnosis has been altered in view of the different interpretation which I have placed on the histological findings.

This is particularly so in the early cases in this series.

Much of the information contained in this appendix has already been abstracted and is given in Chapters II, IV and VI. The post mortem number is quoted at the head of each report so that recourse can be made to the original if desired and unless otherwise stated the case occurred in the Royal Hospital for Sick Children, Yorkhill, Glasgow. A brief reference to any illustration is also given.

The family history given in this appendix is that obtained from the relatives when the child was in hospital. In those instances in which it was possible to visit the children's parents again, fuller details of the family history were obtained. This information is given in the following appendix.

Royal Hospital for Sick Children

Case No. 1 P.M.No. 6401 Sex M. Date of Birth: 5.1.43
Date of Death: 19.2.43
Age at Death: 6 weeks

Family history: Both parents alive and well.
1st child Male Born 1943 Patient

Personal history: Pregnancy was normal, but instruments were used in delivery. Birth weight 5 lb. 2 oz.

Child was breast fed for 2 days but was then changed on to whole milk as it was too weak to suck.

At about 14 days the child developed sores on the back of its head, and a large abscess was present on the breast. Umbilical sepsis was also present. Child failed to thrive and died.

Post mortem findings: The subject is a small slightly jaundiced male infant. Multiple superficial abscesses are present, and one of the largest of these is found to communicate with the right clavicle which is the seat of osteomyelitis.

Multiple abscesses are present in the lungs, the left upper lobe being particularly affected. On section several abscesses are present within the substance of the lungs and there is a wide area of consolidation around these lesions. The heart shows no abnormality.

The umbilicus appears normal and no evidence of infection is seen in the abdomen except in the kidneys where a large subcapsular abscess is present in the upper pole on the left side. The pancreas appears normal.

Bacteriological examination Films of pus from the breast abscess shows abundant staphylococci and a pure growth of staph. aureus is obtained from the lung and from the abscess in the heart wall.

Histological examination The pancreas shows an increase in the amount of connective tissue present. There is a moderate degree of cystic change present and the remaining acini are small and atrophic. The features of the pancreas are those of fibrocystic disease of the pancreas.

Royal Hospital for Sick Children

Case No. 2 P.M.No. 6719 Sex M. Date of Birth: 11.2.44
Date of Death: 1.4.44
Age at Death: 7 weeks

Family history: Both parents alive and well.
1st child Male Born 1944 Patient

Personal history: Pregnancy was normal. Full time instrumental delivery. Child weighed 7 lbs. at birth and showed no abnormality.

The child failed to thrive in spite of various changes of diet. The child also developed a cough which has persisted.

On admission 21.3.44 the child weighed 2.87 K (78% of expected weight), but showed no other gross abnormality on examination.

Diarrhoea persisted and child died on 1.4.44.

Post mortem findings: The body is that of a small wasted male infant.

The lungs show slight basal congestion and oedema but there is no evidence of pneumonia and the bronchi appear normal.

An early peritonitis is present in the upper part of the abdomen where there is a layer of fibrin present on the surface of the bowel. No evidence of infection is seen in the hypogastric arteries or the umbilical vein.
An acute diffuse gastro-enteritis is present with mucosal congestion which is particularly severe in the jejunum. The pancreas appears normal and no other abnormality is seen.

Histological The pancreas is the site of cystic fibrosis. The cysts, which vary in size, are lined by a single layer of epithelium of a very flat type.
Most are empty but some contained a little amorphous colloid. Broad strands of connective tissue run through the organ surrounding the groups of acini and there is also a fine periacinar fibrosis.

Royal Hospital for Sick Children

Case No. 3 P.M.No. 6998 Sex M. Date of Birth: 27.2.44
Date of Death: 26.12.44
Age at Death: 10 months

Family history: Both parents alive and well.

1st child	Male	Born 1941	Died in R.H.S.C. with atresia of bowel.
2nd child	Male	Born 1944	Patient

Personal history: F.T.S.D. at home. Birth weight 7 lbs.

The child showed no abnormality at birth.
The baby was breast fed for 2 weeks and then was changed on to Cow & Gate. The child apparently thrived normally until about 4 months, but thereafter he has not gained weight properly. He has had bouts of green diarrhoea and vomiting. At other times it was noted that the child had loose stools which were paler than normal.

On examination the child was small and showed slight distension of the abdomen. Slight pyrexia occurred at intervals during his stay in hospital and the X-ray appearances of the chest were suggestive of bronchiectasis. Cough persisted and the child failed to thrive. Total faecal fat 38.06 g..

Post mortem findings: The body is that of a fairly well nourished male infant with no external signs of disease.

The bronchial tree is filled with thick yellow pus which extends right down into the minute bronchioles from which beads of pus exude on to the cut surfaces of the lungs. No broncho-pneumonic consolidation is seen however. Numerous small bullous cysts are present in the right lung.
The heart and vessels show no abnormality.

No abnormality is seen in the abdomen.

Bacteriological findings: Cultures from the lungs give a mixed growth of streptococci and staph. aureus.

Histological findings: The pancreas shows a condition of advanced cystic fibrosis with much encroachment on and obstruction to the secreting pancreatic tissue. The islets appear relatively normal. Cysts, which vary in size, are lined by a single layer of flattened epithelium and contain coagulated albuminous exudate.

There is a gross fibrosis throughout the organ.

The liver shows small subcapsular nodules of connective tissue overgrowth in which there are small cysts lined by flattened epithelium which are definitely derived from the bile ducts.

Royal Hospital for Sick Children

Case No. 4 P.M.No. 7376 Sex F. Date of Birth: 19.2.46
Date of Death: 18.9.46
Age at Death: 7 months

Family history: Both parents alive and well.
1st child Female Born 1946 Patient

Personal History: Child was born one month prematurely and birth weight was 4 lbs. 4 oz.

At the age of 5 months the child began coughing frequently and at times had very breathless attacks which followed coughing. The child failed to thrive, and on admission - 11.9.46 - weight was only 3.05 K (46% of expected weight).

An attempt was made at duodenal intubation but no juice was obtained. The child failed to thrive and died.

Post mortem findings: The body is that of an emaciated female child.

Both lungs show considerable areas of atelectasis affecting the lower lobes. When the trachea is opened it is found to be full of thick yellow pus which extends right down the main bronchi and on gentle pressure similar material exudes from the cut surface of the small bronchi and the bronchioles. There is no gross pneumonia in the lung and the lesion appears to be a purulent bronchitis, and bronchiolitis with resultant atelectasis.
The heart and great vessels show no abnormality.

The pancreas appears normal and no lesion is noted in the abdomen.

Bacteriological findings: Pure cultures of staph. aureus coagulase positive and penicillin sensitive were recovered from the bronchial exudate.

Histological findings: The pancreas as a whole has been entirely involved in the fibrocystic change. For the most part cysts are small and they are lined by cubical

type of epithelium but some larger ones are present lined by flattened cells. Many of the cysts contain coagulated albuminous gluid while some contain large phagocytic cells. An excessive amount of fibrous tissue is present. Some of this is thickening of the existing septa of the gland but the rest represents an increase in the fibrous tissue around the acini. The islet tissue shows no gross abnormality.

Royal Hospital for Sick Children

Case No. 5 P.M.No. 7401 Sex F. Date of Birth: 14.6.46
Date of Death: 16.11.46
Age at Death: 5 months

Family history: Mother and father alive and well.

1st child	Male	Born 1938	Died with pneumonia at 3 months.
2nd child	Male	" 1940	Alive and well.
3rd child	Male	" 1943	Alive and well.
4th child	Female	" 1944	Died with pneumonia at 4 months.
5th child	Female	" 1946	Patient

Personal history: Pregnancy was normal and the child was a normal F.T.S.D. Birth weight 8 lb. 10 oz.

The child thrived well until the age of 3 months when she developed "whooping cough". Cough persisted however. Various treatments were given for the cough but no improvement was obtained. The child has fed well and has not vomited.

From the age of 6 weeks it was noticed that the stools were very pale and were foul smelling.

On admission 16.11.46 the child weighed 3.45 K (50% of expected weight).

On examination the child was a moribund, marasmic infant. The abdomen was protruberant. Evidence of pneumonic consolidation was found in the chest.

Duodenal intubation gave a fluid with pH 8 which showed no evidence of tryptic activity.

Post mortem findings: The subject is an emaciated female infant, extremely small and undernourished for her age. Abundant thick tenacious yellow pus is present in the bronchial tree with spread to the bronchioles, from which small purulent plugs can be expressed. Broncho-pneumonic consolidation, however, is absent, the only lesion observed being slight superficial atelectasis at both lung bases. On section

both lungs there is no bronchial dilatation in any lobes of either organ.

There is no peritonitis and the mesenteric glands are inconspicuous. The pancreas weighs 6.8 gms. and consists of a rather large head, and a body and tail of approximately normal size. On inspection of the organ there appears to be some separation of the lobules, so that the structural outline is less compact than usual. No other abnormality is observed macroscopically, and the consistence of the organ is not appreciably altered from the normal. The liver shows no lesion except cloudy swelling. Bile of normal consistence can be expressed readily at the ampulla of Water on exerting pressure on the gallbladder. The wall of the gastro-intestinal tract is of normal thickness throughout with no suggestion of atrophy at any point.

Bacteriological examination: Bronchial pus shows no spirochaetes or fusiform bacilli in films. Culture yields a growth of a diplococcus with the morphological and cultural characters of enterococcus.

Histological examination: The pancreas is the seat of well-marked, typical fibrocystic disease with the characteristic picture of interstitial fibrosis and atrophy of the acinar tissue. The ducts are dilated and many of them lined with a flattened type of epithelium. Many of them contain amorphous eosinophilic staining material in varying amount. In some of the lobules the acini are relatively intact and evidently capable of functioning. The islet tissue is well-preserved throughout. The cysts vary in size in different lobules, even in the same section.

The minute bronchioles are filled with dense, purulent plugs by a zone of colsolidation. Chronic inflammatory change is present in the wall of the larger bronchioles and these also contain abundant purulent material. The inflammatory condition is spreading from the bronchioles into the surrounding lung alveoli.

Royal Hospital for Sick Children

Case No. 6 P.M.No. 7417 Sex

Date of Birth: 22.12.46
Date of Death: 28.12.46
Age at Death: 6 days.

Family history: Not given.

Personal history: Mother had hydramnios but birth was normal. Although the child appeared normal, about 12 hours after birth the child started to vomit. Its abdomen was noted to be distended and it passed no meconium.

At operation a plastic peritonitis was found and the small bowel was distended with meconium. It was not possible to carry out an enterostomy but the abdomen was closed. Subsequently the child's condition gradually deteriorated. Vomiting continued and it died 6 days after birth.

Post mortem findings: The subject is a well-developed child without external signs of disease. There is a stitched laparotomy scar in the left iliac fossa.

There is a left-sided pneumonia of haemorrhagic type involving both lobes of this lung.

The stomach is distended with gas and the small intestine is distended mainly by inspissated meconium. When examined the meconium is rather lightish in colour, greasy and very thick. This distension terminates at the ileo-caecal valve and the large intestine is empty and smaller than normal, being about the size seen in a seven month premature child. The appearance is complicated by a plastic peritonitis which has matted together the loops of small bowel and also the ascending colon, the latter having assumed an S-shape. There is in addition much post mortem decomposition but so far as can be seen there has been no band or other structure producing intestinal obstructions. The obstruction appears to have been caused by the thickened meconium itself and this certainly never entered the large intestine at all. The case, therefore, conforms to the type described in fibrocystic disease of the pancreas, and the pancreas in this child is small and hard, more lobular than normal, but no cysts can be detected naked eye. The organ is being examined microscopically. The liver shows

considerable post mortem change. The gall-bladder and ducts are normal.
Histological examination of the pancreas. Subsequent re-examination of the pancreas in this case showed an increase in fibrous tissue, mucus plugs in the small intra lobular ducts and an absence of zymogen granules. The lesions seen in the pancreas are accordingly considered to be typical of those found in meconium ileus and this case is regarded as one of fibrocystic disease.

Royal Hospital for Sick Children

Case No. 7 P.M.No. 7454 Sex M. Date of Birth: 31.12.46
Date of Death: 16.2.47
Age at Death: 2 months

Family history: Both parents alive and well.
1st child Male Died of bronchitis at 6 months.
2nd child Female Aged 3 years Alive and well.
3rd child Male Died at one week ? intestinal atresia.
4th child Male Patient.

Personal history: Pregnancy was normal and child was a F.T.S.D. Birth weight $7\frac{1}{2}$ lbs.

No abnormality was noticed at birth and the child seemed to thrive well for a period. 4 days before admission the child developed a cough and refused his feeds.

No gross abnormality was found on examination except in the chest. X-ray examination showed emphysema and some consolidation in the right middle lobe. Irregular pyrexia persisted and the child died on 16.2.47.

Post mortem findings: The subject is an emaciated child considerably under-weight for its age. Height 23 ins.

The basal lobe of the right lung is slightly adherent to the diaphragm and is of dark purplish colour. Small greyish areas of consolidation can be seen through the pleural surface at the base of the lung and on section there is an extensive broncho-pneumonia involving almost the entire lobe, and the small bronchi in some instances end in small abscess cavities. The part of this lobe which is not actually pneumonic

is collapsed. The remainder of this lung and the left lung are reasonably well-expanded and free from pneumonia. The main bronchi show an acute bronchitis with intense congestion and swelling of the mucosa and a purulent exudate. At the carina major the pus is abundant and partially obstructs the bronchi. There is an acute tracheitis but the larynx is normal.

The stomach and intestines show nothing of note. The liver shows an advanced degree of cloudy swelling. The gall-bladder and ducts are normal. The adrenal glands and pancreas are normal.

Bacteriological examination: Material from lung puncture, pus from bronchus and pus from ear were cultured on tellurite agar. All specimens yielded a growth of staph. aureus. This is practically pure in the case of the ear swabs and the strain is penicillin-sensitive and coagulase-positive. Specimens from lung puncture and bronchus show a staphylococcal growth intimately mixed with a spreading proteus growth. It was not possible to isolate strains in pure culture.

Histological examination: Lung: There are some areas of confluent broncho-pneumonia and collapse, and the bronchi have lost their tall ciliated epithelium which has been replaced by the pear-shaped cells met with in chronic bronchitis. The bronchioles have their normal lining. Bronchial and alveolar capillaries all show intense congestion.
Pancreas: Some acini contain inspissated secretion and there is some interstitial fibrosis. This is not a gross fibrocystic disease but the gland is not normal.

Royal Hospital for Sick Children

Case No. 8 P.M.No. 7515. Sex F. Date of Birth: 4.1.47
Date of Death: 27.4.47
Age at Death: 3 months

Family history: Both parents alive and well.

1st child	Female	Born 1938	Died at 4 months with a convulsion.
2nd child	Male	Born 1940	Alive and well.
3rd child	Female	Born 1947	Patient

Personal history: Pregnancy was normal and the child was a F.T.S.D. Birth weight is not stated, but at 3 weeks the child weighed 7 lbs.

On 20.4.47 it was noticed that the child was pale and irritable and respiration was embarrassed. Since then the child has vomited feeds and stools have been loose and undigested.

On examination the child was pale and under-nourished. Child showed signs of consolidation of the lungs but no other abnormality was seen.

Post mortem findings: The subject is a poorly developed child without external signs of disease.

There is a right sided pyo-pneumo-thorax with collapse of the right lung. Thick fibrinous pus adheres to both pleural surfaces and some liquid pus is present in the pleural cavity. The lung shows the appearance of almost total collapse but some areas of broncho-pneumonia are present particularly in the basal lobe. The bronchi and trachea are normal.
The heart and great vessels appear normal.

The abdominal viscera show no features of note and the pancreas appears normal.

Histological examination: Histological examination of the pancreas shows cystic change and severe associated fibrosis. The Brunner's glands in the duodenum are dilated. The lungs show an extensive purulent bronchitis.

Royal Hospital for Sick Children

Case No. 9 P.M.No. 7558 Sex M. Date of Birth: 24.4.47
Date of Death: 8.6.47
Age at Death: 6 weeks.

Family History: Parents alive and well.
1st child Male Born 1946 alive and well.
2nd child Male Born 1947 patient.

Personal history: The child showed no abnormality at birth; it took feeds eagerly and was thriving until 30.5.47 when he vomited feeds and had diarrhoea. Since then motions were green and the child has rapidly lost weight; A slight cough has been noticed.

On admission the child was undernourished and dehydrated. No respiratory embarrassment was noticed and no gross lesion was found.

The vomiting persisted and in spite of the appropriate therapy the child's condition deteriorated. Thrombosis of the child's brachial artery occurred and the child's condition steadily deteriorated and it died on 8.6.47.

Post mortem findings: The body is that of a small male infant with fairly extensive haemorrhage into the right upper arm in the region of the elbow. A small surgical incision for an intravenous drip is present in the right antecubital fossa. It appears on dissecting out the vessels that a ligature has been tied round both the brachial artery and vein and a small amount of reddish thrombus is present in the artery just above the ligature, but has not extended far beyond this point. A little recent red thrombus only is present in the vein. No other external lesion of note is present.

No abnormality is found in the pharynx and oesophagus. The larynx contains mucus only but small mucopurulent plugs are present in the bronchioles, and pneumonic consolidation is fairly diffuse in both lower lung lobes. No lesion is evident in the heart, in which the foramen ovale is closed. The pleural and pericardial sacs are healthy.
Very pronounced fatty change is found in the liver, affecting chiefly the central part of the

organ, while the peripheral zone is relatively healthy. Both kidneys are normal except for a few petechial haemorrhages into the pelvis on both sides. The small spleen, the adrenals and pancreas are all healthy. There is some oedema of the gallbladder and the bile is pale and mucoid. Acute diffuse gastro-enteritis is present and the inflamed gastric mucosa is covered by a layer of thick mucopus. Intense hyperaemia is present in the duodenum and throughout the small bowel, becoming less marked in the lower ileum, and only slight in the colon. The intestinal contents are bile-stained with an excess of mucus but no blood.

No haemorrhage is present on the surface of the brain, but when cutting into it there is an extensive area of red softening, in all probability embolic in origin, ? from an embolus detached from the ligated brachial artery. Practically the entire frontal pole of the brain on the left side is affected and there has been destruction of the deep cerebral cortex almost as far as the Rolandic area.

Histological examination: Pancreas. Sections show an early stage in pancreatic fibrosis with fine connective tissue separating the lobules but no cystic change. unfortunately, post mortem change is present.

Royal Hospital for Sick Children

Case No. 10 P.M.No. 7572 Sex M. Date of Birth: 21. 4.47
Date of Death: 28.6.47
Age at Death: 10 weeks.

Family history: Parents alive and well.

1st child	Female	Born 1941	alive and well.
2nd child	Female	" 1943	alive and well.
3rd child	Male	" 1944	alive and well.
4th child	Male	" 1945	alive and well.
5th child	Male	" 1947	patient.

Personal history: Normal full time pregnancy - spontaneous delivery. Birth weight $6\frac{1}{2}$ lbs.

No abnormality was noted at birth, and the child thrived normally until the present illness.

On 28.6.47 the child vomited a small amount of greenish fluid and after that had diarrhoea, passing soft greenish stools. The child

developed convulsions and died within a few hours.

Post mortem findings:

The subject is a marasmic infant.

The thymus gland is not enlarged. The lungs are moderately well-expanded anteriorly but the posterior portions of all lobes are collapsed. There is no pneumonic consolidation but the main bronchial branches contain an excess of mucus, and stringy mucus is present in the trachea and larynx. There is, however, no congestion of the mucous membrane of the trachea and bronchi. The oesophagus is normal. The heart is of normal structure, but atrophic. The great vessels and pericardium are normal.

The stomach contains a small amount of altered blood and some petechial haemorrhages are present on the gastric mucosa. The duodenum shows a moderately acute congestion, especially round the ampulla of Vater, but the small intestine as a whole is not congested and the faeces are dry and well coloured. The large intestine shows nothing of note. The mesenteric glands are not enlarged and there is no enlargement of the Peyer's patches. The liver shows a slight degree of fatty change with cloudy swelling. The gallbladder and ducts are normal. The spleen is of normal size. The adrenal glands and pancreas are normal. The kidneys both show cloudy swelling. The ureters and urinary bladder are normal.

Histological examination:

Pancreas. This is an early fibrocystic disease, the ducts being filled with inspissated secretion. There is some cystic change in the acini.

No other tissues are available for examination.

Ruchill Hospital

Case No. 11 P.M.No. R 46 Sex M. Date of birth: 5.1.47
Date of death: 13.2.54
Age at death: 5 years

Family history: Not available

Personal history: Was in Ward 24, 16.2.53 - 26.8.53 with chronic staphylococcal bronchopneumonia, treated with penicillin, streptomycin, aureomycin and terramycin in turn with good results. Bronchogram showed no bronchiectasis. Re-admitted 30.1.54 very ill. Cyanosis, clubbing and dyspnoea. O/E. chest widespread rales. Neck veins distended. Put on penicillin - no improvement, terramycin - no improvement, 5.2.54, erythromycin - developed ankle oedema. Put on mersalyl and aminophylline and later sulp. and penicillin. All ineffective, died 13.2.54. Staphylococcus proved sensitive only to chloramphenicol.

Post mortem examination: The body is that of a boy aged about 5 who appears to be tall for his age but is very thin. No other abnormality is seen on external examination.

Thorax: Trachea and bronchi are filled with thick yellow pus. Pleurae are normal. The lungs are very voluminous and show gross emphysema particularly of the anterior margins. Areas of collapse are present on the posterior surfaces of the lower lobes. The lungs feel nodular due to small areas of consolidation. Section of the lungs showed an extensive cylindrical bronchiectasis affecting both upper and lower lobes of both lungs. Early abscess formation was present. Pericardium is normal. The heart shows no gross muscular or valvular abnormality. The coronary arteries and aorta appear normal.

Peritoneum, omentum and mesentery are normal. Oesophagus, stomach, duodenum and intestines show no abnormality. Liver shows slight fatty change. Spleen is small and firm. Pancreas appears large but shows no abnormality on section. Adrenals are normal. Kidneys, ureters and bladder are normal.

Scalp and skull are normal. Brain and meninges are congested but show no abnormality on section.

Histological examination: The pancreas shows extensive fibrosis but only a very small amount of cystic change is present. The appearance of the gland is that of fibrocystic disease of the pancreas.

Royal Hospital for Sick Children

Case No. 12 P.M.No. 7850 Sex F. Date of Birth: 3.5.45
Date of Death: 18.6.48
Age at Death: 3 yrs. 1 month

Family history: Both parents alive and well.
1st child Female Born 1945 Patient
2nd child Female " 1947 Alive and well.

Personal history: Pregnancy was normal but the child was born 3 weeks prematurely. Birth weight 6¼ lbs.

The child showed no abnormality at birth and was fed on Ostermilk but gained weight slowly and at 5 months, weight was only 9 lbs.

It was noticed that stools were frequent and loose from birth until one month of age. She had bronchial catarrh but this cleared.

The child had another attack of bronchitis in December 1947 when the cough did not clear up and it was noticed that she was coughing up large amounts of phlegm. Stools were noticed to be pale, bulky and foul smelling.

On admission 26.4.48 the child's weight was 9.1 K (68% of expected weight). The child was pale and thin and had violent spasms of coughing. The abdomen was slightly enlarged.

Following admission to hospital the child became fevered and respiratory symptoms became worse.

Duodenal intubation gave fluid with a pH of 7 which did not digest any gelatine.
Child was regarded as having fibrocystic disease of pancreas. The lung infection did not respond to therapy and the child remained pyrexial.
Weight gain was poor and she died on 18.6.48.

Post mortem findings: The subject is a moderately well-developed child without external signs of disease.

The trachea and main bronchi contain abundant liquid yellow pus, and similar material can be expressed easily from the finer bronchi in the lung. The lungs themselves are moderately well-expanded. The left lung is adherent to the pleural cavity laterally over the basal lobe and

and also is attached to the diaphragmatic surface. There are numerous small abscesses in both lungs. These are peribronchial in distribution for the most part, but some are quite superficial on the surface of the lung. Two well-defined patches of pneumonia are present in the left lung, one in the basal and one in the upper lobe; these are situated nearer to the hilum and are of dark red colour. The mucosa of the larger bronchi is congested and thickened, projecting from the bronchi when they are cut, but there is no evidence of bronchiectasis on naked eye examination. The hilum glands and the paratracheal glands are swollen and congested.

The stomach is empty but for a small amount of blood-stained mucus and contracted with prominent rugae. Immediately distal to the pyloric valve there is intense congestion of the duodenum, and this extends throughout the entire small bowel into the first part of the large intestine. The intensity of the congestion diminishes as the bowel is traced downwards, but in the upper part there is an acute enteritis. The intestinal contents are of light yellow colour and not mucoid. The duodenum and head of pancreas have been retained in a single block for sectioning, but the pancreas is of normal size for the age of the child. It is distinctly nodular with small white cysts projecting above its surface, and when cut the fibrous nature of the gland is evident.

Bacteriological examination: Culture of lung and bronchial pus gives a heavy growth of pneumococci. A swab from the duodenum gives a pure growth of staphylococcus aureus.

Histological examination: The pancreas shows a well-established fibrocystic disease. The connective tissue is in excess and arranged in monolobular form. Cystic change is not particularly marked, although some of the alveoli are distended, and a few of them hold eosinophile material. There is no change in the ducts in this section which is taken midway between the head and tail of the pancreas. The islet tissue is not affected.

Liver: There has been some degree of central necrosis, the tissue around the central veins containing necrotic cells and others swollen with fatty flobules. In this region also there appears to be an overgrowth of connective

tissue and reticulum. There is no change around the portal tracts.

The lung shows acute broncho-pneumonia, some of which is confluent, the peribronchial tissue containing fibrin and polymorphonuclear exudate. The bronchial glands are not particularly numerous in the section, but none of them shows cystic change or inspissated secretion.

Royal Hospital for Sick Children

Case No. 13 P.M.No. 7937 Sex M. Date of birth: 15.4.47
Date of death: 18.11.48
Age at death: 1 year 7 months

Family history: Parents alive and well.

1st child	Female	Born	1926	Died at 3 days - 2 months premature
2nd child	Male	"	1928	Died at 10 days - 1 month premature
3rd child	Female	"	1929	Alive and well.
4th child	Male	"	1936	Died 5 months in R.H.S.C.
5th child	Female	"	1939	Alive and well
6th child	Male	"	1947	Patient

Personal history: Mother had kidney trouble during pregnancy. B.P. was high and she had albuminuria. Labour was easy and the child was normal. Birth weight 7 lbs. 8 oz.

Child became jaundiced at about 3 weeks and failed to thrive. She was put on coeliac diet which apparently helped but stools have persisted loose.

On admission weight 8.6 K (84% of expected weight). The child was wasted and showed evidence of jaundice. Pneumonia developed and did not respond to therapy.

Post mortem findings: The body is that of a normally developed child. There is moderate icterus but no other external evidence of disease.
Both lungs are honeycombed with cystic spaces. The individual cysts are small but there is very little intervening lung tissue. One area in the left lower lobe is soft and may be purulent.
Bile is readily expressed from the gall bladder into the duodenum. The entire duodenum is greatly congested and the opening of the common cystic duct is unusually prominent. The liver is enlarged, pale yellow in colour and granular in appearances. It is moderately fatty.
The intra-hepatic bile ducts contain bile thrombi and may be slightly dilated. The stomach and remainder of the intestine are normal. The spleen is enlarged and is not congested but shows some lymphoid hyperplasia.

Histological/

Histological examination:

Liver: The portal tracts are surrounded by a dense fibrous tissue containing foci of round cell, polymorph and eosinophile infiltration. There are also some giant cells similar to those seen around foreign bodies. This fibrous tissue contains some dilated bile ducts with bile thrombi. Between this mature tissue and the liver lobules there is an area of fibroblastic activity with infiltrated cells as above. In this region, however, there are many clumps of large foamy cells separated from each other by a scanty reticulum. The liver cells at the periphery of the lobules are atrophic and degenerate; there is considerable fatty infiltration of the liver cells in the centre of the lobules.

Lungs: A very similar appearance is present in the lungs, with extensive cell foam tissue in some areas surrounded by a fibrous giant-cell reaction. Many of the pulmonary alveoli and bronchioles, even in areas where no such reaction can be seen are widely dilated. The alveolar walls do not, however, appear to be thinned out around these dilated air spaces.

Pancreas: There is dilatation of the pancreatic ducts with an increase in the amount of fibrous tissue around the ducts. The acini are small and immature; the islets appear correspondingly larger than usual. The histological features of the pancreas are those of fibrocystic disease.

Royal Hospital for Sick Children

Case No. 14 P.M.No. 7953 Sex F. Date of Birth: 14.11.48
Date of Death 16.12.48
Age at Death: 1 month

Family history: Parents alive and well.
1st child Female Patient.

Personal history: Mother had pyelitis during pregnancy. The child was 3 weeks premature but was normal spontaneous delivery. Birth weight 7 lbs.

Child showed no abnormality at birth and throve until 20.11.48 when she developed a cold. Later the child's breathing became very laboured and she was admitted to hospital.
On admission 23.11.48 the child's weight was 2.7 K (71% of expected weight). The child showed evidence of pneumonia but no other abnormality was found.
Respirations were difficult and oxygen was given. The child developed thrombo-phlebitis and later died.

Post mortem findings: The body is that of an under-developed, emaciated infant. There is no external evidence of disease.

The trachea, oesophagus, and bronchi are all normal, as are the mediastinal glands. There is no enlargement of the thymus. Both lungs are moist and heavy and on section there is extensive confluent suppurative bronchopneumonia in the right lower lobe, with scattered foci of suppuration throughout the lung. The bronchi did not seem to be dilated. There is some congestion of the intervening lung tissue. The left lung consists of three lobes, as in the right lung. On section, there are many scattered suppurative foci through the lung. These are not confluent and the intervening lung tissue appears to be normal. The aortic and pulmonary valves appear to be normal, but there are numerous vegetations on the tricuspid and mitral valves, which are congested. There is some distortion and scarring of the tricuspid valve.

There is a very acute enteritis affecting the lower ileum, where the musoca is congested, thickened and covered with a thin fibrinous

exudate. There are numerous small collections of gas beneath the mucosa. These bubbles are separate from each other. The stomach is normal, as is the large intestine. There is considerable fatty change in the liver. The spleen is not enlarged, but is congested. No abnormality can be detected in the adrenals, pancreas, kidneys, ureters and bladder. The mesenteric glands are not enlarged.

Histological examination: Pancreas shows changes characteristic of fibrocystic disease. There is a generalised increase in the amount of fibrous tissue present and considerable cystic change is seen. In the remainder of the gland the acini are small and poorly developed.

Royal Hospital for Sick Children

Case No. 15 P.M.No. 7956 Sex M. Date of Birth: 6.12.48
Date of Death: 18.12.48
Age at death: 12 days.

Family history: Parents alive and well.

1st child	Female	Born 1935)	
2nd child	Male	" 1936)	
3rd child	Male	" 1938)	alive and well
4th child	Female	" 1945)	
5th child	Male	" 1948	patient

Personal history: Pregnancy was normal. The labour was 3 weeks premature and lasted 11 hours. Birth weight 6¾ lbs.

Child was normal at birth and was breast fed. When 5 days old oedema of feet was noted. Meconium was passed normally and one yellow stool was passed on 11.12.48.

Since 12.12.48 the child has not been feeding well and on admission to hospital the child was seen to be slightly jaundiced. Child developed diarrhoea and passed typical gastro-enteritis stools. It failed to respond to treatment and died.

Post mortem examination: The body is that of an under-developed and emaciated recently born infant. There is no external evidence of disease. The umbilicus is healthy but has not yet separated.

The pharynx, oesophagus, trachea and bronchi appear to be normal. There is diffuse haemorrhagic bronchopneumonia affecting the whole of the left lung and the posterior half of the right lung. The remainder of the lung is moist and congested. The thymus is not enlarged nor are the mediastinal glands. The heart appears to be normal except for some distortion of the tricuspid valves. There are no recent vegetations.

The stomach is congested, as is the entire ileum. There is hyperplasia of the lymphoid tissue throughout the small intestine, and the mucosa related to the lymphoid patches is congested and covered with a thick fibrinous exudate. There is some superficial sloughing of the lymphoid patches. The mesenteric glands are enlarged and slightly congested. The spleen is enlarged and soft and congested. The liver presents an unusual appearance. The right lobe is clearly demarcated from the left by a sharp line of division between the bile-stained right lobe. There is considerable fatty infiltration into the left half, which may also be finely fibrous. The kidneys show considerable fatty change. The adrenals, gall-bladder, pancreas, ureters and bladder are all normal.

Histological examination: Pancreas. Acini filled eosinophile material. Islets seem normal. The pancreas shows the typical appearance of fibrocystic disease.

Royal Hospital for Sick Children

Case No. 16 P.M.No. 7967 Sex F. Date of Birth: 23.6.48
Date of Death: 16.1.49
Age at Death: 7 months.

Family history: Parents alive and well.

1st child	Male	Born 1944	Died at 2 months with gastro-enteritis
2nd child	Female	" 1946	Alive and well.
3rd child	Female	" 1948	Patient.

Personal history: Pregnancy and delivery were normal. Birth weight 7½ lbs.

The child was breast fed for 2 months and at the end of this time weighed 9½ lbs. It was noticed that all motions were green and were undigested and at 2 months the child was put on to dried milk but failed to thrive; many changes in feeding were tried.

At about 3 months it was noticed that the motions were large and pale, but were not greasy.

The child lost weight and on admission, 18/12/48 weighed 4.28 K (68% of expected weight).

On examination the child was pale and undersized but appeared otherwise in good health. Temperature, however, was raised and on the following few days it was noticed that there was consolidation at the base of the right lung. In spite of therapy the temperature did not settle.

Faecal fat estimation gave 39.62% of fat.
Neutral fat - 16.8
Free fatty acid - 7.9
Combined fatty acid - 15.32.

Duodenal intubation was attempted unsuccessfully. The child was treated with pancreatin. Antibiotic therapy was continued but childfailed to thrive.

Post mortem findings: The subject is a grossly emaciated child. There is no other external evidence of disease.

The trachea, oesophagus, and bronchi are all normal. The right pleural space is filled with green pus and organised gelatinous exudate. The right lung on section shows multiple abscesses related to dilated bronchi. The

lower and middle lobes are most markedly affected. The left lung shows no definite abnormality although some of the bronchi may be slightly dilated. The thymus and mediastinal glands are not enlarged. The heart and great vessels are normal.

The stomach and intestine appear to be normal. The gallbladder empties normally into the duodenum. The pancreas may be firmer than usual but it is not clearly abnormal to the naked eye. The liver shows moderate fatty change. The kidneys show cloudy swelling, but the adrenals, ureters and bladder all appear to be normal. The spleen is slightly enlarged and soft.

Histological examination: Pancreas. Cystic fibrosis present. The ducts are filled with eosinophile material. Islets seem normal. Hypertrophic muscle tissue abundant in ampulla of Vater.

Royal Hospital for Sick Children

Case No. 17 **P.M.No.** 8061 **Sex** M. Date of Birth: 25.2.49
Date of Death: 14.7.49
Age at Death: 5 months

Family history:

First child	Born 1942	alive and well.
Second child	" 1947	alive and well.
Third child	" 1949	patient

Personal history: Normal pregnancy, F.T.S.D. Birth weight 7 lbs. 2 oz. Breast fed for one month and then put on half C.N.D.M.
Child was slightly jaundiced at birth and this increased rapidly. The child was given three blood transfusions and the jaundice cleared by 9th day. The patient's blood showed erythroblastosis although the Blood Transfusion Service reported that the baby was Rh positive, Coombe's test negative, and the mother's blood Rh negative with antibodies ++.

On examination weight 3.3 K (80% of expected weight). Patient is pale and looks ill with a harsh cough. Breathing is laboured. Cough persisted in spite of treatment.

31.5.49 Duodenal intubation attempted, no trypsin found in any specimen. The child was

dismissed home on 9.6.49 but was re-admitted on 17.6.49 with a history that the cough had been more troublesome. On this occasion weight was 3.5 K. i.e. 63% of expected weight.

On examination, breathing was very laboured with indrawing of the chest. Gelatine test with faeces - no digestion. Bronchoscopy showed the bronchi severely inflamed and filled with thick muco-pus. Child died on 14.7.50.

Biochemistry report:

		% Distribution
Total fat	35.3 G %	
Neutral	2.66 G %	7.49
Free F.A.	7.74 G %	21.88
Combined	24.97 G %	70.32

Post mortem findings:

The body is that of a rather spare male infant, 5 months old and weighing 3520 grms.

Oesophagus normal. The stomach was a little larger than usual due to distention and on section a large quantity of mucus and semi-digested food was present. On routine examination of the rest of the gut no abnormality was seen, though the proximal 2 Ft. of the ileum was distended.
The regional lymph glands were enlarged and discrete.
Peritoneum was normal.
The pancreas weighed 3 grms. it was of average shape and size, but the surface was more crenated than usual and appeared fibrous.
The spleen weighed 9 grms. was of average shape, size and consistency, but was of a browner colour than usual.
The liver weighed 133 grms. and appeared normal in every respect on the surface, but on section there was a lighter zone clearly seen round the portal tracts.
Gall bladder and ducts normal.
The adrenal glands were fatty.
Both kidneys weighed 23 grms. they appeared anatomically normal.
Larynx normal. The trachea contained a small quantity of mucus but the bronchi showed a more viscid and adherent mucus quite firmly attached to the congested wall. On tracing down the bronchial tree this mucus became more purulent and within the lung substance frank pus was obtained from the bronchioles.

The right lung weighed 63 grms and the left 42 grms. The apex of the right lung was completely collapsed and deep plum colour and so was a strip 3 cen. wide on the posterior border of that lung. This collapse contrasted sharply with the adjacent emphysematous lung. The emphysema was particularly seen in the left lung and most marked in the upper lobe of that lung. The pleural surfaces were smooth and glistening.
No free fluid in the pleural sacs.
Regional lymph glands normal.
Pericardium was normal and the heart weighed 28 grms. and routine examination showed no gross abnormality.

Histological examination:

Pancreas. There is a diffuse fibrosis with many ducts dilated and frequently containing inspissated secretion. The dilatation is extensive though the formation of cysts of any considerable size is rare in the sections examined. Many acini are atrophic and in the thickened septa several pigment carrying macrophages are seen. Islet tissue is undisturbed.
Lungs. In the left lung there is moderate emphysema with no inflammation.
The apex of the right lung is collapsed and there is a bronchitis and broncholitis beginning to spread into the alveoli from the terminal bronchiole. Most alveoli contain an exudate though the chief cell is usually mononuclear.
Liver. The parenchyma is normal but most of the sinusoids are distended with collections of large pigment carrying macrophages staining heavily with the Prussian blue reaction. The granules are coarse and can be differentiated from the intracellular bile pigment which is also greatly increased in quantity. Many cells, of course, contain both pigments. There is probably erythropoiesis still active.

Royal Hospital for Sick Children

Case No. 18 P.M.No. 8062 Sex M. Date of Birth: 30.5.49
Date of Death: 17.7.49
Age at Death: 7 weeks.

Family history: None available.

Personal history: Baby was dead when brought into admission hall. It had been off colour for about a week and had been treated by outside doctor for gastro-enteritis. There had been no vomiting or diarrhoea for 3 days.

Post mortem findings: The body is that of a moderately well developed child with no external evidence of disease.

Brain, meninges and ears were normal.

The pharynx, oesophagus, trachea and bronchi were all normal. The thymus was large; there were petechial haemorrhages on the surface; the centre was soft and looked purulent (probably "thymic pus" composed of lymphocytes).
The mediastinal glands were not enlarged.
The entire right lung was diffusely haemorrhagic and consolidated. There were many localised subpleural petechiae. The left lung was normal and showed no petechiae.
The heart was normal except that the wall of the left ventricle seems unusually thick (3 mm) but there was no apparent patency of the foramina or of the ductus arteriosus.
The liver was diffusely fatty. The spleen was slightly enlarged, soft and brownish-grey in colour.
The stomach and intestine appear to be normal as do the adrenals, gallbladder and pancreas.
Both kidneys are unusually pale and show marked cloudy change and foetal lobulation.

Histological examination: Pancreas: There is an increase in the interstitial connective tissue. The acini show focal degenerative changes and the cytoplasm of the acini cell is markedly eosinophilic. Cystic dilatation is slight, the ducts being filled with eosinophilic material.
Kidneys: Tubules intensely eosinophilic. Cloudy change.
Thymus: Hassal's corpuscles also unusually eosinophilic.
Lungs: Extensive haemorrhagic consolidation with

histocyte reaction, and early polymorph exudation.
Heart: normal.
Liver: Extensive fatty infiltration. Sinuses congested. No apparent cirrhosis.

Royal Hospital for Sick Children

Case No. 19 P.M.No. 8089 Sex M. Date of Birth: 13.3.49
Date of Death: 9.9.49
Age at Death: 6 months.

Family history: Parents alive and well.
1st child Male Born 1949 patient

Personal history: The child was born one month premature - spontaneous delivery. Birth weight 4 lbs.15 oz. and showed no abnormality. The mother's pregnancy was uneventful. Fed on N.D.M. Difficult to get the child to thrive during the first week of life, but then child began to gain weight regularly until three weeks old when he had broncho-pneumonia. Since then the child has had a wheezy chest.
On 29.8.49 the child started vomiting its feeds and became listless. Stools yellow in colour and highly offensive.
On examination, weight 5.2 K (80% of expected weight). On examination the child was fairly well nourished but was dyspnoeic and slightly cyanosed. The accessory muscles of respiration were being used. Patient remained highly fevered, dyspnoeic and toxic in spite of treatment with penicillin and sulphonamide. WBC 35,000. Developed spontaneous pneumothorax. Died on 9.9.49. No duodenal intubation carried out.

Post mortem findings: The body is that of a 6 months old male infant, weighing 4600 grms.
Larynx was deeply congested, trachea also deeply congested and covered with thick blood stained pus.
The right lung weighed 60 grms. the upper lobe was collapsed and the middle had expanded well and was apparently normal. The lower lobe had collapsed, the lung was adherent, and over the apex of the lower lobe posteriorly and into the posterior border of the middle lobe was a recent puncture wound caused by the paracentensis.

The lower surface of the middle lobe and the upper surface of the lower lobe were adherent and between them was a small hole which lead into an abscess which in life was an interlobar empyema, this in its turn was involved in an abscess which was situated at the apex of the lower lobe, this, there was a communication directly with the necrotic peripheral bronchioles of the apex into the empyema cavity which had ruptured into the general pleural cavity on that side, hence the pneumothorax.
There was very little lung damage and the empyema cavity was about 1 cm. in diameter. Over the base of the lower lobe posteriorly was a purulent pleurisy. The left lung weighed 45 grms.; it was well expanded and on section no pathological process was recognised.
Oesophagus normal. Stomach; There was little thickening of the pyloric muscle. The rest of the intestine was normal.
Regional lymph glands; normal.
The liver weighed 220 grms. was rather deeper in colour than usual and on section, coarsely mottled, due to congestion and fatty change.
There was one small sub-capsular abscess found on the anterior surface of the right lobe.
Gall bladder and ducts normal.
The spleen weighed 2 grms. was deeply congested but fairly firm in consistency.
Both adrenal glands showed fatty change.
The pancreas was normal.

Histological examination:

Lung: In the section examined there is an acute cavity (non-tuberculous) with no fibrosis. The surrounding lung has totally collapsed but the bronchioles remain outstanding and filled with pus cells and epithelial debris. The bronchial walls are not severely damaged and there is no generalised bronchitis but here and there, early abscesses are beginning to form. There is an acute pleurisy.
Liver: Central congestion and well marked fatty degeneration at the periphery of the lobule.
Pancreas: There is a marked increase in fibrous tissue and many acini are distended by epithelial debris which has stimulated a round cell infiltration. The appearances are quite typical of fibrocystic disease of the pancreas.

Bacteriological examination:

Trachea: Direct examination: Few pus cells and epithelial cells. Numerous Gram + cocci.
Culture yielded abundant growth of coagulase

positive Staphylococcus aureus. The isolated Staphylococcus aureus is not sensitive to penicillin (up to 500 u/ml.)
Pus from abscess of lung: Direct examination: Numerous pus cells. Numerous Gram + cocci. Culture: Yielded abundant growth of coagulase positive Staphylococcus aureus.

Royal Hospital for Sick Children

Case No. 20 P.M.No. 8116 Sex F. Date of Birth: 5.10.49
Date of Death: 20.10.49
Age at Death: 15 days.

Family history:	Mother aged 29.		Both parents alive and well.
1st child	Male	Born 1938	Premature, $2\frac{3}{4}$ lbs. died at 2 months.
2nd child	Female	Born 1939	Premature, died shortly after birth.
3rd child	Male	Born 1941	Alive and well.
4th child	Male	Born 1946	Died at 3 weeks in R.H.S.C.
5th child	Male	Born 1948	Alive and well.
6th child	Female	Born 1949	Patient.

Personal history: Normal pregnancy with full time spontaneous delivery. Birth weight $8\frac{3}{4}$ lbs. The child was normal at birth but did not feed well.

On 17.10.40 the child collapsed and when it was admitted to hospital it was seen to be moribund and was cyanosed.

Post mortem findings: The body is that of a normally developed infant weighing 2800 G. and shows no external evidence of disease.

Both lungs show patchy haemorrhagic congestion but the trachea and bronchi appear normal. The alimentary tract shows no abnormality and the pancreas appears normal.

The kidneys show extensive infarction of the cortex but no other lesion is seen.

Histological findings: The pancreas shows a definite increase in the amount of inter lobar and peri-acinar fibrous tissue. The acini are still well formed but some are dilated slightly and contain mucous plugs.
Kidneys show extensive cystic dilatation of the collecting tubules and look to me like a congenital malformation rather like polycystic

disease.

Heart, spleen and liver appear normal.

Royal Hospital for Sick Children

Case No. 21 P.M.No. 8149 Sex M. Date of Birth: 8.9.49
Date of Death: 25.12.49
Age at Death: 3 months.

Family history:

1st child Born 1945 Died from marasmus
2nd child Born 1947 This child was post-mortemed in the General Hospital, Swansea and there a purulent bronchitis was found. No histological examination of pancreas was carried out.
3rd child Born 1949 patient.

Personal history: N.F.T.S.D. Birth weight 8 lbs. 12 oz. The mother was well during pregnancy and no abnormality was noted in the child at birth. It was breast fed for the first two weeks and then put on Ostermilk. At three weeks old the child began to have diarrhoea which lasted a few days, and shortly after that had some trouble with vomiting after feeds. From that time the child has not been developing well and has been under weight. In the middle of November the child developed a cough and it has been getting steadily worse.

Admitted to R.H.S.C. on 2.12.49. Actual weight 4.45 K. (88% of expected weight). On examination it was seen to have a continuous hard cough. No gross abnormality was found on examination. Gelatine test with faeces - tryptic activity present. W.B.C. 14,000. Patient had a course of penicillin and temperature settled but cough persisted and on 16.12.49 fever recurred. Vomiting and diarrhoea also troublesome. Died 25.12.49. No duodenal intubation carried out.

Post mortem findings: The body is that of an under-developed male infant without any obvious external abnormality.

The lungs were voluminous and were rubbery in consistency. On section purulent material was seen in the bronchi and the left lower lobe.

No definite bronchopneumonic consolidation was present but throughout both lungs the bronchi were prominent and a minor degree of bronchiectasis seemed to be present.

The liver, gall-bladder and biliary passages appear normal and the alimentary tract showed no features of note. The pancreas was small and weighed 8 G. but showed no other abnormality.

Bacteriological examination: Swab from the lung yielded a pure growth of coagulase positive staph. aureus which was not sensitive to penicillin.

Histological examination: The lungs showed a purulent bronchitis.

The pancreas showed early cystic dilatation of the duct which contained eosinophilic material. Fibrosis was fine and mainly peri-acinar but some increase in the fibrous septae in the organ was also noted.

Royal Hospital for Sick Children

Case No. 22 P.M.No. 8176 Sex F. Date of Birth: 6.5.49
Date of Death: 13.2.50
Age at Death: 4 months.

Family history: Both parents alive and well.
First child $3\frac{1}{2}$ years old alive and well.
Second child Died of broncho-pneumonia at 7 months.
Third child Patient.

Personal history: N.F.T.S.D. Birth weight 7 lbs. 2 oz. The child showed no gross abnormality at birth and kept well and throve up to 22.12.49 when she developed a cough and refused feeds. The cough became loose and a lot of mucus was coughed up. Breathing was laboured. Admitted R.H.S.C. 28.12.49. Weight on admission 3.71 K (94% of expected weight). Patient is a rather pale, slightly cyanosed infant. Breathing is a little laboured and there is a spasmodic hard cough. No gross abnormality was found on examination. The child developed pyrexia and showed a massive consolidation of the right upper lobe. Cough persisted throughout the child's stay in hospital. The child was given penicillin and sulphonamide, but did not show a satisfactory response, and was changed on to aureomycin. Pyrexia persisted and the child's condition deteriorated. Died 13.2.50. No duodenal intubation was carried out.

Post mortem findings: The body was that of a rather emaciated female infant of weight 3600 G.

The right lung was adherent to the chest wall along the postero-lateral border of the upper lobe, but elsewhere the pleural surfaces were normal. Numerous broncho-pneumonic foci usually surrounded by a zone of haemorrhage were found throughout both lungs and a large emphysematous bulla was present at the apex of the upper lobe of the left lung.
The heart showed no abnormality and the alimentary tract, liver, spleen and pancreas showed no feature of note.

Bacteriological examination: Cultures gave an abundant growth of coagulase positive staph. aureus which was not sensitive to penicillin.

Histological examination: The pancreas showed a typical fibrocystic disease with both fibrosis and cystic change well marked. The lungs showed an intense haemorrhagic broncho-pneumonia with early abscess formation. Evidence of over-secretion of mucus with the bronchi and bronchioles was seen.

Royal Hospital for Sick Children

Case No. 23 P.M.No. 8224 Sex M. Date of Birth: 5.5.50
Date of Death: 16.5.50
Age at Death: 10 days.

Family history: Details of first child not given.
Second child Patient.

Personal history: Normal full time child. Pregnancy uneventful. The child was admitted to hospital with a history of having passed nothing per rectum since birth. There was no real sickness but some regurgitation of food occurred.
On examination, the abdomen was very distended and was tympanitic.
A finger could only be passed about ½" into the rectum. A septum present was broken down and this resulted in the passage of meconium.
On 11.5.50 only a slight meconium staining was occurring but on 13.5.50 faeces were returned by rectal washout. Although the abdominal distension was greatly reduced, the child did not feed well and died on 16.5.50.

Post mortem findings: The body was that of a normally developed infant weighing 2948 G. The umbilicus appeared healthy but considerable abdominal distension was noted.

The thoracic viscera were normal.

The peritoneal cavity contained a considerable amount of thick green pus and the loops of intestine were grossly dilated. This was most marked in the descending colon and rectum which was found to end blindly at the ano-rectal junction, the anus itself appearing normal. No actual perforation of the bowel was found. The pancreas appeared normal.

Histological examination: The pancreas showed early fibrocystic change with only slight fibrosis and no cystic change. No zymogen granules were present.

Royal Hospital for Sick Children

Case No.: 24 P.M.No. 8250 Sex Male Date of Birth: 24.6.50
Date of Death: 18.7.50
Age at Death: 3 weeks.

Family history: Parents alive and well.

First child	Alive and well
Second child	Alive and well
Third child	Alive and well
Fourth child	Patient

Personal history: The mother was well during pregnancy. Birth weight 7 lbs. 1 oz. F.T.N.B. Breast fed from birth. A large central hernia was present but no other abnormality was detected. The child had green motions from fifth to eighth day after birth, but feeding time was cut down and this stopped. On 11.7.50 umbilicus was seen to be moist and was dressed.

14.7.50 Child was admitted to R.H.S.C. when its weight was 3.1 K (83% of expected weight). It was seen to be a very ill feeble infant which had obviously lost weight. Breathing was regular but with some difficulty and on examination, diminished air entry was found on the left side of the chest. WBC 16,000. Diagnosis of broncho-pneumonia was made and child died on 18.7.50. No duodenal intubation was attempted and no biochemical examinations were carried out.

Post mortem findings:

The body is that of a normally developed infant. There was a large ventral hernia without incarceration or strangulation of the contents.

On opening the pleura, several ounces of pus welled out. The left lung was seen to be completely collapsed and the left pleura was considerably thickened and coated everywhere with dense fibrinous exudate. The left lung was very hard and on section it was seen to be made up of a mass of isolated abscesses extending on to the pleural surface. Some cavities filled with clear mucinous material could also be seen - ? congenital cysts. The right lung was normal apart from some collapse or atelectasis at the right lower lobe. The right lung weighed 26 grms. and the left 50 grms.
The heart weighed 21 grms. and was normal.
The liver weighed 130 grms. it presented no abnormality, the gall bladder draining normally into the duodenum. The spleen weighed 6 grms. was not enlarged and lymphoid follicles were clearly visible. The pancreas was firm but otherwise normal. The adrenals, ureters and bladder was firm but otherwise normal. Both kidneys weighed 18 grms. and appeared to be normal.

There was no pyloric tumour although the stomach was very large and moderately injected as in acute dilatation. Similarly the caecum appeared to be congested and slightly dilated. There was no enlargement of the mesenteric lymph nodes.

Bacteriological examination:

Occasional pus cells and Gram + cocci. Culture yields staphylococcus aureus in moderate numbers coagulase positive sensitive to penicillin.

Lung: Numerous pus cells and Gram - pus cocci. Culture yields Staphylococcus aureus in abundance - Coagulase positive and sensitive to penicillin.

Histological examination:

Pancreas: The ducts contain eosinophilic material and may possibly be a little dilated. The acini are small and although it is difficult to be certain whether there is fibrosis or not there is definitely an excess of eosinophilic cells in some of the supporting stroma.

Left lung: The pleura is thickened and infiltrated with polymorphs, the superficial layers undergoing suppuration. There are frequent large suppurative lesions throughout the lung. Many of the bronchi are filled with a mass of polymorphs extending out into the adjacent lung and in the intervening areas there is collapse and an excess of eosinophilic histiocytic cells.
Liver: There is an abundance of fat in the liver cells and the sinusoids are markedly congested. In some parts there is more active degeneration of the liver cells and possibly a fine inter-colour cirrhosis.

Royal Hospital for Sick Children

Case No. 25 P.M.No. 8307 Sex F. Date of Birth: 18.11.50
Date of Death: 20.11.50
Age at Death: 2 days.

Family history: No record of brothers or sisters given. Child was born at the Maternity Hospital, Rottenrow, Glasgow.

Personal history: N.F.T.S.D. Mother's health was good during pregnancy.
On admission the child's abdomen was distended and was tympanitic.
On rectal examination a small amount of white mucoid material was seen.
Rectum and anus appeared normal.

At operation, a large dilated discoloured jejunum was seen and was diagnosed as meconium ileus, but X-ray examination showed dilated gas-filled coils of small intestine. No fluid levels were seen.

At operation the obstruction was seen to be in the middle of the jejunum, and the lower half of the jejunum, ileum and colon were all plugged with hard inspissated mucoid material. The child was given intra-venous fluid but in spite of this died on 20.11.50

Post mortem findings: The body is that of a newly born infant weighing 2600 G.
A right paramedian surgical wound is present on the abdomen which appears otherwise normal.
The heart and lungs show no features of note.

There was a large amount of free fluid in the peritoneal cavity and gross distension of the small intestine down to the level of the jejuno-ileal junction. The distended intestine was marked congested and contained thick green inspissated material which was almost solid at the point of maximal distension. Below this level the bowel contained grey pultaceous material. No evidence of atresia was noted.

Histological examination: The pancreatic acini are small and atrophic and many of the ducts contain eosinophilic material. Although neither cystic change nor fibrosis are marked the lesion of the pancreas is that of fibrocystic disease.

Royal Hospital for Sick Children

Case No. 26 **P.M.No.** 8331 **Sex** F. Date of Birth: 6.10.50
Date of Death: 7. 1.51
Age at Death: 3 months

Family history:

First child	1934	stillborn	
Second child	1935	male	died at 3 months with pneumonia
Third child	1938	male	died at 3 months with pneumonia
Fourth child		female	alive and well
Fifth child	1944	male	died with spina bifida
Sixth child		female	patient.

Personal history: Mother aged 42. Had normal pregnancy. Child was N.F.T.S.D. Birth weight 8½ lbs. Child was breast fed for 6 weeks and took feeds well and did not vomit. Bowels were constipated. About 3 weeks ago the child became listless and started to vomit after feeds, and shortly after this it developed a cough which is still present.

Actual weight 4.25 K (94% of expected weight).
On examination 9.12.50 no gross abnormality was found apart from the chest.
A moderate degree of anaemia was present.
On 14.12.50 the cough was worse and the child had bouts of dyspnoea.

24.12.50 Trypsin Screening test on faeces - no digestion of gelatine.
Duodenal intubation was attempted but was unsuccessful. Child continued to go downhill in spite of penicillin, cremomerazine and aureomycin and the fever persisted. Child died on 7.1.51.

Post mortem findings:

The body is that of a grossly underdeveloped, emaciated infant weighing 4520 grms. presenting no other external abnormality.
The pharynx, oesophagus, trachea and bronchi appeared to be normal. The right lung weighed 72 grms. and the left 35 grms. The left lung was firmly adherent to the parietal pleura at all areas and on section of this lung the upper lobe was found to be replaced by a collection of pyogenic abscesses up to 1½" in diameter, the intervening lung being consolidated and purulent. Smaller localised patches of suppurative broncho-pneumonia were scattered throughout both lungs, particularly at the right base.
The thymus was not enlarged but there was slight enlargement of some of the mediastinal glands.
No abnormality was seen in the heart or great vessels. The heart weighed 40 grms.

Inspection and palpitation of the pancreas revealed no detectable abnormality. The liver weighed 190 grms. was fatty but otherwise normal as was the gall bladder and the entire intestinal tract.
The spleen weighed 10 grms. was soft and brownish in appearance.

Both kidneys weighed 30 grms. and appeared normal as did the adrenals, ureters and bladder.

Bacteriological examination:

Swab from lung: Direct smear showed moderate numbers of Gram positive cocci. Moderate growth of Staph. aureus coagulase positive and sensitive to penicillin was obtained on culture. Scanty B. proteins also present.

Histological examination:

Pancreas: Typical fibrocystic changes are present throughout the gland as seen in a longitudinal section traversing the head, body and tail.

Royal Hospital for Sick Children

Case No.: 28 P.M.No. 8378 Sex F. Date of Birth: 28.3.51
Date of Death: 31.3.51
Age at Death: 3 days.

Family history: The child was a forceps delivery but birth was otherwise normal. No family history is given.

Personal history: The day after birth it was noted that the abdomen was distended and no meconium staining has been seen since birth. The child has been vomiting.

On admission the abdomen was distended and there was visible peristalsis.

At operation it was noticed that there was an area of atresia in the small intestine and an anastomosis was made. The child did not respond to treatment.

Post mortem findings: The body is that of a 3-day old female infant. There was a recent right para-median surgical incision. The abdomen was grossly distended. The gut from oesophagus to rectum was removed intact. There was extreme dilatation of the jejunum. Oesophagus and stomach were normal and the jejunum ended blindly about the middle of its distance and to this blind end, a surgical anastomosis with a loop of ileum had been made. The sutures were intact and clean, there was no peritonitis. From the base of the gall bladder a fibrous band extended to the other blind end of the jejunum. From this point the gut was traced downwards and no further anomaly was found. The caecum was situated higher up than usual, close to the under surface of the liver.
The liver weighed 69 grms. it was normal in size and shape, on section of red brown in colour. The bile ducts were normal. The spleen weighed 7 grms. somewhat congested.
Pancreas and adrenals, no anomatical lesion found.
Regional lymph glands, normal.
Larynx and trachea normal. The right lung weighed 14 grms. and the left 17 grms.
Most of the right lung was atelectic and congested, the anterior free margin showing signs of expansion where the colour was normal pink.

Expansion was better on the left side and only the posterior half of this lung was atelectic. The respiratory surface was thus markedly reduced. The pleural surfaces were normal. Thyroid and thymus normal.

Histological examination: Pancreas: Well marked fibrosis with a mild degree of cyst formation due to dilated acini many of which contain inspissated secretion.

Royal Hospital for Sick Children

Case No.: 29 P.M.No. 8939 Sex F. Date of birth: 13.4.54
Date of death: 4.7.54
Age at death: 3 months

Family history: Father aged 36 alive and well.
Mother aged 35 alive and well.
Parents are not related.

1st child	Female	Born 1950	alive and well
2nd child	Female	Born 1954	patient

Personal history: Cough for 5 days before admission, worsening over 24 hours before admission. Dullness over whole of L. side of chest, confirmed on X-ray examination as pneumonia consolidation. Improved on aureomycin therapy but atelectasis of L. lower lobe persisted - failed to resolve even on chloromycetin and aureomycin.

Stools loose and foul smelling - considered clinically to be a possible fibrocystic disease of pancreas though trypsin was present in stools. General condition deteriorated rapidly over last four days.

Tuberculin reaction: negative.

X-ray report: latest X-ray on 26.6.54 showed fatal atelectasis of L. lower lobe and compensatory emphysema of R. lung.

Post mortem findings: The body was that of a rather spare and underweight 11 week old female infant weighing 4200 gms. The belly was rather protruberant and there was some peri-anal excoriation but no bleeding.

The oesophagus was normal. The stomach was a little distended but showed no mucosal lesion and the intestines in general were somewhat distended due mainly to gas. No epithelial lesion was observed. The pancreas was 8 gms. in weight and measured $7\frac{1}{2}$ cms. in length with $2\frac{1}{2}$ cms. across the head. Several sections were cut and though the main pancreatic duct was just visible to the naked eye, certainly no indication of fibrocystic disease was recognised, and neither was an increase in fibrous tissue observed.

The liver weighed 250 gms. and was of average size and shape. No lesion was observed, and the colour was normal. The gall bladder and ducts were normal. The spleen was 18 gms. and slightly enlarged with a deeply congested pulp of moderately firm consistence. Both adrenals were rather fatty but normal in size and shape. Regional lymph glands were not obviously enlarged.

Right kidney weighed 30 gms. and the left kidney 34 gms. Each kidney presented a similar appearance of congestion and poor differentiation between cortex and medulla. Pelves, ureters and bladder normal.

The brain was removed and sectioned. The cerebrum weighed 470 gms. and the cerebellum 43 gms. No lesion was observed. The venous sinuses were normal and the middle ears clean.

The laryns, trachea and bronchi contained a large quantity of viscid green pus. The left lung was adherent to the thoracin wall and weighed 101 gms. On section it showed well marked purulent bronchitis and bronchiolitis with abscess formation at the base posteriorly. The pleural surface was roughened and sections taken from the middle and lower lobes sank in the fixative. Aeration was moderately good in the upper lobe. The right lung weighed 110 gms. and also showed capillary bronchiolitis with pus but to a less degree than in the left lung and no abscesses had formed. The pleural surface was smooth and glistening.
Thymus and thyroid were normal.

Pericardium normal. The heart weighed 40 gms. Routine examination of heart muscle, valves and chambers showed no lesion. Both the ductus and the foramen ovale were closed.

Bacteriological examination:

Pus from trachea: Few pus cells, moderate numbers of Gram positive cocci and mucoid material present in direct film.
Moderate growth of staph. aureus, coagulase positive, obtained on culture, not sensitive to penicillin but sensitive to aureomycin, terramycin, chloromycetin and streptomycin.

Histological examination:

Heart, pituitary, thyroid, cervix, parathyroid, kidney, liver, adrenal show no significant lesion.

Bronchial lymph glands show an inflammatory reaction.

Spleen: Marked infiltration of inflammatory cells of all types. This is the reaction to a systemic infection.

Lungs: Bronchial suppuration with mural destruction. Pulmonary fibrosis and pneumonia. Several abscesses have formed.

Parotid gland shows no significant lesion.

Bronchus: Marked mural inflammation. The mucous glands are distended with a thick mucoid secretion in which polymorphs are found. The gland ductules are distended and the columnar epithelium is thickened and often transitional in type with occasional frank squamous metaplasia.

Trachea. Similar lesions with the squamoid metaplasia more marked.

Pancreas: The gland substance is fibrous and individual acini are poorly developed and usually surrounded by fibrous tissue. The glandular lobules are irregular and have lost their usual pattern. Ductules and some acini show slight distension with viscid albuminous material. "Cystic" formation is thus not a striking feature in this gland and is much less evident than the pronounced fibrosis.

Lacrimal glands: Both were examined and each shows the similar picture of marked acinal distension with mucoid material in which scattered polymorphs are seen. There is no marked fibrosis but in the interstitium collections of plasma cells, macrophages and probably mast cells are to be seen.

Submaxillary salivary glands: These show dictule distension with mucoid material containing thinly scattered polymorphs. Here also there is no fibrosis but many foci of inflammatory cells are to be found in the interstitium.

Stomach: Squamous epithelium with a mild cellular infiltration is extended well into the cardia. The pylorus is normal. The antrum is normal.

Duodenum: Distension of Brunner's glands with viscid secretion and some early fibrosis with mild infiltration of inflammatory cells.

Sections from ileum and jejunum show no clear glandular lesion but there is undoubted infiltration of polymorphs and plasma cells in the submucosa. Often a mucous precipitate is seen covering some villi.

Ascending colon. Normal.

Medulla. There is a curious collection of unicellar organisms in the substance of the medulla. These have a clear nucleus, moderate amount of cytoplasm and a well marked jelly-like envelope. A cluster of these organisms have been photographed.

Royal Hospital for Sick Children

Case No.: 30 P.M.No. 8388 Sex F. Date of Birth.: 9.3.51
Date of Death: 15.4.51
Age at Death: 35 days.

Family history: No information about brothers or sisters.
Birth weight 7 lbs. 1 oz.

Personal history: Admitted with anal stenosis which was treated with bougies, but thereafter the child failed to thrive.

4.4.51 Duodenal juice pH 7.7. No liquefaction of gelatine.

Faeces test also gave no liquefaction.

The child took feeds well but did not thrive and died on 15.4.51.

Post mortem findings: The body is that of an emaciated female infant weighing 2100 grms.
Oesophagus and stomach normal. The gut was dissected out, no anomaly was found except at the anal canal, which was narrow, though quite capable of taking probe the thickness of a lead pencil. Above the anus, there was some dilatation of the rectum but no hypertrophy. The mucosa was normal.
Regional lymph glands normal.
The pancreas was dissected out carefully, no signs of fibrosis or thickening was detected, size, shape and consistency were normal.
Adrenals normal.
The spleen weighed 8 grms. of average size and shape, but a little congested. The liver weighed 86 grms. and appeared normal in all respects.
Larynx, trachea and bronchi normal.
The right lung weighed 33 grms. and the left 28 grms. The pleural surfaces were normal and the posterior aspect of each lung were partially collapsed and congested with rib markings.
No pneumonia was recognised. Cultures have been taken.
The heart weighed 16 grms. on the anterior surface of the left ventricle was a small congested focus like an early abscess, otherwise routine examination showed no lesion.

Bacteriological examination: Lung tissue: Moderate growth of lactose fermenting coliform organisms obtained on culture only.

Histological examination: Pancreas: There is a mild, though quite definite degree of fibrocystic disease.

Royal Hospital for Sick Children

Case No. 31 P.M.No. 8389 Sex F. Date of Birth: 18.1.51
Date of Death: 17.4.51
Age at Death: 3 months

Family history: Parents alive and well.
First child Male Born 1943 alive and well
Second child Female Patient

Personal history: Normal full time breech birth. Birth weight 7 lbs.
The child was cyanosed at birth and remained so for a few days. It was breast fed for a few days and then fed on $\frac{1}{2}$ C.N.D.M. The child has not gained weight since 3 weeks old. She has had a good appetite. Stools have been large, pale, undigested and very foul smelling since the first week of life.

Admitted 29.3.51. Weight 3.1 K (69% of expected weight).

On examination the child is pale, but is not acutely ill, and nothing abnormal was found in the respiratory system.

Screening test for faeces gave digestion of gelatine.

Duodenal intubation was not apparently carried out.
The child developed gastro-enteritis and died on 17.4.51.

Post mortem findings: The body is that of an under-developed infant with no external evidence of abnormality.
The trachea and bronchi were normal.
The thymus weighed 2 grms. was not enlarged nor were the mediastinal glands.
No abnormality was seen in the heart or great vessels. There was collapse and some hypostatic congestion at the base of both lungs and at one small corner, the lung appeared to be consolidated, immediately below the pleural surface.

Both lungs weighed 33 grms.
The liver weighed 90 grms. and showed no abnormality.
The gall bladder emptied normally into the duodenum. The spleen weighed 8 grms. was not enlarged and was normal on section. No abnormality was seen in the adrenals, ureters and bladder.
Both kidneys weighed 13 grms. and appeared to be normal. There was some congestion of the lower ileum but otherwise the stomach and intestinal tract showed no abnormality.

Bacteriological examination: Ileum: Moderate growth of lactose fermenting colonies obtained on McConkey agar-culture is positive for B.coli D433x (Colonies pink on saccharose agar).

Histological examination: Pancreas: Typical lesion of fibrocystic disease.
Lung: Unevenly expanded. Some of the alveolar walls are over-distended and a moderate amount of emphysema is seen. In a few bronchi clumps of dead macrophages are seen but in the block examined no pneumonia was found.

Royal Hospital for Sick Children

Case No.: 32 P.M.No. 8398 Sex F. Date of Birth: 29.1.51
Date of Death: 3.5.51
Age at Death: 4 months

Family history: Parents alive and well.

1st child	Male	Born 1941	alive and well
2nd child	Male	Born 1944	alive and well
3rd child	Male	Born 1947	alive and well
4th child	Female	Born 1951	patient

Personal history: N.F.T.S.D. at home. Birth weight 7 lbs. Breast fed for one week and then changed on to cows' milk.

On 23.2.51 the child developed a severe cough and began to vomit after feeds.

On admission, weight 2.2 K (55% of expected weight). The child appears pale, thin and is dehydrated. Child's chest condition became worse and breathing was very difficult.

Stool trypsin screening test gave a digestion of galetine.
The child went downhill and died on 3.5.51.

Post mortem findings: The body was that of a two-month old female infant, thin and dehydrated weighing 1720 grms. The trachea contained a thin muco-purulent secretion. The pleural surface of the lungs were normal. The right lung weighed 28 grms. and the left 25 grms. In each lung, the upper lobes were free from infection and had expanded well. At the base of each lower lobe, posteriorly, there was broncho-pneumonia with pus in the small air tubes.
Pericardium normal and the heart weighed 14 grms. Routine examination of the heart muscle, valves and chambers showed no abnormality.
Oesophagus and stomach were normal.
The intestines were pale pink in colour and no lesion was seen. A culture of the stool is being made.
Regional lymph glands normal. The spleen weighed 4 grms. and was normal on section.
The liver weighed 72 grms. of average size and shape and on section a brown red colour.
Gall bladder and ducts normal.

Bacteriological examination: Lung: Moderate growth of lactose fermenting coliform organisms and B. proteus.

Intestine: Moderate growth of lactose fermenting coliform organisms obtained on culture. Scanty B, proteus also present. All negative for B. coli D433.

Histological examination:

Lung: The bronchioles are filled with pus and there is an acute inflammation of their walls. The surrounding alveoli are plugged with exudate. This is a well established broncho-pneumonia.
Kidney: Small foci of inspissated material in the medulla with early cyst-like appearance. This is identical with the early changes in renal medullary calcinosis.
Pancreas: Typical picture of fibro-cystic disease in head, body and tail.

Royal Hospital for Sick Children

Case No.: 33 P.M.No. 8399 Sex F. Date of Birth: 28.4.51
Date of Death: 4.5.51.
Age at Death: 6 days.

Family history: No family history given.

Personal history: The child was admitted to hospital aged 2 days, with a history that no meconium had passed since birth. She had vomited up dark green material. The abdomen was distended at birth and this has increased in size.
Operation showed an area of atresia of the jejunum, and a side to side anastomosis between the dilated proximal portion of the bowel and the small distal portion was carried out. The child failed to thrive and died.

Post mortem findings: The body is that of a six-day-old female infant, rather dehydrated weighing 2800 grms. There was a recent right vertical surgical abdominal incision. This was opened, there was no signs of healing. At the base of the incision, there was a purulent mass to which the loops of intestine adhered.
Oesophagus and stomach normal. The upper part of the jejunum was considerably distended and this was caused by the Mesenteric artery lying in front of the gut, thus causing partial obstruction. About 100 cm. from the duodenal-jejunal junction, the gut ended blindly.
The anastomosis had been made between this part and the following part of the jejunum. Previously there had been a blind end here which had been

removed at operation. The sutures were intact. The anastomosis was patent but the area of operation showed that the gut was non-viable and there was a localised peritonitis.
Beyond the anastomosis the bowel was opened and a thick greenish substance filled the lumen for another 30 cm. or so. Thereafter the bowel was small and continued to be small as far as the rectum. The contents were firm and typical of that seen in a meconium ileus. The regional lymph glands were enlarged and congested.
The liver weighed 1.33 grms. was of average size and shape, on section was congested.
Gall bladder and ducts normal.
The adrenals were fatty.
The pancreas appeared to be of normal length, and no fibrosis could be seen by naked eye.
The spleen weighed 7 grms. and congested.
Larynx and trachea were normal.
The right lung weighed 33 grms. and the left 27 grms. The pleural surfaces were normal and on section of the lungs, no infection was found.
Expansion was good.
Pericardium was normal.
The heart weighed 19 grms. Routine examination of the heart muscle, valves and chambers showed no lesion.

Histological examination.

Pancreas: Fibrocystic disease is present, moderately well marked.
Ileum and colon: Sections of each show normal epithelium but the lumen is plugged with meconium and in the colon the glands are distended by it. Though the various elements of the bowel are proportionately normal there is considerable under-development. Nervous tissue is normal.
Mesenteric glands: The sinusoids are distended with oedema fluid containing macrophages, myelocytes and lymphocytes.

Royal Hospital for Sick Children

Case No.: 34 P.M.No. 8424 Sex M. Date of Birth: 16.6.51
Date of Death: 3.8.51
Age at Death: 15 days.

Family history: Mother had influenza at 4 months but otherwise pregnancy was normal.

Personal history: N.F.T.S.D. This is the fourth child but history of others is not given.
The baby was difficult to feed and has vomited.

Examination showed an absence of the anus. A recto-urethra fistula was present which opened in the middle of the scrotum.

At operation, an attempt was made to repair this, on 20.6.51. Following this, however, the child failed to thrive and died on 4.8.51.

Post mortem findings: The body was that of a thin 7 week old male infant weighing 3750 gm. There was a healed right paramedian incision on the abdomen.

The left kidney was enlarged weighing 28 gm. but the right was grossly underdeveloped. When sectioned the left kidney showed extensive acute pyelonephritis. The bladder appeared normal. A small fistula was present at the root of the penis and this opened into the rectum. The artificial anus, which was made surgically, appeared adequate.

The alimentary tract, liver, gall bladder, pancreas and adrenals appeared normal.

The heart and lungs showed no abnormality.

Histological examination: Showed changes of fibrocystic disease in the pancreas. There is a moderate degree of fibrosis throughout the gland but cyst formation is not marked. The gland acini are small and the acinar cells contain no zymogen granules.

Royal Hospital for Sick Children

Case No. 35 P.M.No. 8340 Sex M. Date of Birth: 6.8.51
Date of Death: 10.8.51
Age at Death: 4 days

Family history: Both parents alive and well. Mother aged 21.

First child Born 1949 alive and well.
Second child Born 1951 Male twins (a) Birth weight 5 lb.10 oz.
(b) Patient

Personal history: Normal pregnancy with full time spontaneous delivery. Birth weight 8 lbs. 6 oz.
The child was well until 8.8.51 when it vomited meconium stained mucus. Since then vomiting has persisted and a large amount of dark material has been brought up.

On examination, the abdomen was distended but there was no rigidity and a firm sausage like mass was present in the right hypochondrium.

9.8.51 the child was taken to theatre and the abdomen was opened. The upper small bowel was grossly dilated until about the middle of the ileum. At this site the bowel became very much smaller in calibre and full of hard inspissated material. There was no evidence of an obstruction external to the bowel itself. The diagnosis was made of meconium ileus and a solution of pancreatin in saline was injected into the lumen at various places along the length of the impacted bowel. An attempt was made to milk the softening material along the bowel but without success.

Post mortem findings: The body is that of a male infant. There was a fresh right para-median incision in the abdomen which was very grossly distended indeed.

On opening the abdomen, slight blood stained fluid gushed out gether with loops of grossly distended small intestine. It was evident that intestinal obstruction was present and there was a recent very early peritonitis. The site of obstruction was found in the lower ileum which contained a mass of inspissated material extending over a distance of perhaps 25 cm. The apex of this mass lay in the caecum and on opening the bowel it was found to be composed

of inspissated mucus and desquamated epithelium. The ileo-caecal valve was patent and there was no evidence of any other cause of this material which distally had the feel of putty. It was less inspissated proximally, where it contained a very much higher concentration of bile pigment, there being little bile in material constituting the apex of the mass. The disposition of the intestine was normal and no other abnormality was detected in the abdominal contents. Pancreas was normal, removed entire for examination.
Adrenals and spleen, grossly normal.
The lungs were poorly expanded but otherwise presented no abnormality.

Histological examination: Pancreas: There is a definite fibrosis but no cysts are to be seen. Some acini are slightly distended and contain inspissated secretion.

Royal Hospital for Sick Children

Case No. 36 P.M.No. 8450 Sex F. Date of Birth: 29.9.51
Date of Death: 1.10.51
Age at Death: 2 days

Family history: No family history given.

Personal history: Child was born at home - full time normal delivery. Birth weight $7\frac{1}{2}$ lbs.

No abnormality was noted at birth, but the day following birth child vomited greenish material. No meconium was passed.

On examination the abdomen was seen to be very distended. The child was operated on in an attempt to relieve the obstruction.

At operation, a diagnosis of meconium ileus was made and pancreatin was injected into the bowel. Colostomy was made.

Post mortem findings: Examination was only made through existing surfical wound.

The subject was a normally developed new born female infant. Death occurred six hours prior to the autopsy. The anterior abdominal wall was discoloured and autolytic changes in the abdomen were more advanced than usual for the time after death. The gut was removed and the pancreas. No abnormality was recognised in the pancreas but it will all be blocked. The gut was distended under the ileum and the lower 40 cm. of this contained a very sticky meconium and where the pancreatin had been injected at the operation, necrosis of the tissue was more advanced. There was slight haemorrhage beyond so far as the ileo-caecal valve. The colon was small and empty. No hard content was seen. The picture otherwise was that seen in meconium ileus.

Histological examination: Pancreas: There is a fine peri-acinar fibrosis and an increase in the connective tissue septa. Many of the acini are plugged with an inspissated secretion but there is little sign of cystic formation yet, presumably because the child has not lived long enough.

The colon was sectioned in its entire length (13 blocks). There was no abnormality in the nerve tissue.

Royal Hospital for Sick Children

Case No. 37 P.M.No. 8474 Sex F. Date of Birth: 10.7.51
Date of Death: 5.11.51
Age at Death: 4 months.

Family history: Both parents alive and well.

1st child Female Born 1951 Patient

Personal history: Normal pregnancy and delivery. Birth weight 8 lbs.
Breast fed 3 weeks ½ C.N.D.M. FC. Ostermilk.
16th October developed cough and since then has repeatedly pulled up legs as if in pain.
21.10.51 cough worse; listless and off feeds.
16/10 - 20/10 and 24/10 - 26/10 she had cremomerazine 3I N. & M.
No vomiting; 2 - 3 motions daily.

O.E. well coloured, dyspnoeic with marked paroxysmal cough. Bulging fontanelle.
Marked dullness (R) base and fine crepe;
R.M. diminished and harsh vescular.
W.B.C. 35,000 (68% polys.)
Paracentesis; tenacious blood stained pus - staph. aureus moderately sensitive to penicillin and aureomycin. Impression empyema (R).

No duodenal intubation was attempted.

Tuberculin reaction - negative.

Post mortem findings: The body is that of a rather spare female infant of the stated age weighing 5000 grms.
Larynx was normal. The trachea was injected and mainly filled with pus, the length of the trachea was 4.8 cm. and its lesser diameter 4 mm. The right lung was almost completely adherent to the chest wall and inseparable from the diaphragm weighing 100 grms. and on section the lower two thirds of the lung tissue was freely pocked with abscesses mainly 1 cm. across, though three were considerably larger. The walls of these abscesses were thin with little or no fibrous reaction and when the pus was washed away the lining glistened as if the condition was one of infected cysts. A probe was gently inserted through the main bronchi and at the base of the lung posteriorly, it was clear that at least two broncho-pleural fistulae had been established.

The intervening lung tissue was congested.
The left lung weighed 58 grms. and in the upper part of the lower lobe, several small abscesses had been formed, smaller than these in the right and clearly secondary infected.
The pleura of the left lung was normal.
Thymus and thyroid normal.
The heart weighed 30 grms. and routine examination of the heart muscle, valves and chambers showed no lesion.
Oesophagus, stomach and intestines showed no gross lesion. The liver weighed 200 grms. was of average shape, and size but deeper in colour than usual and the cut surface showed early autolytic change.
Gall bladder and ducts normal.
The spleen weighed 13 grms. of average shape but soften in consistency than usual.
The pancreas was of average length but appeared rougher on the surface than normal. The right adrenal weighed 2.5 grms. and the left 2 grms. no gross lesion seen.

Bacteriological examination: Pus from right lung. Mixed growth of Staph. aureus coagulase positive, and Friedlander's bacillus obtained on culture. Staph. aureus is slightly sensitive to penicillin, moderately sensitive to aureomycin.

Histological examination: Lungs. There are multiple staphylococcal abscesses all of approximately the same age. The fibrous reaction is minimal. No indication of a previous cystic condition of the lung.

Pancreas. Typical picture of well advanced fibrocystic disease. The acini vary greatly in their size and in the quantity of inspissated secretion.

Royal Hospital for Sick Children

Case No. 38 P.M.No. 8482 Sex F. Date of birth: 27.12.50
Date of death : 22.11.51
Age at Death : 11 months

Family history: Parents alive and well.

1st child	Female	Born 1940	Died at 3 months
2nd child	Female	Born 1950	Patient

Personal history: F.T.N.S.D. at home. Birth weight was 8 lbs. and the child appeared normal at birth.
The child throve well but a cough has been present almost since birth. The child has had an excellent appetite - can't get enough to eat, and has never been sick, but for the last 9 months this child has had foul-smelling putty-like stools, and the cough has persisted in spite of therapy.
Recently the child has been losing weight and on 28.9.51 was admitted to hospital as a case of broncho-pneumonia. On admission weight 4.3 K (51% of expected weight).

On examination the patient was a pale, marasmic infant with wasting of buttocks and thighs.
The abdomen was protruberant.
Signs of pneumonia were found in the chest.

Duodenal intubation was carried out on three occasions and gave no digestion of trypsin.
The child remained ill and had bouts of fever in spite of aureomycin. The stools are very foul. 22.11.51 child died.

Post mortem findings; The body was that of a rather emaciated female infant weighing 3600 grms. of 11 months of age.

Larynx and trachea were filled with a purulent mucus but no acute inflammation of the epithelium was seen. The trachea from vocal cord to carina was 6 cm. and its internal diameter 6 mm. The right lung weighed 82 grms. and the left 68 grms. The right lung was adherent to the thoracic wall over the distribution of the lower lobe. These adhesions were quite firm and had obviously been there for several days. On

section the lower lobe was deeply congested, firm and partially replaced by numerous Staphylococcus abscesses. In the middle lobe, beads of pus could be squeezed from the finer bronchioles, although no abscess formation had taken place. The upper lobe was well expanded and except at its base it appeared normal, the base showing a few beads of pus. The left lung was well expanded but the base of each lobe, numerous beads of pus could be expressed from the base of each lobe when the tissue was squeezed. It is probable that early abscess formation was taking place. The condition is at least an acute bronchiolitis.

The heart weighed 27 grms. and routine examination of the heart muscle, valves and chambers showed no lesion.

Oesophagus, stomach and intestines showed no lesion. The regional lymph glands were normal. The liver weighed 173 grms. was rather darker in colour than usual but of normal size and shape. On section, no lesion was seen. The gall bladder was exceptionally small but contained normal bile. There was no fibrosis. The pancreas weighed 5 gms. and was of average size but the surface appeared consistently granular over its entire length. The right adrenal weighed 1.5 grms. and the left 1 grm showed no significant change. The spleen weighed 6 gms. and was congested.

Bacteriological examination: Swab from lung. Gram positive cocci present in direct film. Abundant growth of staph. aureus, coagulase positive, obtained on culture, not sensitive to penicillin, but moderately sensitive to aureomycin, streptomycin and chloromycetin.

Histological examination: Lung. There is an acute bronchiolitis, leading to bronchopneumonia with subsequent abscess formation, so typical of a staphylococcal lesion.

Pancreas. Greatly thickened septa and interacinar connective tissue with atrophy and inspissated secretion. There are a few dilated acini. The lesion here is more fibrous than cystic.

Royal Hospital Sick Children

Case No. 39 P.M.No. 8495 Sex F. Date of birth: 10.1.51
Date of death: 26.12.51.
Age at death: 11 months

Family history: Both parents alive and well.

1st child	Male	Born 1947	7 months still birth
2nd child	Female	Born 1948	alive and well
3rd child	Female	Born 1951	patient

Personal history: N.F.T. induced delivery. Birth weight 7 lbs. 4 oz. Child was Rh positive. Coombes positive. Although mother was Rh negative and had antibodies in her blood the child showed no evidence of erythroblastosis.

The child who was breast fed for 6 months and then put on mixed diet thrived until the age of 6 months when she developed a severe cough which did not settle with treatment.

On 5.11.51 diarrhoea developed and it was seen that the stools were bulky, yellow and greasy. The appetite has remained good with no vomiting.

On admission weight 5.7 K (62% of expected weight). The child was very thin, emaciated with a rapid wheezy respiration and a frequent loose cough. The abdomen was distended.
Examination revealed extensive broncho-pneumonia.

Duodenal intubation on two occasions gave an acid fluid which did not liquefy gelatine but on a third occasion the fluid was alkaline.
The child failed to thrive. Pyrexia persisted in spite of intensive antibiotic therapy and child died on 26.12.51.

Post mortem findings: The subject was the body of a well developed female infant 11 months of age.

The trachea was full of muco-pus. Oesophagus was normal. The bronchi were filled with muco-pus some of the bronchial tubes and bronchioles were dilated. The pleura was dull and thickened in patches and there was a few adhesions. Both lungs showed very numerous areas of consolidation

except in the middle and lower right lobe where there was an increase in the amount of interstitial fibrous tissue. The right lung weighed 180 grms. and the left 140 grms. The heart weighed 30 grms. and showed no abnormalities.
Thymus was normal.

The liver weighed 220 grms. and appeared to be normal. Gall bladder and ducts normal. Pancreas appeared to be normal. The intestines were normal. The spleen weighed 12 gms. and was normal. The kidneys and urinary tract were normal. Both kidneys weighed 28 grms. each. Uterus and appendages normal.

Bacteriological examination: Lung tissue: Abundant growth of Staph. aureus, coagulase positive and moderate number of colonies of B. proteus obtains on culture; the Staph. aureus is sensitive to penicillin and aureomycin.

Histological examination: Pancreas: Four blocks of the pancreas were cut. There is a definite fibrosis with inspissated secretion in the majority of acini and ductules but no remarkable cystic appearance as so often seen in similar conditions.

Lung: There is a well marked broncho-pneumonia. The bronchiol walls have softened due to the severe unusual inflammation. Though there is no demonstrable dilatation of the bronchiole, this is the fundamental step to bronchiolectasis.

Royal Hospital for Sick Children

Case No. 40 P.M.No. 8502 Sex M. Date of birth: 11.9.51
Date of death: 12.1.52
Age at death: 3 months

Family history: Parents both alive and well

1st child	Male	Age 13 years	in sanatorium with T.B.
2nd child	Female	Born 1941	Died at 8 weeks with pneumonia
3rd child	Male	Born 1942	Died at 5 weeks in R.H.S.C.
4th child	Female	Born 1943	alive and well
5th child		Born 1950	abortion 3 months
6th child	Male	Born 1951	patient

Personal history: Normal healthy pregnancy. F.T.S.D. Birth weight 8 lb. 12 oz. No abnormality was noted at birth. The child was breast fed two weeks and then transferred to ½ C.N.D.M.

In the middle of November the child developed a cough, but continued to take feeds well. Although otherwise well, the child did not appear to be putting on weight and feeds were increased. At the beginning of December, the child began to vomit feeds and cough become worse. Bowels were regular and no abnormality was noted in faeces.

On admission 17.12.51 weight 4.2 K (84% expected weight). The child was poorly developed and rather pale but no gross abnormality was seen. Although the child was apyrexial the findings in the chest suggested broncho-pneumonia.
26.12.51 - Stool for tryptic activity gave no digestion of gelatine.
Duodenal intubation was attempted on 29th December and 3rd January but no fluid was obtained.
Glycine and gelatine absorption curves were carried out.

On 8th January, duodenal intubation gave juice pH 7.9 which showed no liquefaction of gelatine.

The child's chest condition deteriorated and it died on 12.1.52.

Post mortem findings:

The body was that of a four-month old male child weighing 4080 gm.

The trachea and bronchi were normal but both lungs showed foci of consolidation and a fibrin exudate was present on the pleural surfaces.

The liver, gall bladder and bile ducts were normal.
The pancreas weighed 2 gm. but showed no abnormality. The alimentary tract and kidneys appeared normal.

Histological examination:

Pancreas: There is some thickening of the fibrous septae. The ducts and acini are only slightly distended but some of them contain inspissated eosinophilic material. Although the histological changes are not as pronounced as usual this is regarded as a case of fibro-cystic disease.

Lung: There is a confluent broncho-pneumonia. The bronchioles contain pus and some haemorrhage is present around the alveolar regions. A few abscesses have formed and the appearance is typical of a staphylococcal infection.

Royal Hospital for Sick Children

Case No. 41 P.M.No. 8514 Sex Male Date of birth: 27.1.52
Date of death: 1.2.51
Age at death: 5 days

Family history: No family history is given.

Personal history: The patient was admitted 31.1.52 with a history of having passed nothing per rectum since birth.

On examination, the abdomen was seen to be grossly distended and no abnormality in rectum or anus was found. The child was operated on and an enormous distended gangrenous bowel presented. The distal portion of bowel was filled with hard putty-like material. In view of the extensive gangrene no surgical repair was attempted.

Post mortem findings: The body was that of a four-day old male infant weighing 3160 gm. The umbilical stump was still adherent and clean. There was a recent right para-median abdominal surgical wound which was also clean.

Oesophagus and stomach were normal. When the abdomen was opened about 10 ccs. of clotted blood was found in the peritoneal sac and a distended segment of the jejunum was presented. The intestine was removed by cutting along the mesenteric border. The duodenum and jejunum appeared normal but distension was evident in the lower jejunum and was most marked in the upper ileum where it is doubtful if the bowel was viable. The appearance was that of an acute obstruction and its main cause was due to the volvulus which had to be untwisted before the bowel could be removed. In this part the faecal contents were dark brown and fluid. Distally sticky meconium was found in the lower third of the ileum and typical grey firm contents of a meconium ileus was recognised. The large intestine was very small in comparison and mainly empty. A full histological examination will be made later. The liver weighed 114 gm; was of average size, shape and on section it was congested, deep brown in colour. Gall bladder and ducts normal. The spleen weighed 7 gm. and was normal.
Pancreas was of average size and a few very small cysts could just be made out by the naked eye. It felt normal in consistency. The

The left adrenal weighed $4\frac{1}{2}$ gm. and the right 4 gm. were normal. Regional lymph glands normal.

The heart and lungs appeared normal. The kidneys showed no abnormality.

Histological examination:

Pancreas: A longitudinal section of the entire gland was made in two blocks. There is a definite fibrocystic disease present though in this case the fibrosis is more marked than the acinar and ductule distension. Several foci of haemopoiesis are see n.

Thyroid: This is underdeveloped. Colloid formation is poor. Connective tissue septa are prominent but no true fibrosis exists.

Submandibular salivary gland: The gland on each s side was examined. There is no lesion present, no acinar dilatation.

Liver: Erythropoiesis within normal limits for the age of the body. The portal tracts are freely infiltrated by macrophages and the number of small tracts give the impression of being more numerous than normal.

Lung: The alveoli are not fully expanded. There is no infection. Many examples of the bronchial mucous glands were examined. No No lesion seen.

Intestine: Samples from the small gut were blocked and sectioned. The part with the volvulus showed acute necrosis and probably was not viable. In the other parts no abnormality in the nerve plexus was found.

Royal Hospital for Sick Children

Case No. 42 P.M.No. 8539 Sex M. Date of birth: 5.3.52
Date of death: 17.3.52
Age at death: 12 days.

Family history: Mother is Rh negative. Both parents alive and well.

1st child Miscarriage
2nd child Male Died at 10 months with enteritis
3rd child Male Born 1952 patient

Personal history: The child was admitted aged 3 hours with exomphalous and extraversion of bladder. The child also had bilateral talipes equino-varus. The child failed to thrive and died.

Post mortem findings; The body was that of a premature male infant showing gross malformation of the anterior abdominal wall and the genitalia.

The cord was attached, hardened but healthy. The anterior abdominal wall surrounding the cord and down to the pubis was composed of a thin membrane through which the end of the ileum protruded as an intussusception, that is to say, the end of the small gut was expressed inside out for some 6 cms. Behind this there was another bowel opening and when the abdomen was opened a probe could be put through this wide second opening into the small intestine and also to the right into the ascending colon which ended blindly after 3 cms. in two horns, a bifid blind ending. The peritoneum was complete and on further examination of the gut it would appear that the distal wall of the caecum was absent and expressed to the exterior thus acting as an anus. There was no true anus, thus the rectum, sigmoid and the transverse colon were absent, in fact most of the gut supplied by the left colic artery. On examining further what was now recognised to be the caecum, two appendices were found. The ileo-caecal valve was large and patent and almost at the exterior. An intussusception of the end of the ileum was easily reduced and no permanent damage was done to the invaginated bowel. Proximal to this the gut, stomach and the oesophagus was normal. Examining the anterior abdominal wall still further, two large red masses were seen approx. 1 cm. across on each side of the cloacal opening. On the

anterior surface of these, two patent ureteric openings were seen, and between them, it is presumed, was the trigone of the bladder and anterior to this in the mid line by approx. $\frac{7}{8}$ cm. was a small rudimentary phalos, thus merely the posterior wall of the bladder existed and even that was underdeveloped. The testicles lay just external to the external ring under the skin. Immediately distal to their site in the peritoneum on each side were two wrinkled patches of skin which were taken to be the scrotum though they were separated by a distance of 4 cms. When the pelvic contents and pupenda were removed, a gross deformity in the bony pelvis was recognised and there was a gap anteriorly of 4 cms. The exact deficiency of the bones will be ascertained when the specimen is macerated. The spinal column with ribs and pelvis attached from the level of the fourth cervical vertebra were removed intact.

There was a bilateral club foot.

The head was not opened.

Routine examination of the thoracic contents, heart, lungs and the aorta showed no gross lesion. The child died of inanition.

Abdomen: The Spiegelian lobe of the liver was attached to the inner aspect of the umbilicus causing it to be prolongated and dragged. There was no other maldevelopment in the abdomen. The cut surface of liver, spleen, adrenals, pancreas and kidneys were normal and the ureters were patent and undistended.

Histological examination:

Pancreas: Although no gross abnormality is present there is some increase in the inter lobular fibrous tissue. Special staining methods show an increase in the inter acinar reticulum and mucus plugs are present in many of the small intra acinar canaliculi. Although the changes seen are slight, they are quite definitely abnormal and in my opinion, are those of fibrocystic disease of the pancreas.

Lung: Congestion with focal areas of oedema and partial collapse. No infection.

Royal Hospital for Sick Children

Case No. 43 P.M.No. 8545 Sex M. Date of Birth: 18.3.52
Date of death: 21.3.52
Age at death: 3 days.

Family history: Not given.

Personal history: The child was born in Ayrshire Central Hospital, Irvine and showed no gross abnormality at birth, but the abdomen became distended and it was noticed that the child failed to pass meconium. Later it vomited green stained material.

On admission, the child was seen to be well nourished, but the abdomen was grossly distended. Diagnosis of small bowel obstruction was made.

In theatre, the bowel was seen to be grossly distended and saline was injected over a few inches along the bowel. The bowel was then opened and sticky meconium was evacuated with great difficulty. A catheter was placed in the middle of the ileum and was left in for the purpose of injecting further material.
The child subsequently died.

Post mortem findings: The body was that of a young male child weighing 2860 grms.
The abdomen was distended and there is a recent lower abdominal surgical wound.

The oesophagus is normal. The stomach contains brownish fluid but is otherwise normal.
The duodenum shows no abnormality. The jejunum is distended and contains mainly gas. The distension becomes more progressively severe and reaches its maximum about 1 ft. from the ileo-caecal valve. In the lower portion of the bowel is filled with very dark meconium which is extremely thick and could only be removed with difficulty. There is no evidence of organic obstruction and the features are those of a meconium ileus. The large intestine is small and collapsed. The liver weighed 120 gm. is small in size and bile stained but presents no other abnormality. The gall bladder and biliary passages appear normal. The pancreas weighs 3 grms. and shows no abnormality on external examination or on section. The spleen weighs 6 grms. in small in size and shows no abnormality.

The peritoneal surface and peritoneal cavity contains only a small amount of blood stained fluid and there is no evidence of peritonitis.

The tongue and tonsils are normal. The salivary glands show no features of note. The trachea and bronchi appear normal and did not contain any mucus. The left lung weighs 45 gm. and the right 55 gm. are dark in colour and show congestion and partial collapse in the lower lobes but there is no evidence of pneumonia.

Histological examination:

Pancreas shows well marked fibrocystic disease. There is diffuse fibrosis throughout the organs. The acini are small and zymogen granules are not seen. Cyst formation is not noted and the ducts do not contain hyaline plugs. The islets appear unaffected.

Submaxillary salivary gland shows no gross abnormality. Some of the ducts appear dilated but no fibrosis is noted.

Stomach appears normal but the Brunner's glands of the duodenum show very considerable cystic dilatation. They are lined with a low flattened type of epithelium and no secretion is visible.

Intestine: The deeper portion of the ducts are dilated and are filled with eosinophilic mucus, the appearance of which resembles pseudomucous. The large bowel shows similar features.

Liver: The portal tracts appear close together and there is an increased amount of fibrous tissue. There is also some proliferation of the bile ducts.

Lungs: Some bronchi contain mucus but no gross dilatation is seen. No infection is present.

Royal Hospital for Sick Children

Case No. 44 P.M.No. 8556 Sex M. Date of birth: 16.8.51
Date of death: 16.4.52
Age at death: 8 months.

Family history: Parents alive and well.

1st child Male Born 1951 Patient.

Personal history: Pregnancy was normal and the child was a F.T.S.D. Birth weight 6 lb. 9 oz.

No abnormality was noted at birth. The child was breast fed for 3 weeks and then changed to Ostermilk. Although appetite has been excellent weight gain has been poor. The child has had frequent coughs but these have so far always cleared up.

On 18.1.51 weight was 4.4 K (60% of expected weight). The child was thin and pale but showed no other gross abnormality on external examination.

Gelatine and glycine absorption curves were carried out and gave evidence of delayed absorption.
The child continued to have low grade pneumonia which did not respond to therapy and the child died on 16.4.52.

Post mortem findings: The body is that of a rather poorly nourished male child. Trachea and bronchi are filled with thick purulent material. The lungs show fairly extensive collapse affecting the lower lobes and on section there is a gross purulent bronchitis in the portions of lung related to the collapsed areas. There is no evidence of pneumonia in the adjacent parenchyma.
The heart weighs 35 grms. and shows no muscular or valvular abnormality.
Oesophagus and stomach show no abnormality and the small and large intestine present no features of note. The liver weighs 200 grms. shows slight fatty degeneration but is otherwise normal.
Gall bladder and biliary passages are normal.
Pancreas weighs 4 grms. and shows no abnormality on external examination. The spleen weighs 12 grms. is small and firm and appears normal.
The meninges show extensive subarachnoid haemorrhages while some is present on the inferior surface of the cerebrum and the major portion of

the haemorrhage is around the anterior surface of the pons and spreads upwards on to the cerebrum. The haemorrhage extends along the sylvian fissures and some are seen along the sulci on the vertex of the brain. The superficial cerebral vessels were dissected and at one point, blood was very adherent to the surface of the posterior cerebral artery and the appearance suggested than an aneurysm is present. On section the brain shows a slight degree of internal hydrocephalus but no evidence of obstruction is seen in the ventricular system.

Histological examination:

Lungs: They show some bronchi dilated with thick mucus. The majority of the others show a gross purulent bronchitis. The adjacent lung is emphysematous but is otherwise normal. The appearance of the lung is that seen in fibrocystic disease.

Submandibular salivary glands: Normal.

Liver, spleen and kidney seem normal.

Pancreas shows the changes of fibrocystic disease. There is extensive fibrosis around the acini which are lined by low cubical epithelium and do not show any zymogen granules. Slight cystic change is present.

Royal Hospital for Sick Children

Case No.: 45 P.M.No. 8565 Sex M. Date of birth: 4.5.52
Date of death: 7.5.52
Age at death: 2 days

Family history: Parents alive and well.

1st child Born 1947 alive and well.
2nd child Male Born 1952 patient.

Personal history: N.F.T.S.D. Child showed no abnormality at birth and seemed all right for first 24 hours when it vomited green material. Although the child was stated to have passed meconium twice, this was doubtful.
The child was admitted as a case of intestinal obstruction and was taken to theatre.

At operation, the jejunum was seen to be greatly distended while the ileum and colon were small and contained firm material. An attempt was made to clear the bowel by injection of saline, but this was unsuccessful.

Post mortem findings: The body is that of a well nourished, young male child weighing 3600 grms. The face and extremities are cyanosed. The abdomen is distended. A recent surgical incision is present on the lower abdomen and the wound shows no abnormality.
The pharynx, larynx and trachea show no features of note. Both lungs lie free in the congested cavity and the pleurae show no abnormality.
The lungs are deeply congested but appear well aerated and show no evidence of pneumonia.
The left lung weighs 45 grms. and the right 50 grms.
The pericardium is normal. The heart weighs 20 grm and shows no muscular or valvular abnormality.
The peritoneum shows widespread inflammatory congestion, suggestive of an early peritonitis.
A small amount of bile stained fluid is present but no site of rupture is seen. The oesophagus is normal. The stomach and duodenum contains masses of thick tenacious dark green mucus but show no other abnormality. The small intestine is greatly distended and is about 4 times its normal diameter. The distension is more marked lower down the bowel and reaches its maximum at a point 12" from the caecum. The proximal portion of the small intestine if filled with semi-fluid dark green material but the proximal portion, particularly around the site of maximal distension

contains very thick tenacious dark green material. The appearance is that of a meconium ileus. Immediately proximal to the caecum contains grey putty-like material. The large bowel appears empty. The liver weighs 150 grms. is slightly enlarged and is very dark and congested. On section it shows the appearance of an acute venous congestion. The spleen weighs 20 grms. and is also enlarged showing marked congestion. The pancreas and adrenals appear normal.

Bacteriological examination: Duodenum, jejunum, ileum. Three specimens yielded moderate growth of lactose-fermenting coliform organisms (negative for specific serological types of Bact. coli alpha, beta, gamma.). No gelatinase producing organisms obtained on culture.

Histological examination: Lungs: Show extensive partial collapse. Many of the alveoli contain squames inhaled from the liquor amnii. No infarction is seen and the bronchi appear normal. The duodenum shows dilatation of the Brunner's glands characteristic of fibrocystic disease. The mucous glands of the trachea are similarly affected.

Pancreas: Shows slight fibrosis but no cystic dilatation of either ducts or acini.

Salivary glands: Normal.

Suprenals, heart, brain, lymph nodes and kidney show no gross abnormality.

Royal Hospital for Sick Children

Case No.: 46 P.M.No. 8567 Sex M. Date of birth: 8.1.51
Date of death: 9.5.52
Age at death: 15 months

Family history: Both parents alive and well.

1st child Male Born 1951 4 weeks premature birth. Mother said to be hypertensive.

Personal history: Spontaneous delivery. Birth weight 4½ lbs. No abnormality was found at birth. Child was breast fed for 3 weeks and then transferred to ½ C.N.D.M.

The child was admitted first on 6.6.51 with a history of failure to thrive and a persistent cough which failed to respond to sulphonamide.

On admission he weighed 3.5 K (62% of expected weight).

Thereafter the child was in and out of hospital for the rest of its life. It failed to thrive normally, had a persistent cough with periods of pyrexia which did not respond to antibiotics. The child frequently vomited after feeds and faeces were bulky, yellowish and foul smelling. Weight gain was poor.

On 8.12.51 duodenal intubation was carried out and the fluid showed no evidence of gelatine liquefaction. The child was put on to panteric tablets and improved slightly.

On 2.1.51 the child was only 41% of his expected weight.

On 6.5.52 the child was re-admitted as an acute intestinal obstruction. The abdomen was distended and masses of faeces could be felt in the right lower abdomen. In view of the obstruction the child was taken into theatre and it was noted that coils of small bowel were filled with hard inspissated material. This had a putty-like consistency. The caecum and rectum contained very hard stone-like material. An attempt was made to remove this material by milking it along the bowel, but this was not successful.
On 9th May treatment with lysozyme was

attempted, but the child died shortly after this was commenced.

Post mortem findings:

The body is that of a rather emaciated young child (male) weighing 5520 grms. The abdomen is greatly distended and there is a recent surgical wound on the surface of the lower abdomen.
The peritoneum contains about 200 ccs. of clear fluid. There is no evidence of peritonitis.
Oesophagus and stomach are normal.
The duodenum appears slightly dilated and contains some rather thick greenish material.
The small intestine is grossly distended throughout its entire length. The terminal 18" of ileum are full of thick tenacious white faecal material. Proximal to this the bowel contains some solid greenish matter and this portion of the bowel seems to be hypertrophied as well as dilated. The general appearance is similar to that of a meconium ileus as seen in newborn children. The large intestine appears normal, it also contains solid tenacious faecal matter similar to that seen in the small intestine.
A moderate degree of mesenteric adenitis is present. The liver weighs 200 grms. shows marked fatty change but no other abnormality.
Gall bladder and biliary passages appear normal.
The pancreas shows no gross abnormality and appears normal on section. Adrenals normal.
The spleen weighs 10 grms. shows no abnormality.
Tongue and tonsils are normal.
The salivary glands showed no abnormality.
Trachea and bronchi are normal.
The left lung weighed 60 grms. and the right 80 grms. showed numerous areas of collapse particularly in the lower lobes and on section a moderate degree of purulent bronchitis is seen affecting mainly the bronchi to the lower lobes, elsewhere scattered small areas of bronchopneumonia are seen in the lungs.

Pericardium is normal. The heart weighs 30 grms. and shows no muscular or valvular abnormality.

Scalp and skull are normal.
The meninges and superficial cerebral vessels showed no abnormality. The cerebrum weighs 815 grms. and the cerebellum 85 grms. showed no abnormality on external examination or on section.

Histological examination:

Pancreas: Shows extensive fibrosis with atrophy of the pancreatic acini. These are small in size and the cells which have only scanty cytoplasm contain no zymogen granules. The islets of Langerhans appear normal. There is only slight cystic change in the ducts.

Lungs: Show plugging of the bronchi with mucus. Some infection is present. The mucous gland acini present in the walls of the bronchi and in the trachea are dilated and are lined by flattened cells. The acini of Brunner's glands show similar changes but the salivary glands show no gross abnormality.

Liver: Shows diffuse fatty change but no abnormality is seen in the portal tracts. The other viscera appear normal.

Royal Hospital for Sick Children

Case No.: 47 P.M.No. 8595 Sex F. Date of birth: 16.6.52
Date of death: 26.6.52
Age at death: 10 days.

Family history: First child of Rh positive mother.
No abnormality was noted at birth.

Personal history: Failed to pass faeces normally. The child developed generalised oedema and on rectal examination a very tight band was found about 2 inches from the anus which could not be passed by finger or by tube. The child failed to respond to treatment and died.

Post mortem findings: The body is that of a young female child, and the abdomen is grossly distended.

When the peritoneum was opened a large quantity of thin bile-stained fluid was found occupying the whole of the anterior portion of the peritoneal cavity. All the serous surfaces are covered by a very thick layer of dark green material. The intestine had collapsed and are plastered on the posterior abdominal wall. The oesophagus and stomach appear normal but it is not possible to trace the small and large intestine and the cause of the escape of meconium could not be ascertained.

Histological examination:/

Histological examination: While the pancreas shows no gross cystic change there is an increase in the amount of fibrous tissue present.

Special staining shows some mucus plugs in the centre of the acini and this is regarded as a case of fibrocystic disease of the pancreas. It seems probable that the intestinal lesion was primarily one of meconium ileus and that rupture and escape of the meconium occurred above the site of the obstruction.

Royal Hospital for Sick Children

Case No.: 48 P.M.No. 8609 Sex M. Date of birth: 30.3.52
Date of death: 20.7.52
Age at death: 4 months.

Family history: Parents alive and well.
Patient is first child.

Personal history: Pregnancy was normal but the child was born 2 weeks premature.
Birth weight 6 lbs. 4 oz.
The child was breast fed for 2 weeks and then transferred to F.C.N.D.M.

Towards the end of May the child developed a cough and went off feeds.

On admission the child weighed 3.87 K (77% of expected weight).

Examination of the chest showed consolidation in the right upper and middle lobes and in the left upper lobe.

Duodenal intubation was attempted but failed. The child failed to respond to antibiotics and died on 20.7.52.

Post mortem findings: The body is that of a rather pale, poorly nourished child aged 3 months weighing 4440 gm.

The upper respiratory passages appear normal but the bronchi contain thick muco-pus. The left lung shows patchy areas of collapse in the lower lobe, but the upper lobe is fully aerated. On section the smaller bronchi are seen to contain pus but no pneumonic consolidation is noted. The right lung weighs 85 cm. and shows

complete collapse of the middle lobe and areas of superficial collapse throughout the rest of the lung.

The heart and great vessels show no abnormality.

The alimentary tract appears normal and the liver shows no abnormality. The gall bladder and biliary passages are normal and the pancreas is normal in size, shape and texture.

Histological examination:

Pancreas shows well marked fibrocystic disease with atrophy and dilatation of the pancreatic acini and ducts. Many of the ducts contain masses of eosinophilic mucus. There is widespread fibrosis.

Lungs show extensive purulent bronchitis. Many of the bronchi are dilated and are completely filled by polymorphs. There is no widespread pneumonia.

The Brunner's glands of the duodenum appear relatively normal.

Liver, spleen, adrenals, kidney, brain - normal.

Royal Hospital for Sick Children

Case No. 49 P.M.No. 8614 Sex M. Date of birth: 5.8.52
Date of death: 10.8.52
Age at death: 5 days.

Family history: First pregnancy - premature.
Second and third, normal.
Patient is fourth child.

Personal history: The day after birth it was noted that the child's abdomen was distended and tympanitic. The child vomited greenish material - did not pass meconium.

Child was taken to theatre and the abdomen opened. The dilated portion of bowel had ruptured, and a meconium peritonitis was present.
The child failed to rally and died.

Post mortem findings: The body is that of a well developed 3-day-old male infant.

The oesophagus and stomach were normal.
There was a left sided laparotomy wound on the abdomen and when the peritoneum was opened early inflammation was seen. The adhesions present were confined to the left hypochondrium where there was an organising mass. When the intestine was dissected out, a blind end was observed in the jejunum some 90 cms. from the duodeno-jejunal junction. This part of the gut was evenly distended and there was no perforation and it was probably viable. The contents were liguid, brown and foul smelling. The proximal end of the distal part of the jejunum was involved in the organic mass in the hypochondrium. This was apparently the site of perforation, distal to this the intestine was thin and unexpanded containing green substance and the intestinal wall appeared healthy. The caecum was small and the appendix, a mere cm. in length.
The caecum had not fully descended. Apart from this small diameter the small intestine was normal. The anus was normal. The liver weighed 113 gm. and was congested and showing signs of early autolysis. Gall bladder and ducts normal. Adrenals normal. The regional lymph

glands were normal. The spleen weighed 11 gm. and was deeply congested. Thin fibrous adhesions connected the various loops of intestine to themselves and to do the abdominal wall. The pancreas appeared normal.

The heart and respiratory system showed no abnormality.

Histological examination: Sections of the pancreas showed typical fibrocystic disease with well marked fibrosis. Cystic spaces are small but are filled with inspissated eosinophilic material.

Royal Hospital for Sick Children

Case No. 50 P.M.No. 8633 Sex F. Date of birth: 16.4.52
Date of death: 19.9.52
Age at death: 5 months.

Family history: Parents alive and well.

1st child	Male	Born 1950	alive and well
2nd child	Male	Born 1952	patient

Personal history: The mother had a normal pregnancy and labour. The child was born at full term and weighed 9 lbs. No abnormality was found at birth.

About the middle of July the child developed diarrhoea and stools were loose, yellowish and foul smelling. About the same time the child developed a cough which was helped somewhat by oral penicillin. The mother feels that the child is not thriving and gaining weight as she should.

On admission the child weighed 3.97 K (70% of expected weight) and on examination the child was seen to be thin and under-nourished. A harsh cough was present but no gross abnormality was found in the lungs.

Duodenal intubation gave juice with a pH 8.2 and showed no liquefaction of gelatine.

The child was given a course of terramycin and was put on pancreatin gr. 5 six times per day, but in spite of this its condition went downhill and it died on 19.9.52.

Post mortem findings:

The body is that of a fairly well nourished young female child and presents no external evidence of disease.

The alimentary tract, liver and biliary passages appear normal and the pancreas shows no abnormality in shape, size or texture.

The upper respiratory passages are normal and no excess of mucus is seen in the trachea, but the small amount of mucus present appears unusually viscid. The left lung weighs 70 gm. and the right 70 gm. both show wide areas of partial collapse particularly in the lower lobes and on section it is seen that the bronchi related to these are full of thick purulent material. No abscesses however, are seen in the lung substance and there is no evidence of generalised pneumonia.

The heart shows no abnormality and the urinary system appears normal.

Histological examination:

The bronchi are filled with mucus and many have become infected. There is considerable collapse associated with obstruction of the bronchi and in places infection has spread into the adjacent lung.

Pancreas shows a fibrocystic disease in which fibrosis is the main feature and cystic change is relatively inconspicuous.
The salivary glands show no gross abnormality.
The duodenum showed marked distension of Brunner's glands.

Royal Hospital for Sick Children

Case No. 51 P.M.No. 8658 Sex M. Date of birth: 5.8.52
Date of death: 25.11.52
Age at death: 3 months

Family history: Both parents alive and well.
Patient is first child.

Personal history: Mother had an appendicectomy at 5 months but pregnancy otherwise normal. Full time Caesarian section. Birth weight $6\frac{1}{2}$ lbs.

The child showed no abnormality at birth, but in spite of feeding well the child did not thrive. The child developed a cough at the age of 6 weeks.

On admission to hospital its weight was 2.71 K (54% of expected weight). It was noticed that its stools were soft and foul smelling.

Evidence of consolidation was found in the chest. Duodenal intubation gave juice with a pH of 5.5 which failed to liquefy gelatine. The child was put on pancreatin and was given a course of antibiotics but failed to respond to treatment.

Post mortem findings: The body is that of a rather poorly nourished male child aged about 3 months weighing 2880 gm. A large partially Ischio-Rectal abscess is present.

The upper respiratory passages are normal. The trachea and main bronchi are full of thick green pus, a swab of which was submitted for culture. The lungs lie free in the chest cavity. The right and lower lobe showed almost confluent broncho-pneumonic consolidation. The left upper lobe is similarly affected. The lungs are preserved whole for subsequent section.

The oesophagus and stomach appear normal. The duodenum contains a small amount of rather viscid clear mucoid material mixed with clotted milk. The large intestine contains a considerable amount of foul smelling pale faeces but is otherwise normal. The pancreas appears normal in size and shape and shows no evidence of cystic change. The liver, gall bladder and biliary passages are normal.

Bacteriological examination: Swab from trachea: Abundant growth of B. proteus obtained on culture.

Histological examination: Lungs: Two blocks were examined. They show an intensely purulent bronchiolectasis with gross inflammation and distension of the bronchiolar wall. The surrounding lung tissue is pneumonic. An unusual feature is the remarkable generalised giant cell reaction. There is gross destruction of all the lung elements. Metaplasia is extensive in the epithelium of the bronchioles. There are several collections of spore-like bodies.

The bronchial mucous glands are distended and many contain inspissated mucus. The histological picture is typical of staphylococcal destruction.

Pancreas: This is an example of a severe fibrocystic lesion. There is almost no functioning tissue visible except the islets which appear to be greatly reduced in number. The distended acini are also the site of a septic inflammation probably staphylococcal in origin.

Heart, kidney, thalamus, cortex, medulla, rib, pituitary, adrenal show no early lesion.

Liver: Early autolysis. No obvious lesion.

Spleen: There is an excessive amount of blood pigment, mainly intracellular. This would indicate the presence of some haemolytic process.

Ileum and colon: Sections from each show a definite inflammation but no glandular distension or inspissation of secretion.

Royal Hospital for Sick Children

Case No.: 52 P.M.No. 8694 Sex M. Date of birth: 6.2.53
Date of death: 9.2.53
Age at death: 3days.

Family history: Parents alive and well.

1st child	female	Born 1950	alive and well
2nd child	female	Born 1951	alive and well
3rd child	female	Born 1953	patient

Personal history: Normal pregnancy and spontaneous delivery. Birth weight $9\frac{1}{2}$ lbs.

An attempt was made to breast feed the child but vomiting occurred about half an hour after every feed and was green in colour.
The abdomen was slightly distended but the child was stated to have passed meconium.

At operation, a small bowel atresia was found. An attempt was made to carry out an anastamosis between the large proximal loop and the small distal loop.

Post mortem findings: The body was that of a newborn male infant weighing 2700 gms. There was a right paramedian surgical incision through which a loop of the small gut had been exteriorised.

The oesophagus and stomach were normal. The length of the entire intestine from pylorus to anus was barely $8\frac{1}{2}$ feet. The gut was opened from the pylorus distally. Mid-way along the small intestine, presumably at the junction approximately of jejunum and ileum and gut ended blindly in a large sac. There was no communication between this distended sac and the adjacent intestine which started in a fine cone quickly reaching the normal dimensions for this part of the ileum and containing an average quantity of pale sticky meconium not unduly inspissated. It was the loop of intestine ending and beginning blindly which had been exteriorised, and into the proximal distended blind end a rubber tube had been inserted. This distended part was not viable. Some of the mesenteric lymph nodes

were enlarged and green on section. There were adhesions between some of the loops of proximal gut and granulations had formed giving the impression that the adhesions had occurred before birth. The distal gut showed no ad hesions. The peritoneal sac contained about 25 c.c. of blood, more than would be expected from mere surgical trauma, though no leaking point was detected.

The liver weighed 150 gm. and was normal in size and colour. On section no gross lesion was seen, and the gall bladder and ducts normal. The pancreas showed no obvious fibrosis. The spleen weighed 10 gm. and was congested. The adrenals were of normal size.

The left kidney weighed 16 gm. and the right kidney 17 gm. On section no lesion was seen. The pelvis, ureters and bladder were normal.

The larynx and trachea contained a small quantity of vomitus not apparently reaching the bronchioles.
The lungs had expanded normally and no focus of infection was seen.
The pleurae were normal.

The pericardium was normal. The ductus was widely patent. The heart weighed 18 gm. and on routine examination no other abnormality was seen in muscles, valves or chambers. The aorta was normal.

The brain was removed in two halves, and over the postero-lateral aspect of each parietal lobe a patch of sub-dural haemorrhage was found some 6 cms. across, circular in shape. There were superficial tears on the surface of the tentorium over the angle with the falx, the probable site of the haemorrhage. The falx was intact. No lesion was seen in the sinuses nor on multiple section of the brain. The cerebrum weighed 380 gm. and the cerebellum 28 gm.

Histological examination:

Pancreas: There is a fine fibrosis throughout the gland. Some early cystic formation is seen with inspissated secretion. Though early, this is beyond doubt a fibrocystic pancreas. Zymogen granules are diminished.
Neighbouring nodes show a polymorph infiltration because of their draining the operation site.

Royal Hospital for Sick Children

Case No. 53 P.M.No. 8698 Sex M. Date of birth: 8.2.53
Date of death: 12.2.53
Age at death: 4 days

Family history: No family history is given.

Personal history: The child was admitted as an intestinal obstruction. The abdomen was distended and no meconium had been passed by the child.

At operation the small bowel seemed to be grossly dilated and a volvulus was present. This was corrected but the obstruction was not relieved and the child died.

Post mortem findings: The body is that of a young child aged about 5 days. The abdomen is distended and a recent surgical incision is present in the upper abdomen. Some haemorrhage has occurred from this but otherwise the wound appears normal.

The peritoneum contains a considerable amount of free blood. The loops of the small intestine are graded together by light fibrinous adhesions. The oesophagus and stomach are normal. The small intestine is grossly dilated, the dilatation being proximal some 18 inches from the caecum. The proximal portion of the small intestine is filled with brown fluid material, but further down it is plugged with very thick tenacious dark green meconium. The small intestine has a very long mobile mesentery but the bowel is not rotated on the mesentery as seen at post mortem. The large intestine is small and is filled with thick white inspissated mucus. The large bowel is tacked down firmly by a short mesentery on to the posterior wall of the abdomen, and the caecum lies in its normal position. The appearances seen are regarded as those of meconium ileus. No evidence of atresia is seen.

The liver (120 gm.) is congested but shows no other abnormality on external examination or on section. The gall bladder and biliary passages are normal. The pancreas is normal in size and shows no abnormality of note.
The adrenals appear normal.

The kidneys (25 gm.) show no abnormality on external examination or on section. There is a

moderate degree of urate deposit in the medullary pyramids. The ureters and bladder appear normal.

The pericardium appears normal. The heart shows no muscular or valvular abnormality. The coronary arteries, aorta and great vessels show no features of note.

The pleurae are normal. The lungs (left lung 35 gm. and the right lung 40 gm.) are very dark in colour and appear consolidated. On section they show extensive haemorrhagic consolidation affecting the upper and lower lobes, particularly on their posterior aspects.

The scalp and skull are normal. The meninges and superficial cerebral vessels present no features of note. The cerebellum (30 gm.) and the cerebrum (350 gm.) show no abnormality.

Histological examination:

Pancreas: There is a fine interlobular and interacinar fibrosis with early acinar dilatation with inspissated secretion. This is a fibrocystic pancreas.

Salivary gland: Some acini show marked secretory activity but no abnormal dilatation. No fibrosis.

Kidney: Urate debris in the collecting tubules.

Liver: A few haemopoeitic foci. Congestion.

Spleen: Some haemopoiesis. Congestion.

Lung: Extensive haemorrhage into the alveoli along the posterior border. This is mainly hypostatic. No infection.

Pituitary; heart, adrenal, medulla, cerebral cortex show no significant lesion.

Intestine: Three blocks from the gut were cut and examined. In each the feature of dilated acini containing a viscid secretion was seen, with mucus secreting cells unusually prominent and distended.

Royal Hospital for Sick Children

Case No.: 54 P.M.No. 8704 Sex F. Date of birth: 14.1.53
Date of death: 21.2.53
Age at death: 5 weeks.

Family history: Both parents alive and well.
The patient is a first child.

Personal history: Pregnancy was normal. Breech delivery but otherwise no obstetrical abnormality.
Birth weight 5 lbs.

The child was breast fed for 2 weeks and then transferred to ½ C.N.D.M.

On admission, weight 2.5 K. The child showed slight generalised oedema and the skin was pale. Respiration was difficult and there was a marked wheezing cough. The child failed to respond in spite of eucortone and aureomycin.

Post mortem findings: The body is that of a small baby and is lacking in a satisfactory amount of fatty tissue.

The trachea contains yellowish mucopus and this is also present in the larger bronchi and can be expressed from the bronchioles. There is a small pleural effusion on the left side of straw-coloured fluid; it is not loculated. The left lung is increased in weight (71 gm.) and firmness. The lower lobe is consolidated. The induration is not very dense and it is not clearly bronchial in distribution. The upper lobe is also denser than normal but less so than the lower lobe and there are areas of emphysema in it also. The right lung (42 gm.) is slightly increased in density. This is much less marked than on the other side. There is no clear broncho-pneumonia. There are many areas of emphysema.

The heart (33 G) is fully developed and sound. The great vessels are normal.

The oesophagus, stomach and small and large intestine are normal. The liver (120 gm.) the gall bladder and biliary passages are sound. The pancreas has a distinctly lobulated appearance but this may be due to loss of surrounding fat. The spleen and the adrenals are normal.

The kidneys (11 gm. each) show no lesions. The ureters and bladder are normal.

The cerebrum (350 gm.) and the cerebellum (35 gm.) show no abnormality.

Bacteriological examination:

1. Swab from left upper lobe bronchus. Numerous pus cells and moderate number of Gram positive cocci seen in direct film.

2. Swab from lung tissue 23/2 (R. lower lobe). Blood and pus cells and abundant Gram positive cocci present in direct film with occasional Gram negative bacilli and few yeast cells.

Abundant growth of staph. aureus, coagulase positive was obtained on culture, not sensitive to penicillin, aureomycin or terramycin, but sensitive to streptomycin and chloromycetin. Scanty growth of monilia also obtained on culture of broth.

Histological examination:

Sections of the left lung show widespread collapse and pneumonia associated with severe bronchiolitis from which it is originating apparently. There is a moderate degree of inflammation of the large bronchi. A few clumps of Gram-positiv cocci are seen in the exudate.

Sections of the right lung shows collapse but no pneumonia.
There is a considerable plug of mucus in one large bronchus associated with an area of subacute purulent bronchitis due to a monilia infection. The mycelial threads of the latter are clearly seen. No blastospores or hyphae are seen in alveoli.

The trachea is moderately severely inflamed. The oesophagus is normal.

The pancreas shows early changes of fibrocystic disease.

The liver cells contain a considerable amount of iron pigment. A small cellular mod-zone focus is present in the liver. Its significance is not clear.

Medulla oblongata, pituitary, adrenal, heart, kidney, spleen - n.a.d.

Royal Hospital for Sick Children

Case No.: 55 P.M.No. 8727 Sex M. Date of birth: 28.2.53
Date of death. 12.4.53
Age at death: 6 weeks

Family history: Both parents alive and well.

1st child	Female	Born 1950	Died at 2 months with pneumonia
2nd child	Male	Born 1953	patient.

Personal history: Pregnancy was normal and child was full time spontaneous delivery. Birth weight 6 lbs. 7 oz.

The child showed no abnormality at birth and throve normally, but at 3 weeks old he developed a cough. In the last three days fits of coughing have distressed the child.

On admission weight 2.9 K (75% of expected weight). No abnormality was noted apart from difficulty in respiration. The child's respiration became worse and it was treated with antibiotics.

Duodenal intubation was not attempted. Child failed to respond to treatment and died on 12.4.53.

Post mortem findings: The body was that of a rather spare 8 weeks old male infant weighing 3250 gm.

The larynx, trachea and bronchi were filled with a rather viscid yellow pus. The pleural surfaces of the lungs were normal but the lungs themselves were nodular to touch, and on section numerous foci of broncho-pneumonia were seen. On squeezing the lungs beads of pus exuded from the bronchioles. There was no enlargement of the regional lymph glands. The right lung weighed 67 gm. and the left 62 gm.
The thymus and thyroid were normal.

The pericardium was normal. The heart weighed 33 gm. Routine examination of heart, muscle, valves and chambers showed no lesion. The ductus was closed. The aorta was normal.

The brain was removed and sectioned. The cerebrum weighed 460 gm. and the cerebellum weighed 46 gm. On section no lesion was seen.

The oesophagus, stomach and intestine showed no obvious lesion. The pancreas was normal to touch but rather more lobulated in appearance than usual.
The adrenals were normal. The spleen weighed 13 gm. and was of average shape and consistency. The liver weighed 154 gm. and showed bo abnormal features. The gall bladder and ducts were normal.

Each kidney weighed 21 gm. On section no lesion was seen and the capsules stripped easily leaving smooth surfaces. Pelves, ureters and bladder were normal.

Bacteriological examination:

1. Pus from trachea: Pus cells and large numbers of Gram positive cocci present in direct film. Abundant growth of staph. aureus coagulase positive obtained on culture.

2. Pus from lung: Large number of pus cells and Gram positive cocci present in direct film. Abundant growth of staph. aureus coagulase positive obtained on culture.

3. Pus from ileum: No growth of coliform organisms obtained on any cultures. Scanty growth of staph. aureus only on MacConkey agar.

All staphylococci obtained on culture proved to be resistant to penicillin, aureomycin and terramycin, moderately sensitive to streptomycin and chloromycetin.

Histological examination:

Pancreas: Four blocks were cut and examined. Each shows a similar picture - marked fibrosis of the pancreas with some early though slight dilatation of ductules and acini with inspissated secretion. There is no doubt that this is fibrocystic disease of the pancreas.

Lung: Three blocks were cut and examined. Each shows the typical features of a suppurative pneumonia, staphylococcal in type with destruction of bronchiolar walls. Bronchial mucous glands are distended with secretion.

Trachea: There is a mild though quite definite tracheitis. The mucous glands are distended with inspissated secretion.

Thyroid: A slight thickening of the connective tissue. Practically no colloid is seen and the acini are poorly developed.

Kidney, heart, liver, ileum, adrenal, medulla, pituitary - all show variable congestion but no lesion.

Spleen: There is still some erythropoiesis. general congestion.

Royal Hospital for Sick Children

Case No.: 56 P.M.No. 8838 Sex M. Date of birth: 23.2.52
Date of death: 26.11.53
Age at death: 1 year 7 months

Family history: Both parents alive and well. Mother aged 28.

1st child	6 years	female	alive and well
2nd child	1952	male	patient

Personal history: Normal pregnancy and delivery.
This child was admitted with the complaint of persistent diarrhoea since the age of 3 months. The child had 3 or 4 motions per day and stools per pale, bulky and offensive. Chronic bronchitis has been present since aged 10 months. Child's appetite has always been good but it has failed to thrive.

On admission - weight 9.4 k. (expected weight 10.4) 90% of expected weight.
Duodenal intubation gave a fluid pH 7.6 which failed to liquefy gelatine. Stool test for trypsin gave liquefaction of gelatine but the child was apparently on pancreatin at this time.
The child developed a temperature and its chest condition became worse and failed to respond to antibiotics.

Post mortem findings: The body is that of a well developed and fairly well nourished male of appearance consistent with the stated age. There are some purpuric spots over the lower limbs anteriorly but no other external evidence of disease or injury.
Body weight is 10,080 gms.

The peritoneal cavity is clear and dry. The oesophagus is normal. The stomach shows terminal dilatation and contains much milky material.

The pylorus is unobstructed; the duodenum, jejunum and ileum are unexceptional. The proximal colon is distended with gas but the distal colon and rectum show no features of note.
The liver (350 gm.) shows a rather patchy pattern suggestive of terminal congestion or fatty change. The gall-bladder is tiny and contains only a little viscid mucus. The biliary passages are however entirely patent throughout. The pancreas appears a little hypoplastic but shows no gross abnormality on inspection or palpation. The spleen (28 gm.) is firm and pale. The submandibular, parotid and pacrimal glands are taken for histology.

The kidneys (each 40 gm.) show no abnormality of capsule, parenchyma or pelves. The ureters and bladder are as in health. The testes are present in the scrotum.

The adrenals show some autolytic change but the thyroid, thymus and pituitary are unexceptional.

The cranial cavity is dry. There are small areas of "milk-spot" type on the visceral pericardium anteriorly. The heart weighs 60 gm. There is a suggestion of left ventricular hypertrophy but no abnormality of any other chamber or valve. The great vessels are normally disposed.

Both pleural cavities are dry. On the right side, however, there are numerous mature fibrous adhesions present posteriorly especially towards the apex. Rather more recent adhesions are also present at the left base.
The trachea and major bronchi contain much aspirated food material. The lungs (R.L. 300 gm. L.L. 170 gm) show gross disease. The right lung is almost entirely consolidated and the left also shows much consolidation of the lower lobe posteriorly. Elsewhere in this lung are small areas of collapse. A sample is sent for bacteriological examination. On gross section the right lung is seen to be indeed the seat of confluent broncho-pneumonia with small areas of suppuration scattered throughout the parenchyma irregularly. Pus is present also in the smaller bronchi. A similar process although less severe is seen at the right base. The hilar lymph nodes, and to a lesser degree, the tracheal nodes show some hyperplasia.

Bacteriological examination:

Lung: Direct examination - few pus cells. Numerous Gram positive cocci.
Culture - abundant growth of coagulase-positive staphylococcus aureus, sensitive to chloromycetin, not sensitive to penicillin or streptomycin.

Histological examination:

Heart: Myocardium and endocardium of left ventricle shows no abnormality.

Trachea: There is no significant submucosal infiltrate. The lumen contains some haematoxylinophilic material through which is scattered a few inclammatory cells. The tracheal glands are rather hyperplastic and some are slightly dilated.

Thyroid gland shows no abnormality.

Lungs: Bronchi show evidence of aspiration. The bronchial glands are hyperplastic and much mucus is present in the lumen frequently. Surrounding the larger bronchi is a chronic inflammatory infiltrate. There is acute bronchitis with bronchopneumonia going on to suppuration. Cocci are seen in number. In some areas oedema is noted also.

Carinal, hilar and tracheal nodes show reactive hyperplasia.

Kidney, appears essentially as in health.

Adrenals. One shows medullary haemorrhage and the other some slight haemorrhage.

Spleen, shows moderate reactive lymphoid hyperplasia.

Liver: There is fairly marked fatty change, most obvious in the centrilobular zones. Nuclear vacuolation is present in mild degree.

Gall bladder: The villeus pattern is, perhaps, rather simplified but the covering epithelium is of tall columnar type. Occasional Rokistansky-Aschoff sinuses are noted. The gall bladder lumen contains some mucus.

Thymus, pituitary and pineal gland are unexceptional.

Cerebral cortex and spinal cord appear normal.

Testes, breasts and prostate show no feature of note.

Pancreas shows typical fibrocystic disease. There is severe interstitial fibrosis and atrophy of parenchyma with the islets standing out prominently. The ductules are dilated and contain inspissated mucin.

Parotid glands show some fatty infiltration probably not of pathological degree. The ducts are not dilated.

Lacrimal glands: Fatty infiltration is again noted of similar degree. There is no gross abnormality, except in one small area where there is slight interstitial fibrosis with some mucinous material present in the slightly dilated ducts.

Submandibular glands appear normal.

Oesophagus shows rather patchy round cell infiltrate in the carium. There is slight dilatation of glands.

Stomach shows no abnormality but in the duodenum there is cystic dilatation of Brunner's glands.

Jejunum and ileum and colon are essentially normal, but there is perhaps a tendency to excess mucus formation.

Royal Hospital for Sick Children

Case No.: 57 P.M.No. 8847 Sex F. Date of birth: 19.8.53
Date of death: 19.2.53
Age at death: 4 months.

Family history: Both parents alive and well.
Normal pregnancy and delivery.
Birth weight 5 lbs. 4 oz.

1st child	Male	Born 1951	fibrocystic disease of pancreas. Dismissed September 1941, Ward 6, R.H.S.C.
2nd child	Female	Born 1953	patient.

One sib - older - fibrocystic disease of pancreas - untreated - well.

Personal history: Normal delivery - well until age of one month - then developed diarrhoea which lasted 1 week.
Developed a cough at this time which has persisted - varying in severity.
Fed well usually but had periods when she refused feeds.
Pancreatin commenced 1.12.53. On 3.12.53 fever commenced - with dyspnoea and grey colour.
Admitted R.H.S.C. O.E. cyanosed, dyspnoeic, recession.
Widespread medium fine crepitations all over lungs. Treated with aureomycin, then penicillin and streptomycin. No real response. Kept on continuous oxygen - sudden collapse on 19.12.53.

Tuberculin reaction - negative.
X-ray report - not done.

Post mortem findings: The body is that of a rather poorly nourished female infant of appearance consistent with the stated age. Body weight is 3.08 kilos. There is no external evidence of disease or injury.

The peritoneal cavity is clean and dry. The oesophagus, stomach and small and large intestines show no features of note on naked eye examination.
The liver (135 gm) is markedly congested.
The gall bladder is healthy and the biliary passages are patent. The spleen (15 gm.) is pale and firm. The pancreas (8 gm.) shows no obvious change.

The kidneys (each 20 gm.) show no abnormality of capsules, parenchyma or pelves. The ureters,

bladder, uterus and ovaries are unexceptional.

The adrenals, thymus, thyroid and pituitary glands show no features of note.

The cranial cavity, meninges, cerebrum (1500 gm.) and cerebellum and brain stem (55 gm.) show no intrinsic change. A little blood coagulum is present in the left lateral ventricle.

The pericardial cavity contains about 2 mls. of blood coagulum. The heart (26 gm.) shows no abnormality of the myocardium or of any chamber, valve or great vessel.

The pleural cavities are dry and free of infection. The trachea and larger bronchi are filled with thick greenish-yellow pus of similar appearance present in even the smaller brachial subdivisions. A swab is sent for culture.

Portions of the parotid, submandibular and lacrimal glands are removed for histological examination.

Bacteriological examination: Swab from bronchus: Culture yields abundant growth of staphylococcus aureus coagulase positive, not sensitive to penicillin and moderate growth of gram-negative bacilli of the haemophilus group (? H. influenzae).

Histological examination: Heart: There is no abnormality of endocardium, myocardium or coronary vessels.
Trachea shows infection. Thyroid is unexceptional.
Major bronchi and others show acute pyogenic infection with broncho-pneumonia.
The lung also shows collapse, congestion and small haemorrhages in some areas, while others appear emphysematous.
Liver is congested.
Spleen shows lymphoid hyperplasia.
Kidney - the preparation is poor, but no significant change is seen.
Adrenals are congested.
Pituitary, thymus, uterus are unexceptional.
Medulla shows no feature of note.
Stomach - the surface epithelium is possibly secreting an excess of mucin.
Duodenum and jejunum contain an excess of mucin and many desquamated cells.
Colon shows no feature of note.

Pancreas shows the appearance of fibrocystic disease with much dilatation of ducts and mucin present therein in quantity. There is some autolysis but islet tissue is readily recognised in quantity. Similar appearances are seen in several blocks.

Parotid: Numerous large cells are seen with rather granular haematexyphilic cytoplasmand large rather ill-defined nuclei. There is no evidence of fibrocystic disease.

Submandibular gland: Scanty large cells are again seen. The major ducts are sometimes perhaps slightly dilated and contain some mucin.

Lacrimal gland shows no feature of note.

It is felt that the parotid and submandibular glands show a form of cytomegalic disease change.

Royal Hospital for Sick Children

Case No. 58 P.M.No. 8858 Sex M. Date of birth: 15.4.52
Date of death: 17.1.54
Age at death: 1 year 9 months

Family history: Both parents alive and well.
Mother developed poliomyelitis but pregnancy went on to full time.

1st child	Female	6 years	alive and well
2nd child	Male	5 years	alive and well
3rd child	Male	4 years	alive and well
4th child	Male	2 years	alive and well
5th child	Male		patient

Personal history: The child was first admitted in April 1953 with the history of failure to thrive and examination showed a chronic bronchitis.
On admission the weight was 6.4 kilos - expected weight 9.3. 69% of expected weight.
The child was pale and had a cretinoid appearance.
The abdomen was slightly distended but showed no gross abnormality.
Duodenal intubation pH 7.6 gave no liquefaction of gelatine in any tube but a stool test for trypsin gave liquefaction of gelatine.
The child was out and in hospital for the next year. The chronic bronchitis persisted in spite of several courses of antibiotics and died on 7.1.54.

Post mortem findings: The body was that of a somewhat spare male infant of 1 year 9 months of age, weighing 6240 gm.

The larynx, trachea and bronchi were filled with frank pus. When this was washed away no infection of the trachea was observed. The pleural surfaces of the lung were normal, but the lungs themselves were much increased in weight, nodular to touch and on section showed beads of pus escaping from the bronchi of all sizes, typical of the picture of purulent bronchiolitis. The right lung weighed 130 gm. and the left 125 gm. The regional lymph glands were enlarged and oedematous. The thymus and thyroid were normal.

The pericardium was normal. The heart weighed 65 gm. Routine examination of heart muscle valves

and chambers showed no lesion.

The brain was removed intact and sectioned. The cerebrum weighed 800 gm. and the cerebellum 118 gm. On section no lesions were recognised.

Both kidneys were of average size and shape, the left weighing 30 gm. and the right 33 gm. On section no specific lesion was recognised. Pelves, ureters and bladder were normal.

The oesophagus, stomach and intestine showed no obvious lesion. Sections from the greater curvature of the stomach, the pylorus, the first part of the duodenum, the jejunum, a Meckel's diverticulum uninfected, the lower ileum and the transverse colon were taken for specific examination of their glandular structure. The spleen weighed 18 gm. and was of average size and shape, but softer in consistence than usual. The liver weighed 300 gm. and showed no obvious change. The gall bladder and ducts were normal.

Histological examination:

Lachrymal gland, submaxillary gland, thyroid, testicles, heart, kidney, pituitary, medulla, adrenal, gall bladder show no significant lesion.

Liver: Marked fatty change but no unusual appearance of the portal tracts.

Spleen: The littoral cells are swollen and there is a considerable infiltration of round cells and macrophages into the pulp. The appearance is that of an acute infection.

Tonsils: Both are infected but probably the reaction is not excessive.

Lungs: In the sections examined the typical features of staphylococcal broncho-pneumonia are seen. There is a purulent bronchitis with parenchymal abscesses and the bronchial mucous glands are distended with viscid secretion and the connective tissue around these glands is heavily infiltrated with subacute and chronic inflammatory cells.

The trachea and bronchi show well marked mural infection with distended glands holding viscid secretion. There is a regional adenitis.

Alimentary tract: Stomach, pylorus, jejunum and colon show no definite glandular disturbance. In the submucosa of the duodenum the distension of Brunner's glands is remarkable. The secretion in them appears viscid. The glands of the ileum are slightly distended and some show viscid secretion. Though the lesion here is mild it is quite definite. There is also a low grade inflammation.

Meckel's diverticulum: Here the epithelium is of small intestinal type with the glandular lesion more marked than in the ileum. No pancreatic or gastric ectopic tissue found in the diverticulum which was embedded and cut longitudinally.

Royal Hospital for Sick Children

Case No. 59 P.M.No. 8956 Sex F. Date of birth: 9.8.54
Date of death: 12.8.54
Age at death: 3 days.

Family history: Both parents alive and well. Not related.

1st child	Male	Born 1948	Died aged 2 days. Stoppage of bowel.
2nd child	Female	Born 1952	Died aged 1 year. Pneumonia Proved fibrocystic disease (Case 27).
3rd child	Female	Born 1953	Patient

Personal history: Born 3 days ago. Day following, vomiting began and every feed was vomited thereafter. Two meconium stools passed following birth.
Transferred Ward 10 ex Bellshill M.H.
On admission, cyanosed, vomiting faecal material, abdomen distended.
C.V.S. and R.S. appeared normal. I/V drip started. No operation possible. Died 12.8.54.

Post mortem findings: The body was that of a normally developed 3 day old female infant. There was exceptional cyanosis of the entire skin which was a deep blue colour.

The oesophagus and stomach contained a quantity of brown material which had an appearance of fluid faeces. This was identical with the contents of a greatly distended duodenum, jejunum and ileum though in the jejunum and ileum the

contents were slightly more viscid and in the ileum more meconium was recognised. The caecum was not distended and there was no obstruction to the ileo-caecal valves which were widely patent, but the caecum contained a plug of more inspissated material which appeared to be the source of obstruction and beyond this the colon was completely empty. The colon was small and of even calibre, and the rectum and anus were normal. The impression was that the viscid small intestinal contents acted as an obstruction and the muscle of the gut became paralytic, a type of ileus. This had not the picture of a meconium ileus as meconium was not the only intestinal contents predominantly this was faecal. The hard inspissated colourless mass so typical of meconium ileus as associated with fibrocystic pancreas was absent. The colon suggested either hypoplasia or a Hirschsprung's Disease affecting the entire large gut. There was considerable autolytic change so that only selected parts of the gut were taken for histology.

The liver weighed 182 gms., it was very dark and of even consistence, showing no obvious lesion on section. Gall bladder and ducts normal. Pancreas weighed 3.5 gm. and was of average appearance. The spleen weighed 15 gms. and was congested and somewhat friable. The adrenals were normal.

Each kidney weighed 20 gms. On section no lesion was seen apart from congestion. Ureters, pelves and bladder normal. Uterus and appendages normal.

Pericardium normal. The heart weighed 30 gm. There was a widely patent ductus, otherwise routine examination of heart muscle, valves and chambers showed no lesion. The aorta was normal.

Larynx, trachea and bronchi were discoloured but otherwise normal. Each lung weighed 38 gm. and was dark in colour. On section there was only slight oedema and no pneumonia was recognised.

The brain was removed and sectioned. No lesion was recognised. Cerebrum 420 gm. and the cerebellum 34 gm.

Histological examination:

Pancreas: Extensive inter-acinar fibrosis with inspissated secretion in the acini but no marked cystic dilatation of the ducts. The picture is typical of the pancreatic lesion associated with meconium ileus.

The gut: Sections were examined from antrum, pylorus, duodenum, jejunum and ileum, lower ileum, ascending colon and rectum. There was some distension of Brunner's glands in the duodenum, and in the ileum an early mild inflammatory reaction was seen but no other significant features.

Heart, adrenal, pituitary, liver, kidney, medulla show no significant lesion apart from general congestion of blood vessels.

Spleen: Congested to the extent of haemorrhage thus obscuring the pattern. The white pulp stands isolated against this haemorrhagic background.

Lung: Intensely haemorrhagic with inhaled vomitus or amniotic debris in the bronchioles. In the block examined no respiratory function could have been possible.

Royal Hospital for Sick Children

Case No. 60 P.M.No. 8964 Sex M. Date of birth: 4.54
Date of death: 24.9.54
Age at death: 4 months

Family history: Both parents alive and well. Not related.

1st child Female Born 1951 Died fibrocystic disease (Case 73)

2nd child Male Born 1954 Patient

Personal history: Diarrhoea from 24.7.54. Motions are pale and very offensive. Stool trypsin - absent. Persistent cough since 1.9.54.

Diagnosis: Fibrocystic disease of the pancreas.

Tuberculin reaction: Negative.

X-ray report: Lungs are emphysematous and increased broncho vascular markings. Chronic respiratory infection consistent with fibrocystic disease.

Post mortem findings: The body was that of a rather spare 4 months old male infant weighing 3980 gms. with a somewhat protruberant belly.

The oesophagus, stomach and intestine showed no obvious lesion. The regional lymph glands were rather enlarged but discrete. The pancreas weighed 6 gms. and was of average length but a little more lobular in appearance than usual. The liver weighed 192 gm. and was normal in shape, size and consistence but deeply congested. The gall bladder and ducts normal. The spleen weighed 13 gms. and showed no unusual features. The adrenals were normal.

Right kidney weighed 28 gm. and the left kidney 30 gm. Each kidney was of average size and shape and on section the cut surface showed general congestion. The pelves, ureters and bladder were normal.

Pericardium normal. The heart weighed 31 gm. Routine examination of heart muscle, valves and chambers showed no obvious lesion. The aorta was normal.

The larynx, trachea and bronchi contained a viscid purulent secretion. The lungs had smooth pleural surfaces. Right lung weighed 96 gms. and the left lung 73 gms. Mainly the lung tissue was pink but on palpation of each lung there were irregularly scattered nodular areas typical of broncho-pneumonia. On section localised areas of infection leading to early abscess formation were found at the apex and base of the right lung and in the mid-zone of the lower lobe of the left lung. There were also small minor nodules of infection scattered throughout the lung tissue. The features were those of a staphylococcal pneumonia. The thymus and thyroid were normal.

The brain was removed and sectioned. Cerebrum 450 gms. and the cerebellum 67 gm. No unusual features were found. The blood sinuses were normal and the middle ears clean.

Bacteriological examination:

Secretion from R. bronchus:
Direct examination. Few pus cells. Few Gram positive cocci.
Culture. (1) Abundant growth of alpha-haemolytic streptococci.
(2) Few micrococci.

Histological examination:

Pancreas: Well established fibrocystic disease. Fibrosis is coarse and many ductules are dilated and contain a laminated inspissated secretion. These lesions are most marked in the head.

Lung: There is a severe bronchiolitis with mural destruction. Irregular patches of bronchopneumonia, collapse and emphysema all contribute to the dysfunction of the lung which is severe.

Trachea: The epithelium is normal but the mucous glands are active and their secretion appears viscid. There is no glandular distension or fibrosis.

Bronchus: Similar to the trachea.

Salivary glands, thyroid, testes, kidney, pituitary, medulla, liver, spleen, oesophagus, heart, adrenal show no significant lesion.

Duodenum: Brunner's glands are filled with viscid secretion. No cystic change and no fibrosis.

Antrum, fundus, cardia, duodenum, jejunum, ileum, ascending colon, rectum, mesenteric lymph nodes show no significant lesion.

Comment: There is some interest here in the finding that the bacterial destruction of the lung is due to a streptococcal infection and not the usual staphylococcal infection in such a case.

Royal Hospital for Sick Children

Case No. 61 P.M.No. 8984 Sex M. Date of birth: 8.6.54
Date of death: 2.11.54
Age at death: 5 months

Family history: Both parents alive and well. Not related.

1st child	Female	Born 1947	Alive and well
2nd child	Male	" 1948	" " "
3rd child	Male	" 1954	Patient

Personal history: N.P.F.T. forceps delivery. Developed a "cold" at 6 weeks and his cough persisted despite treatment. At age of 8 weeks he had "catarrh" in nose and chest which persisted. Losing weight rapidly before admission. Oily foul smelling stools since birth, 8/days.
O/E. Marasmic, pale infant. Constant loose cough.
Rectal swab: negative for O:111, O:55, O:26.
Duodenal intubation: pH 7.6. No liquefaction of gelatin.
Trypsin absent from stool.
Tuberculin reaction: Negative.
X-ray report: Atelectasis left lower lobe and multiple cysts, R. lung emphysematous.

Post mortem findings: The body is that of an emaciated male infant weighing 3640 gms. with sunken eyes and a grossly distended abdomen.

The peritoneal cavity is dry. The tongue and the oesophagus are normal. The stomach contains a milk feed stained with gentian violet. The small and to a greater extent the large bowel are grossly distended with gas but almost empty of faeces.
The liver (140 gm.) shows no fatty change.
The gall bladder contains only a little inspissated bile and the biliary passages are patent.
The pancreas (3 gm.) shows no abnormality on naked eye examination.
The spleen (12 gm.) is firm.

The kidneys (R.K. 21 gm. and L.K. 22 gm.) show a slight degree of foetal lobulation. The capsules strip readily.

The thyroid, thymus, pituitary and adrenals show no features of note.

The cranial cavity, falx and tentorium are

healthy. The brain stem (52 gm.) and the cerebrum (520 gm.) are slightly oedematous and the veins are greatly congested.

The heart (25 gm.) shows no abnormality of any chamber, valve or great vessel. The ductus and foramen ovale are both closed.

The pleural cavities are dry. The trachea and main bronchi are free of pus or foreign material. There is patchy collapse posteriorly in both lungs. There is no pleural reaction. At the periphery of the left lower lobe there are numerous small cyst-like cavities which are smoothly lined and communicate with the dilated bronchi. These "cysts" contain thin odourless pus. There is no evidence of infection in any of the other lobes, which appear normally aerated. Right lung weighed 60 gm. and the left lung 59 gms.

Bacteriological examination:

Ileum: Culture yields abundant growth of Bact. coli 0:111 group.

Colon: Culture yields (1) abundant growth of Bact. coli 0:111 group (confirmed by agglutination tests). (2) Few monilia and albicans (confirmed by biochemical tests).

Histological examination:

Pancreas: There is marked loss of pancreatic acini which are replaced by scantily collagenous fibrous tissue. The ducts are dilated and many contain amorphous eosinophilic material which in some places shows concentric rings. There is some replacement of the gland by adipose tissue. The islets of Langerhan remain normal. The appearances are typical of fibrocystic disease of the pancreas with in this case the fibrotic element more pronounced than the cystic.

Submandibular gland: There is some eosinophilic secretion in the main ducts but this is not granular or dense and appears to be the normal mucus secretion. There is no evidence of fibrosis.

Ileum: Shows marked infiltration with plasma cells, lymphocytes and occasional eosinophils. (The appearances are those of gastro-enteritis). This is seen to a much lesser degree in the colon. Here post mortem autolysis is marked.

Liver: There is no fatty change or histological evidence of biliary stasis.

Kidney, spleen, suprarenal, thyroid, testis and brain show no features of note.

The upper part of the trachea is covered by respiratory type epithelium. The mucus glands in the wall show no abnormality.

Lungs: All sizes of bronchi contain a mass of granular debris consisting of a mixture of mucus, macrophages, shed epithelial cells, lymphocytes and broken up polymorphs. The epithelial lining in some of the larger ones shows squamous metaplasia. Surrounding the bronchial walls thereis heavy infiltration of lymphocytes and plasma cells and much increase of fibrous tissue with loss of alveoli. In the area where cystic spaces were noted on naked eye examination it is seen that these cysts are for the most part identifiable as dilated bronchi. In some shreds of epithelium are left and in others remaining mucus glands are seen. For the most part the walls are lined by necrotic material and granulation tissue. In this area there is massive replacement of lung parenchyma by collagenous fibrous tissue in which foamy macrophages are seen. In some of the lung there are groups of alveoli filled with oedema fluid and others filled with foamy macrophages.

Royal Hospital for Sick Children

Case No. 62 P.M.No. 8993 Sex Male Date of Birth:
Date of death: 24.11.54
Age at death: $4\frac{1}{2}$ months

Family history: Both parents alive and well. Not related.

1st child	Female	Born 1950	Alive and well
2nd child	Male	" 1952	" " "
3rd child	Male	" 1953	Patient
4th child	Female	" 1955	Alive and well

Personal history: N.P.F.T.S.D. Taken to Millbrae Home aged 5 days for B.C.G. Developed gastro-enteritis there and went to Knightswood Hospital. There he had a persistent cough and foul smelling oily stools. Stools - negative for trypsin.
Mother aged 29 known to have pulmonary T.B.
O/E. Small marasmic infant. Liver $1\frac{1}{2}$ f.b. Occasional rhonchi in chest. Rhonchi present in chest ++ at times. General condition remained poor in spite of pancreatin, aureomycin and abidee. Full anterior fontanelle. On Nov. 8th - L.P. negative.
? hand marantic I.C. sinus phlebothrombosis.

Tuberculin reaction: positive.

X-ray report: Interstitial broncho-pneumonia compatible with fibrocystic disease.

Post mortem findings: The body is that of a poorly nourished male infant (3050 gms.) with a distended badomen. There is a 0.5 cm. diameter scar on the outer aspect of the left upper arm.

The pericardium is normal. The heart weighed 30 gm Routine examination of the heart muscle, valves and chambers reveals no abnormality. The ductus and foramen ovale are closed.

The cranial cavity, meninges and venous sinuses show no abnormality. There is some oedema of the brain b t no hydrocephalus or other abnormality is noted on section. Cerebrum weighed 500 gms. Cerebellum, medullaand pons 58 gms.

The pituitary, thyroid and adrenals show no changes except for those of post mortem autolysis.

The kidneys (L.K. 21 gm. R.K. 19 gm.) are slightly lobulated. The capsule strip readily and no evidence of infection or other abnormality is seen on section. The renal pelves and ureter are free of infection. The testes are normal and present in the scrotum.

The peritoneal cavity is healthy. The oesophagus and stomach show no abnormality. The small and large bowel are both almost empty of faeces but greatly distended by gas. Tissue is taken for culture for gastro-enteritis organisms. The liver (158 gm.) is pale and rather fatty in appearance. The gall bladder is small and contains very little bile. The biliary passages are patent. The spleen (9 gm.) is slightly soft and shows some lymphoid hyperplasia. The pancreas (5 gm.) is slightly more definitely lobulated than usual.

The pleural cavities are dry. Occasional petechiae are seen in the subpleural region of the lung. The lower part of the trachea and the main bronchi are almost filled with thick glutinous pus, and this spreads down to the smallest bronchioles in all lobes of both lungs and can be squeezed out of them like toothpaste. There is slight nodularity of the lung substance to the touch possibly due to early bronchopneumonia. No evidence of fibrin is seen on the surface of the lung. There is some patchy collapse of the lung parenchyma especially in the posterior part of the lower lobes. Right lung weighs 59 gms. and the left lung 63 gms. The lymph nodes at the hilum of the lung are enlarged. On section there is no evidence of suppuration or tuberculosis.

Bacteriological examination:

Swab from trachea: Direct examination - few epithelial cells. Few Gram positive cocci. Culture yields (1) moderate growth of staphylococcus aureus, coagulase-positive, sensitive to chloromycetin, slightly sensitive to streptomycin, non-sensitive to penicillin, aureomycin and terramycin.
(2) A few atypical safrophytic (gelatin liquefying) gram-negative bacilli.

Ileum: Direct examination: Numerous Gram-positive cocci. Few Gram-negative bacilli.
Culture: (1) Abundant growth of atypical non-lactose fermenting (gelatin liquefying) coliform

organisms probably safrophytic Gram-negative bacilli of the genous pseudomonas or achromabacterium.
(2) Staph. aureus coagulase-positive in moderate numbers.

Colon: Direct examination: Numerous Gram-positive cocci. Occasional Gram-negative bacilli.
Culture: (1) Abundant growth of non-lactose fermenting (gelatin liquefying) coliform organisms, probably safrophytic Gram-negative bacilli of the ? B. pyocyaneas group of Achromabacterium.
(2) Scanty growth of staph. aureus coagulase-positive. Sensitivity tests of organisms isolated for ileum and colon.
(1) The coliform organisms are sensitive to chloromycetin, non-sensitive to aureomycin, streptomycin, terramycin.
(2) The staphylococci are sensitive to chloromycetin, slightly sensitive to streptomycin, non-sensitive to terramycin, aureomycin, penicillin.

Histological examination:

Pancreas: The pancreas shows marked loss of pancreatic acini due to replacement of the gland by collagenous fibrous tissue. Many of the ducts contain inspissated, eosinophilic secretion and are much dilated. No actual formation of concretions is seen. The islets of Langerhans are not abnormal.

Lungs: The trachea shows marked lymphocytic infiltration of the wall and the lumen contains mucus, pus and desquamated epithelial cells and groups of bacteria. The mucus glands in the wall are large but no inspissation of secretion is seen.
Section of the lung parenchyma shows that all the sizes of bronchi and bronchioles are blocked with pus and there are several patches of early bronchopneumonia with the alveoli containing pus and macrophages but very little fibrin. There is early peribronchial fibrosis with patchy emphysema. In spite of the very marked purulent bronchitis full blown squamous metaplasia of the bronchial epithelium is not seen.

Liver, spleen, adrenal, stomach, oesophagus, pituitary, kidney, testis, heart, brain are normal.

Sections of duodenum, large and small bowel and salivary glands show no secretory abnormality.

Lymph nodes from hilum shows sinus catarrh.

The pulmonary artery shows no evidence of atheroma.

Royal Hospital for Sick Children

Case No. 63 P.M.No. 9000 Sex M Date of birth: 31.3.54
Date of death: 9.12.54
Age at death: 8 months

Family history: Both parents alive and well. Not related.

1st child Male Born 1954 Patient.

Personal history: Admitted with history of vomiting and diarrhoea. General condition fair. Given B.C.G. Mantoux 1/100 neg.
Dietetic regime - poor response. Given sulpha, then erythromycin. Rectal swabs (4) and 1 on November 14. Positive for B. coli 0:55. Others - enterococci. I.V. therapy for 10 days beginning on 23/11/54. Total I.V. fluid plasma 2,910 ccs. N/4 saline and 5% glucose 4,375 c.c. Streptomycin, cortisone and D.O.C.A. given and latterly I.M. penicillin too. Infant hypotonic, dehydrated and moribund. Gradually become worse and worse. Latterly developed clinical broncho-pneumonia.

Tuberculin reaction: Mantoux 1/100 neg. Had B.C.G.
X-ray: Long bones - ? deficiency disease.

Post mortem findings: The body was that of a normally developed 8 months old male infant weighing 5469 gms. There were petechiae over the lower abdomen and both lower limbs sparsely scattered and the left leg was swollen. An intravenous infusion had been given to the left leg.

The brain was removed and fixed. No lesion was seen on external examination. The meninges and the blood sinuses were normal. The total weight of the brain was 800 gms.

Larynx and trachea in themselves were normal but a few purulent foci were found in the connective tissue around them. The lungs presented a remarkable picture of massive pulmonary abscesses with free pus in the left pleural sac. On

section these abscesses, typically staphylococcal in type, were found throughout the lung substance. There was no clear infection of the bronchi themselves.
Thymus and thyroid were normal.
Right lung weighed 115 gms. and the left lung 75 gms

The pericardium was adherent to the heart which had a sticky fibrinous exudate covering it after the pericardium was removed. Systematic examination of muscle revealed one or two pyaemic abscesses but there was no valvular lesion and the shape and size of the heart was normal. The heart weighed 38 gms.
The aorta was normal.

Oesophagus normal. The stomach was distended with a recently taken meal. The duodenum and the rest of the gut presented no obvious lesion and the colon was empty. Regional lymph glands were slightly enlarged perhaps secondary to the general toxaemic condition. The pancreas weighed 5 gms. and the connective tissue septa appeared more marked than usual indicating a fibrocystic disease. The shape of this gland however was normal. The spleen weighed 20 gms. and showed no unusual features. It was not unduly soft. Gall bladder and ducts normal.
The liver weighed 360 gms. and was somewhat congested but show no specific lesion.

Each kidney weighed 32 gms. and on section a very few small pyaemic abscesses were found.
The size and colour of the kidneys was normal.
Pelves, ureters and bladder normal.

Bacteriological examination:

Ileum and colon: Culture: No growth of organisms on MacConkey plate and SS agar plate.
Blood agar plate culture yields (1) moderate growth of staphylococcus aureus, coagulase positive, sensitive to erythromycin, non-sensitive to penicillin, streptomycin, aureomycin, terramycin, chloromycetin.
(2) moderate growth of enterococci (catalase negative) slightly sensitive to erythromycin, non-sensitive to penicillin, aureomycin, streptomycin, chloromycetin, terramycin.

Swab from tissue round oesophagus:
Direct examination: A little amorphous debris. No pus cells seen. Occasional Gram positive cocci.
Culture: Abundant growth of staphylococcus aureus, coagulase-positive, non-sensitive to penicillin, sensitive to aureomycin and erythromycin.

Swab from (R) lung:
Direct examination: Few pus cells. Few Gram positive cocci.
Culture - yields abundant growth of staphylococcus aureus, coagulase-positive, non-sensitive to penicillin, sensitive to aureomycin and erythromycin.

Histlological examination: Salivary gland, kidney, testes, liver, pituitary, adrenal, stomach duodenum show no significant lesion.

Lachrymal glands. No present in block.

Spleen: Infiltration of macrophages and plasma cells consistent with a toxaemic state.

Heart: Early pericarditis with subpericardial abscess formation. One venule is severely infected and the phila of thrush can be seen growing through the polymorph exudate.

Lung: There is a purulent bronchiolitis with lung abscess formation of a type similar to that seen in staphylococcal infection of the lung. Also early pleurisy.

Pancreas: There is a marked though irregular fibrosis of the gland with no cystic change. There are extensive areas of normal or near normal tissue. The appearances are not those typical of fibrocystic disease but there is little doubt that the lesion seen is only a slight modification of the usual pattern.

Ileum: Low grade infection.

Royal Hospital for Sick Children

Case No. 64 P.M.No. 9009 Sex Female Date of birth: 21.1.54
Date of death: 25.12.56
Age at death: 11 mths.

Family history: Both parents alive and well. Not related.

1st child	Male	Born 1940	Died age 5/12 gastroenteritis.
2nd child	Female	" 1942	Alive and well
3rd child	Female	" 1954	Patient

Personal history: Premature - 6 months - pale, bulky stools, offensive, 4-6/day.
Weight loss slight. Contact with open tuberculosis.
Cough for 1 week before admission.

Impression: Early coeliac disease. A few loose stools after admission. Clinical coeliac disease and glutein free diet started. On 8tg December child developed upper respiratory infection: marked broncho spasm on December 11th and profuse moist sounds in chest following day. Treated with sulphatriad, aureomycin and finally erythromycin ?to which staph aureus recovered from throat was sensitive). Transient improvement followed by deterioration.
Mantoux (1/1000) negative.
X-ray: ? retro-pharyngeal abscess.
Faecal trypsin positive.

Diagnosis: Broncho-pneumonia.
Might this child have fibro-elastosis.

Post mortem findings: The body is that of a moderately well nourished female infant weighing 6350 gms. The abdomen is grossly distended. No other abnormality is noted on external examination.

The oesophagus, stomach, small and large intestine are normal apart from gaseous distension of the bowel. There is no free fluid in the peritoneal cavity.
The liver is enlarged and is pale in colour with slight patchy congestion. The gall bladder is small and shrunken and contains only a little viscid bile. The biliary passages are patent.
The spleen weighs 18 gms. and is soft and congested. There is quite marked hyperplasia of lymphoid tissue, although the organ is not enlarged.

The pancreas is normal in size and appearance.

Two sections of bowel are taken for bacteriological examination.

Each kidney weighs 29 gms. and shows slight foetal lobulation. The pelves and ureters are free of infection and the uterus, tubes and ovaries appear normal.

The scalp and skull are normal. The meninges show no abnormality and the superficial cerebral vessels are normal. The cerebrum weighs 780 gms. and the cerebellum 98 gms. On section there is no feature of note.

The pericardium is normal and there is no excess of fluid. The heart weighs 70 gms. None of the chambers is abnormally large. The great vessels are normally placed. The ductus arteriosus and foramen ovale are closed. The myocardium appears well nourished and there is no evidence of fibro-elastosis in any of the chambers. A few petechial haemorrhages are seen below the visceral pericardium.

The larynx is normal. No evidence of retro-pharyngeal abscess is seen. The trachea is filled with thick viscid pus as are the bronchi both large and small. Very many small areas of frank bronchopneumonia are seen in both lungs, especially in the lower lobes. In spite of this no pleural reaction is seen and the pleural cavities are free of fluid.
Swabs are taken both from the trachea and from the lung substance.

The adrenals, thyroid and pituitary are normal. No vestige of thymus is seen.

Bacteriological examination:

Swabs from (1) lung and (2) trachea.
Direct examination: No pus cells seen.
Numerous gram positive cocci.
Culture: Abundant growth of staph. aureus, coagulase positive. The isolated staphylococci from both specimens are non-sensitive to penicillin, aureomycin, erythromycin, streptomycin, terramycin, but sensitive to chloromycetin.

Large and small bowel: Abundant growth of lactose-fermenting coliform organisms negative for 0:111, 0:55, 0:26 types of Bact. coli.

Histological examination:

Pancreas: The several sections of pancreas examined show marked increase in fibrous tissue which accentuates the lobular pattern and also results in some loss of acini. Many of the acini and ducts are filled with and distended by deeply eosinophilic amorphous matter which in some areas is concentrically ringed like corpora anylacea. A small group of glands also contain degenerate polymorphs. A single duct shows early squamous metaplasia. The islets of Langerhans are comparatively normal. The appearances are characteristic of well established fibrocystic disease of the pancreas.

Duodenum: Brunner's glands are markedly hypertrophic and distended but the secretion is not granular or in any way histologically abnormal.

The submandibular glands and those of the stomach, small and large bowel show no feature of note.

Myocardium, pituitary, adrenals, cerebrum and pons, kidney, spleen and ovaries are normal.

Liver shows some centrilobular congestion.

Gall bladder shows marked autolysis with disintegration of the epithelium. The few remaining shreds however, do appear rather more distended than usual.

The hilar and paratracheal lymph nodes show marked sinus hyperplasia and catarrh.

Trachea: Microscopy shows an acute inflammatory process with congestion of the blood vessels, oedema and exudation of lymphocytes and polymorphs. The tracheal mucous glands are rather hyperplastic. The bronchi both large and small show similar changes and are plugged with pus. There is also a patchy and confluent bronchopneumonia. The alveoli are packed with polymorphs with occasional red cells. Fibrin is scanty. Many of the alveoli unaffected by the pneumonic process are filled with oedema fluid. There is early squamous metaplasia is some of the medium sized bronchi.

Royal Hospital for Sick Children

Case No. 65 P.M.No. 9019 Sex Male Date of Birth:
Date of death: 15.1.55
Age at death:

Family history: Both parents alive and well. Not related.

1st child	Male	Dead	
2nd child	"	Born 1947	Alive and well
3rd child	"	Born 1954	Patient

Personal history: Vomiting and diarrhoea since birth.
Trypsin absent from stools.
Duodenal intubation - no liquefaction of gelatin in any tube.
X-ray chest - Atelectasis R. lower lobe with bronchopneumonic changes in R. upper lobe.
The appearances are consistent with fibrocystic disease.

Tuberculin reaction: Neg. 1/1000.

Post mortem findings: The body is that of a rather poorly nourished male infant weighing 3500 gms. The abdomen is distended and the skin is rather wrinkled and inelastic. There is no external evidence of disease.

The trachea and main bronchi contain thick muco-pus. The upper lobes of both lungs are for the most part well aerated. Irregular areas of haemorrhage, however, are seen and the lung parenchyma in these areas is firm and nodular. Both lower lobes are purple in colour and almost completely lacking in air. They are firm and granular in consistency and on section pus can be squeezed from the smallest bronchi which are surrounded by irregular patches of confluent bronchopneumonia, which in this case appears to be associated with much haemorrhage. The extent of the bronchopneumonia is more on the right side than on the left. No pleural reaction or effusion is seen in either pleural cavity. Swabs for bacteriological culture have been taken from the trachea and from the lung substance.

The heart weighs 30 gms. and there is some increase in size in the right ventricle as compared with the left. The great vessels entering and leaving

the heart are in the normal position. The ductus arteriosus is closed as is the foramen ovale. No septal defects are found and the valves are normal. A few sub-pericardial haemorrhages are seen. The myocardium appears well nourished and the coronary arteries are normal.

The oesophagus, stomach, small and large bowel show no features of note apart from a gaseous distension. Specimens of bowel are taken for bacteriological examination. The biliary passages are patent. The gall bladder is very small and contains a little thin bile. The liver weighs 180 gms. and is patchy and congested. The spleen weighs 17 gms. and shows some lymphoid hyperplasia. The pancreas weighs only 5 gms. and appears smaller than normal.

The kidneys each weigh 19 gms. and show foetal lobulation. Apart from some medullary congestion they appear normal as do the pelves and ureters. The testes are normally placed in the scrotum.

The thyroid, pituitary and adrenals appear healthy.

The scalp, skull and meninges are normal. The brain is somewhat oedematous and the small veins in the meninges are congested. On section there is no evidence of disease.

Bacteriological examination:

Swab from Lung:
Direct examination: Occasional leucocytes.
Occasional Gram positive cocci.
Culture: Abundant growth of staph. aureus, coagulase positive, non-sensitive to penicillin, aureomycin, erythromycin, sensitive to streptomycin.

Colon: (1) Abundant growth of lactose-fermenting coliform organisms negative for O:111, O:55, O:26 types of Bact. coli.

Swab from trachea:
Direct examination: Few epithelial cells. No pus cells.
Occasional Gram positive cocci.
Culture: Abundant growth of staph. aureus, coagulase-positive, non-sensitive to penicillin, aureomycin, erythromycin, but sensitive to streptomycin.

Histological examination:

Pancreas: The pancreas shows marked fibrosis with both increase in intra-lobular fibrous tissue and also more diffuse fine fibrosis. The islets of Langerhans appear normal. There is little cystic change but where this does occur the ducts are distended with very dense and sometimes concentrically ringed deeply eosinophilic material. The appearances are those of fibrocystic disease of the pancreas.

Trachea and main bronchi: There is oedema of the wall with marked infiltration in the lymphocytes, plasma cells, scanty polymorphs and ? myelocytes. These like the small bronchi are acutely inflamed and distended with pus. Microscopy shows a patchy bronchopneumonia, the alveoli containing many polymorphs and macrophages and scanty red cells. Congestion of the alveolar walls is not now very marked. The amount of fibrin is very scanty and fragmentary. In addition to the bronchopneumonia, large areas of lung alveoli are filled with oedema fluid and macrophages, and others are filled with blood. The cause of the haemorrhage is not clear. Squamous metaplasia of the bronchi is not seen.

The heart, thymus, small and large bowel, oesophagus, stomach, brain, kidney, testis, pituitary, adrenal show no feature of note.

The spleen is acutely congested.

The liver shows centrilobular congestion and a little diffuse fatty change also more marked in the central zones.

Royal Hospital for Sick Children

Case No.: 66 P.M.No. 9049 Sex M. Date of birth: 7.3.55
Date of death: 15.3.55
Age at death 8 days

Family history: Both parents alive and well. Not related

1st child	Male	Born 1955	Patient
2nd child	Male	Born 1956	Died 3/52 pneumonia (Case 90)

Personal history: Intestinal obstruction from birth. Ileostomy on third day of life. Microcolon with obstruction lower ileum.

Post mortem findings: The body is that of a poorly nourished full term male infant weighing 1950 gms. The umbilicus appears healthy. There is an ileostomy loop projecting from a surgical wound in the left lower abdomen.

The oesophagus, and stomach show no features of note. The loops of small bowel are slightly dilated especially proximal to the ileostomy. The bowel near to the ileostomy on both sides contains several masses of glutinous dark green meconium. There is no evidence of ileus or of obstruction and apart from a little fibrinous exudation on the loop of bowel involved in the ileostomy there is no evidence of peritonitis. There is some slight narrowing of the small bowel as it comes towards the ileo-caecal valve but this is not marked in comparison with the sharp change in size beyond the ileo-caecal valve. The whole of the colon from caecum to anus is greatly narrowed being less than a centimetre in diameter. It is patent throughout its length and the colon contains white stringy mucin only, no meconium being seen.

The liver weighs 81 gms. and is slightly yellowish in appearance. The gall bladder is distended and contains a large quantity of thick inspissated bile. The biliary passages are patent. The spleen weighs 5 gms. and is small and firm in consistency. There is no lymphoid hyperplasia. The pancreas shows no abnormality on naked eye examination.

The pleural cavities are free of fluid. There is fine fibrinous exudation on the visceral

pleura involving the diaphragmatic surface and posterior part of the lower lobes. The trachea and main bronchi contain thin glairy mucupus. The posterior part of the upper lobe and both lower lobes are dark purple and solid in consistency The small bronchi contain thin pus and the lung parenchyma appears to be infected by a confluent and haemorrhagic broncho-pneumonia, which at one area at the base of the right lower lobe appears to be advancing to the stage of formation of minute abscesses. Right lung weighs 45 gms. and the left lung 39 gms.

The heart weighs 14 gms. The chambers bear the usual size relationship to each other. The myocardium and valves appear healthy. The great vessels enter and leave the heart in the normal position and the coronary arteries take origin from the aorta. The ductus arteriosus is still patent but is narrowed and the foramen ovale is almost completely closed. No thrombus is seen in the pulmonary arteries.

The bladder is not unduly large but there is a mild degree of bilateral bydro-ureter for which no anatomical cause can be seen on naked eye examination. The kidneys show no evidence of hydro-nephrosis. They each weigh 14 gms. and the capsules strip readily. A heavy encrustation of uric acid crystals is seen in the renal medulla. The testes are in the scrotum.

Thyroid, thymus, pituitary and adrenals show no features of note.

The scalp, skull and meninges are healthy. The cerebrum weighs 300 gms. and the cerebellum 25 gm. Section of the brain reveals no abnormality.

Bacteriological examination:

Swab from trachea. Direct examination. No pus cells seen. Occasional Gram-positive cocci. Culture yields (1) abundant growth of staph. aureus, coagulase-positive.
(2) Few alpha-haemolytic streptococci.

Swab from lung. Direct examination. No pus cells seen. Few Gram positive cocci. culture yields (1) abundant growth of staph. aureus, coagulase positive. (2) Few alpha-haemolytic streptococci.
Both strains are non-sensitive to penicillin, slightly sensitive to streptomycin, sensitive

to streptomycin, sensitive to erythromycin, aureomycin, chloromycetin.

Histological examination:

Trachea: There is only a very little lymphocyte infiltration beneath the mucosa.

Lungs: The bronchi and bronchioles show an acute inflammatory reaction in the walls, which spreads through the muscle coats. There is extensive haemorrhagic bronchopneumonia with abscess formation. No squamous metaplasia is seen in the bronchi.

Pancreas: There is fibrocystic disease of the pancreas with moderately severe fibrosis and only minimal cystic change. There is a little retention of secretion. The islets of Langerhans appear normal. There is marked autolysis in all sections.

Blocks of other organs are filed.

Sections of large bowel from anus to caecum show no lack of ganglion cells in any part.

Royal Hospital for Sick Children

Case No. 67 P.M.No. 9099 Sex F. Date of birth: 24.11.51
Date of death: 24.8.55
Age at death: $3\frac{1}{2}$ years.

Family history: Both parents alive and well. Not related.

1st child	Female	Born 1951	Patient
2nd "	"	" 1955	alive and well.

Personal history: Birth weight 5 lb. 6 oz. Breast fed for 3 months weaned 9 months. At first, poor weight gain but gradual improvement, though smaller than average. Abdomen always large. Stools soft, bulky. April, 1955 developed pneumonia which persisted until death - resistant staphylococcus. Duodenal juice and stools were free of trypsin.
Treatment: Pancreatin and antibiotics - penicillin sulphas, chloremphenical, erythromycin.
Tuberculin reaction: negative.
X-ray report: 5065.

Post mortem findings: The body was that of a $3\frac{1}{2}$ year old female infant, of average development, weighing 18,143 gms.

Oesophagus, and stomach showed no lesion. The ileum was a little congested but no frank inflammation was recognised and the colon appeared normal with stools of average consistence.
The pancreas was of average size but on section small cysts could be made out and the substance of the gland was firmer than usual. Both adrenals were normal. The spleen weighed 58 gms. and was soft and congested with prominent lymph follicles seen on the cut surface. The liver weighed 400 gms. and was oddly shaped in that the left lobe was twice its usual size and there was only a rudimentary right lobe. The surface of the liver was mottled, green and light brown. It appeared that the bile canaliculi towards the surface were exceptionally injected. The cut surface of the liver was pale and the pattern was unusual in that the fine lobulation normally present could not be made out though the central veins were normally seen. There was a rudimentary gall bladder but no obstruction to the bile passage, and the intestinal contents were normally coloured.

Right kidney 52 gms. and the left kidney 56 gms. Each kidney presented a normal appearance.

The capsules stripped easily and no lesion was seen in pelves, ureters or bladder.

The brain was removed and sectioned. Cerebrum 860 gms. and the cerebellum 155 gm. No lesion was recognised.

Pericardium normal. The heart was of average size and shape and weighed 70 gms. On routine examination no lesion was found in muscle valves or chambers. The aorta was normal.

Larynx and trachea were slightly inflamed. The right lung weighed 220 gms. and the left lung 200 gms. Each lung presented a similar appearance of pleurisy covering the lower lobes and on section multiple abscesses, most of which had well defined walls indicating that the infective process had been there for some weeks.

Bacteriological examination:

Swab from lung: Direct examination - few degenerate cells. Numerous Gram Positive cocci. Culture: Abundant mixed growth of micrococci, coliform organisms and alpha-haemolytic streptococci.

Ileum: No Salmonellae. No shigellae. 0:26, 0:55, 0:111, 0:119, 0:128 types of B. coli. Abundant growth of ? B. aerogenes.

Histological examination:

Pancreas: Typical features of a well developed fibrocystic disease.

Lung: There are many abscesses filled with pus. Most of the bronchioles are distended with pus and their walls are necrosed. Squamous metaplasia of the bronchial epithelium is very well shown in the two blocks of lung examined.

Liver: Severe fatty change.

Duodenum: Brunner's glands show marked activity but no actual distension.

Spleen: Prominent infiltration into the pulp of subacute and acute inflammatory cells, the picture of a septicaemia.

Jejunum and ileum: Blocks from both segments of the intestine show a definite enteritis.

Pituitary (anterior lobe), adrenal, heart, kidney, medulla show no significant lesion.

Comment: The organisms apparently responsible for the destruction in the lungs is a streptococcus and not the usual staphylococcus.

Royal Hospital for Sick Children

Case No. 68 P.M.No. 9105 Sex F. Date of birth: 17.4.55
Date of death: 31.8.55
Age at death: 4 months

Family history: Both parents alive and well. Not related.

1st child	Female	Born 1955	Patient
2nd child		1956	Miscarriage at 3 months

Personal history: Admitted as an asthmatic with complaint of wheezing of 2 days duration though had been present in milder form since child was 14 days old. Became easily cyanosed. 1 week after admission proved to have fibrocystic disease of pancreas. Chest condition deteriorated and she became persistently cyanotic and oxygen was required. Developed several raw areas on body, swabs from which grew culture staph. aureus.

Tuberculin reaction: negative.

X-ray report: Emphysema at both bases with interstitial changes in both lungs. Appearances consistent with fibrocystic disease and superadded bronchitis.

Post mortem findings: The body was that of a normally developed 4 months old female infant weighing 4876 gms. There was no lesion of the skin.

Oesophagus and stomach showed no obvious lesion. The duodenum was rather inflamed and a similar rather undetermined appearance was found in the first part of the jejunum. The rest of the alimentary tract presented no unusual features. Regional lymph glands normal. The liver weighed 210 gms. and was of average proportions and colour. On section no specific lesion was recognised. The spleen weighed 12 gms. and was normal in size and shape. The pancreas was of average length but the surface was rough and the definite impression of fibrosis was made on examination. Both adrenals were of average appearance.

Right kidney 22 gms. and the left kidney 28 gms. Each kidney was congested but presented no other unusual features. Pelves, ureters and bladder were normal. Uterus and appendages normal.

The brain was removed and sectioned. No lesion was seen. Cerebrum weighed 460 gms. and the cerebellum 59 gms. The venous sinuses were normal.

Pericardium normal. The heart weighed 29 gms. and on routine examination of heart muscle, valves and chambers no obvious lesion was seen. The ductus and the foramen ovale were closed and the aorta was normal.

Larynx and trachea were congested and there was a thin film of pus covering the living epithelium. The bronchi were acutely infected and there was pus lying in the lumen. Each lung presented a similar appearance of smooth pleurae with numerous wedgelike areas of collapse at the periphery of the lungs. On section there were a few foci of bronchopneumonia irregularly scattered throughout each lung but no abscess formation. Right lung weighed 83 gms. and the left lung 55 gms.

Thymus and thyroid were normal.

Bacteriological examination: Pus from bronchi: Large numbers of pus cells and Gram positive cocci present in direct film.

Moderate growth of B. proteus and ? staphylococci. It has proved impossible to isolate the staph. from the proteus, but on testing sensitivity of mixed growth the streptomycin appeared to be sensitive to penicillin, chloromycetin and aureomycin; B. proteus to streptomycin and chloromycetin.

Histological examination: Spleen: The pulp and sinusoids show a great increase in the numbers of polymorphs - an indication of a septicaemic state.

Salivary glands: Each gland shows a heavy infection of "inclusion bodies" almost entirely affecting the epithelium of the ductules.

Kidney: Inclusion bodies in the tibular epithelium in very small numbers but there is a marked local subacute cellular reaction in the interstitium associated with the presence of the bodies.

Pancreas: Typical picture of fibrocystic disease.

Adrenal, liver, pituitary show no significant lesion.

Trachea: Tracheitis with infection of mucous glands which are distended by a viscid secretion.

Lung: Acute bronchiolitis with infection of adjacent mucous glands. There is a broncho-pneumonia with some heavy aggregation of polymorphs indicative of early abscess formation.

Royal Hospital for Sick Children

Case No. 69 P.M.No. 9117 Sex M. Date of birth: 5.9.55
Date of death: 22.9.55
Age at death: 2 weeks

Family history: Both parents alive and well. Not related.

1st child	Male Born 1950	Died 1 year - Fibrocystic disease
2nd child	Male Born 1951	Alive and well
3rd child	Male Born 1955)	Patient Case 69
	Twins)	Case 70

Personal history: Neo-natal obstruction and meconium peritonitis. 7.9.55 - operation 8.9.55. Volvulus of ileum. Terminal ileum unexpanded. Double-barrel ileostomy done.
15.9.55 Closure of ileostomy. Died 22.9.55

Post mortem findings: The body was that of an underweight spare male infant weighing 1,550 gms. 2 weeks of age. There was an upper abdominal transverse surgical incision which was completely healed on the surface but adherent to the underlying loops of intestine.

When the abdomen was opened coils of intestine presented in an adherent mass with free faeces in the lower abdomen. The oesophagus and the stomach were normal. The jejunum was distended but of a healthy colour. The loops of intestine were carefully dissected free and the source of the faecal escape was traced to the ileostomy

which had broken down leaving a widely gaping aperture through which the faeces had escaped. The stitches fixing the ileal loop laterally held fast, but those which had closed the ileostomy had completely given. The lips of the opening were congested and oedematous. The colon was small in diameter when compared to the ileum but there was no evidence of stasis in this segment of the gut. The liver weighed 88 gms. and was dark in colour and of average size, shape and consistence. On section no lesion was seen. The gall bladder was exceptionally small and probably non-functioning. There was, however, no evidence of bile stasis. The pancreas weighed 4 gms. and was of average length but the surface was obviously crenated due to fibrosis. The spleen weighed 3 gms. and was small and rather soft. It was of average shape. The adrenals were normal.

Right kidney weighed 14 gms. and the left kidney 10 gms. The right kidney was deeply congested and situated near the right pelvic brim. The left was of normal colour and neither, apart from congestion, showed pathological features. Pelves, ureters and bladder normal.

The brain was removed and sectioned. Cerebrum 234 gms. and the cerebellum 17 gms. On section no unusual features were found. The middle ears were clean and no thrombi were found in the venous sinuses.

Pericardium normal. The heart weighed 12 gms. Routine examination of heart muscle, valves and chambers showed no lesion. The aorta was normal.

Larynx, trachea and bronchi showed some congestion. The lungs had normally collapsed. Right lung 24 gms. and the left lung 18 gms. On section no lesion was seen.

Histological examination: Pancreas: Fibrosis of the parenchyma with occasional dilatation of the ducts forming cysts. There is a marked round cell infiltration in the connective septa.

Jejunum and colon show a necrotizing peritonitis with minimal cellular reaction.

Duodenum: distension of Brunner's glands.

Lung: The alveoli have thick walls due to the round cell infiltration there. There is no other obvious infection.

Thyroid, trachea, oesophagus, salivary gland, heart, liver , kidney, medulla, pituitary, adrenal show no significant lesion.

Royal Hospital for Sick Children

Case No. 70 P.M.No. PC25/55 Sex M. Date of birth: 5.9.55
Date of death: 7.9.55
Age at death: 2 days

Family history: Twin brother of Case 69.

Personal history: This child was the twin brother of Case 69. He was admitted on 6th September within a few hours of birth on account of abdominal distension and oedema. The abdominal wall was not discoloured and no masses could be felt. There was no evidence of any other abnormality. An X-ray of the abdomen revealed a pneumo-peritoneum and a few coils of air filled intestine separated from each other. There was no hypertrophic calcification to be seen. I operated on this child shortly after admission and through a transverse abdominal incision clear green fluid and gas escaped. There was also some meconium free in the peritoneal cavity and the loops of intestine were matted together by fibrous peritonitis. A loop of ileum had undergone volvulus and had become gangrenous. It was adherent to the anterior abdominal wall to the right of the umbilicus. This loop was mobilised and resected and an end to end anastomosis was performed. The meconium in the distal ileus was thick and sticky and an effort was made to wash this out prior to the anastomosis by the injection of saline into the distal ileum and caecum. The child did not stand the operation well and died shortly afterwards. Dr. Brown administered the anaesthetic which consisted of gas and oxygen and 50 mg. Scolene. I did not give a blood transfusion because the child was extremely small, weighing $3\frac{1}{2}$ lbs. at the time of death and I was anxious to avoid circulatory

over-loading. There was very little blood loss at operation and it is a matter of speculation whether the ascites had been derived from the circulation of the mother or that of the infant. When we started operation there was no evidence of any circulatory distress.

Post mortem findings: The small bowel presented the appearance of meconium ileus.

Histological examination: The pancreas showed fibrocystic disease.

Royal Hospital for Sick Children

Case No. 71 P.M.No. 9131 Sex F. Date of birth: 11.6.55
Date of death: 18.10.55
Age at death: 4 months

Family history: Both parents alive and well. Not related.

1st child	Female	Born 1950	Alive and well
2nd child	Female	" 1951	Alive and well
3rd child	Male	" 1953	Bronchitis and chronic cough
4th child	Female	" 1955	Patient

Personal history: Admitted with a complaint of cough for 5 weeks and nasal discharge one week. On admission was marasmic with a continual cry and wheezy cough. The baby had an offensive smell; pale and toxic looking. L. chest dull - bronchial b.s.
X-ray showed collapse of L. lung with elevation of L. diaphragm and displacement of mediastinum into L. hemothorax. There was consolidation of R. upper lobe.
22.9.55 Dr. Hutchison explored L. chest in mid axillary line in 4th space. 15 ccs. of yellow pus obtained. 250 mgm. (i.v.) of terramycin given intrapleurally. Repeated 24.9.55 - chest improved considerably but ? right apical opacity thought to be cystic.
Stools - trypsin free.

Post mortem findings: The body was that of a rather spare female infant weighing 3620 gms. The skin was wrinkled, the eyes were sunken and the belly was protruberant. There were needle marks in the left chest in the mid-axillary line.

Larynx, trachea and bronchi contained a large quantity of muco-pus. The mucous membrane of the bronchial tree was congested. Right lung weighed 68 gms. and was rather voluminous and mainly of a pink colour except in the antero-lateral aspect of the upper lobe where the pleura was adherent to the chest wall and at this point there was a large abscess cavity containing air but with thickened walls lined with exudate. This cavity was some 3 cms. across. There were a few minor adhesions in the upper part of the lower lobe but on section only the bronchiolitis was observed and no further abscesses had formed. The left lung weighed 72 gms. and was rather firm and partially consolidated. It was firmly

adherent to the chest wall and on section numerous medium-sized abscesses with well defined walls were found. Regional lymph glands were slightly enlarged.
Thymus and thyroid were normal.

The pericardium was adherent to the heart over a spot on the anterior surface near the apex. The heart weighed 34 gms. and on routine examination of muscle, valves and chambers no other lesion was found.

Oesophagus, stomach and intestine presented no unusual features. The pancreas was of average length, rather firmer than usual with the septa quite prominently marked. The liver weighed 220 gms. and was of average size and shape though a little paler in colour than usual. On section apart from early fatty change no significant lesion was seen. The gall bladder was very small and contained straw-coloured jelly-like fluid. The impression gained was that the gall bladder was not functioning but there was no evidence of obstruction. The spleen weighed 21 gms. and was a little larger than usual, of a dark colour but of normal shape. On section the lymph follicles were prominent. The adrenal glands were normal. The mesenteric lymph glands showed some slight general enlargement.

Each kidney weighed 25 gms. and was of average size, shape and colour. On section no obvious lesion was seen. Pelves, ureters and bladder were normal. Uterus normal but both ovaries were slightly cystic.

The brain was removed and sectioned. Cerebrum 420 gms. and the cerebellum 50 gms. No lesion was seen. The venous sinuses were normal. The right middle ear was rather moist but no pus was present.

Bacteriological examination: Pus from abscess in lung: Moderate number of pus cells and abundant Gram positive cocci present in direct film. Abundant growth of staph. aureus obtained on culture - not sensitive to penicillin, sensitive to chloromycetin and erythromycin, not sensitive to streptomycin or aureomycin.

Histological examination:

Pancreas: Coarse fibrosis and tubular dilatation, i.e. all the features of fibrocystic disease.

Salivary glands, medulla, pituitary, adrenal show no significant lesion.

Heart: A mild subacute inflammatory reaction of the visceral pericardium. There are also several foci of plasma infiltration in the interstitium of the left auricle. These are pyaemic lesions.

Lung: Extensive abscess formation and destruction of lung tissue. Bronchioles are distended and their walls destroyed. There is a much more marked fibrosis than is usually found in such lungs; that is to say that the effort to repair is considerable. bronchial mucous glands are distended with inspissated secretion.

Mesenteric lymph nodes: Reactive hyperplasia.

Liver: The portal tract is more frequently seen than usual, smaller, and there are occasional round cell infiltrations associated with them. No parenchymal lesion.

Spleen: The sinusoids and pulp contain a range of inflammatory cells compatible with a condition of pyaemia.

Kidney: There are small interstitial collections of round and plasma cells in the cortex periphery mainly. This lesion is also associated with pyaemia.

Duodenum: Brunner's glands are distended.

Jejunum, ileum and colon: Show an indefinite polymorph infiltration probably related to the pyaemia than to any specific gut infection.

Hawkhead Infectious Diseases Hospital

Case No. 72 P.M.No. 97/55 R.A.I. Sex Date of birth: 13.5.55
Date of death: 16.11.55
Age at death: 6 months

Family history: Both parents alive and well.

1st child Female Born 1955 Patient.

Post mortem findings: Post mortem showed a rather emaciated child.

The whole of the upper lobe of the right lung and part of the middle lobe showed numerous abscesses the largest of which was about one centimeter in diameter. There was no obvious obstruction to the bronchi which were, however, acutely inflamed on the right side. The lower lobe of the right lung and the whole of the left lung showed no gross abnormality or suggestion of any cystic changes.

Examination of the organs of the body showed no abnormality.

The pancreas appeared a little larger than normal, but it was taken entirely for histological examination.

No abnormality of the brain was found.

Death was considered to be due to bronchopneumonia with abscess formation of the right lung, probably secondary to fibrocystic disease of the pancreas.

Knightswood Hospital

Case No. 73 P.M.No.A 8293 Sex F. Date of death: 1.12.51
Age at death: 8 months

Family history: Sister of Case 60.

Personal history: Admitted 30.10.51 with a right lobar pneumonia. Had 5 days course of penicillin, then sulphadianine, but failed to respond. Then treated with aureomycin which appeared to settle the temperature. However 9 days later she developed a further elevation of temperature and required more aureomycin which once again settled the temperature. 4 days later a 3rd course was commenced.

Before admission to hospital this child is said to have had whooping cough andduring her stay in hospital she had several very alarming attacks of breathlessness and coughing which made her cyanosed. O_2 did not help. She also had a rectal prolapse which was replaced.
Stools all along were rather frequent and faecal fat estimation showed -

Total fat 28.7 gms. %
Split " 79.3 gms.%
Unsplit " 20.7 gms.%

Stools contained practically no pigment.
X-ray reports - 2.11.51 consolidation of R.U.L. and R.L.L.
6.11.51 Some resolution in R.U.L. R.L.L. still consolidated.
19.11.51 Atelectasis in R.U.L. and R.L.L.
Her abdomen felt rather full but nothing definite was palpable. Nail beds showed marked clubbing.

Post Mortem findings: The body is that of an 8 months old female infant. It appears underweight and somewhat underdeveloped for the age. The fingers are clubbed.

Both lungs are firmly adherent to the chest wall by extensive adhesions on their lateral and diaphragmatic surfaces. Adhesions are particularly firm over the right lower lobe. The right lung shows a moderate degree of general collapse. The greater part of the lower lobe is solid and firm. This is the seat of bronchopneumonia. Around the edges of the area the staphyloid pattern is visible but in the

centre infected areas have coalesced. Throughout the whole of the lung there are small patches of bronchopneumonia apparently associated with collapse. In addition, a lung abscess 2 centimetres in diameter has formed in the lower part of the lower lobe towards its lateral surface. It contains eyllowish pus and is enclosed by a well-formed pyogenic membrane, probably several weeks old. The bronchi are inflamed and pus exudes from some of the smaller divisions. The left lung shows areas of patchy collapse and early bronchopneumonia similar to those in the right upper lobe.
The heart and great vessels are normal.

The brain is sound. No abnormality of the mouth, throat or neck is seen.

The stomach, the small and the large bowel are healthy. The liver is normal and the gall bladder and biliary passages are healthy. Bile is present in the duodenum and exudes on pressure on the gall bladder. The spleen and adrenals are normal. The kidneys, ureters and bladder are sound. The genitalia are in keeping with the infantile state.

Histological examination:

Sections of the pancreas show a moderate lobular and intra-acinar fibrosis with dilatation of acini into microcysts containing thick laminated eosinophilic inspissated secretion. The islet tissue is rather prominent. The epithelium lining many of the micro-cysts shows evidence of pressure atrophy but no definite examples of squamous metaplasia are seen. No inclusion bodies are seen in sections stained with eosin-phloxine.

Lungs: The lung abscess is surrounded by a pyogenic membrane rather fibrous in character. Consolidation of the rest of the lung is loose, much fluid being present. Monocytes are prominent in the fluid. The bronchi are the seat of severe acute bronchitis and around them polymorphs are numerous.

Gateside Hospital, Greenock

Case No. 74 P.M.No. H.R.520835 Sex F. Date of birth: 5.11.49
Date of death: 5.3.52
Age at death: 2 years 4 months

Family history: Both parents alive and well.

1st child	Female	Born 1944	well
2nd child	"	" 1948	Died at 6 weeks - chest disease
3rd child	"	" 1949	Patient

Personal history: Normal full time spontaneous delivery. Birth weight 7 lbs. 7 oz. Thrived normally for the first 3 weeks but later was rather difficult. Had a cold at 4½ months and developed whooping cough at 7 months.

Admitted to R.H.S.C. on 10.2.51. Weight 5.9 K (expected weight 9.3 K) 63% of expected weight.

Faeces had been noticed to be bulky and offensive and examination showed that they contained 32 mg.% of fat.

Duodenal intubation was carried out and gave 3 to 4 c.c. of fluid pH 7.3. No digestion of gelatine was obtained.
Trypsin test on stools also showed no digestion of gelatine.

The child was dismissed and died about a year later in Greenock with broncho-pneumonia.

Histology submitted to Western Infirmary.

Histological examination: The pancreas shows widespread fibrosis and cystic change and the appearance is characteristic of fibrocystic disease.
Lung shows widespread distension of the bronchi with mucus and pus. The adjacent lung shows areas of collapse and early pneumonic change is seen.

Seafield Hospital, Ayr

Case No.: 75 P.M.No. R.89 Sex M. Date of birth: 28.10.53
Date of death: 14.5.54
Age at death: 7 months

Family history: Both parents alive and well. Not related.

1st child	Male	Born 1941	Alive and well.
2nd child	Female	" 1942	Alive and well
3rd child	Male	" 1953	Patient
4th child	Female	" 1956	Alive and well

Personal history: Admitted 3.5.54 with history of failure to thrive since birth and of chronic cough.

Birth weight 9 lbs. weight aged 6/12 - 10 lbs. 12½ oz. History of persistent, spasmodic, irritating cough, with dyspnoea and production of much tenacious mucus. Stools rather frequent, but normal in consistency and colour. PA. No acute illness.

F.H. No F.H. of meconium ileus or cystic fibrosis of pancreas. M. & F. alive and well. Sibs. - Male 13 years alive and well, female - 11 years alive and well.

O/E. pale, wasted, underweight. Tongue dry and furred.
Chest: emphysematous with widespread crepitations.
Gth: distension only.
Stool: Soft yellow - non offensive.
Fatanalysin: Total fat 38.96 G%
Split fat 33.75 G/
Unsplit fat 5.21 G%
X-ray chest: basal fibrosis, emphysema of upper lobes.
Urine: Albumen +, Bl. urea 10.5.54 66 mgm.%
Bl. urea 14.5.54 87 mgm.%
Duodenal intubation: No tryptic activity.

Condition continued to deteriorate despite chemotherapy and pancreatin treatment. Died 14.5.54

Post mortem findings: The body is that of a very emaciated male child which is considerably under the expected weight for his age. In contrast with marked wasting of the limbs the abdomen is greatly distended.

The tongue and tonsils appear normal and the salivary glands show no abnormality. The trachea and main bronchi contain a considerable amount of thick muco-purulent material. Pleurae: Areas of fibrous exudate are present on the surface of the lower lobes of both lungs. Lungs are very voluminous and show gross emphysema of the upper lobes and of the anterior borders of the lower lobes. The posterior surfaces of both lower lobes show an extensive confluent bronchopneumonia. Although the bronchi contain this pus long abscesses are not seen. The pericardium shows no abnormality. The heart shows no muscular or valvular lesions and the aorta and great vessels appear normal.

The oesophagus and stomach are normal. The small intestine is dilated mainly by gas but shows no other abnormality. The large bowel appears normal. The liver is normal in size and shows no evidence of fibrosis. The pancreas is normal in size and shows no gross abnormality on external examination. No cystic change is noted. Spleen and adrenals are normal. The kidneys show no abnormality on external examination or on section. Ureters and bladder appear normal.

Diagnosis: Fibrocystic disease of the pancreas.
Bronchopneumonia.

Histological examination:

The submucous glands of the trachea are distended with mucous. The lungs show a widespread bronchopneumonia which is proceeding to abscess formation in places. The intervening lung parenchyma is very emphysematous.

The pancreas shows fibrocystic disease. Neither fibrosis or cystic change is gross and only the large ducts contain plugs of mucous. The acini are well preserved and in places show zymogen granules.

The alimentary tract shows evidence of an abnormality in mucous secretion. Brunner's glands are dilated as are the ducts of Lieberkulm in the small intestine.

The submandibular and parotid salivary glands show no abnormality. Liver, kidney, spleen, adrenals and heart show no abnormality.

Seafield Hospital, Ayr

Case No. 76 P.M.No. R.107 Sex F. Date of birth: 17.8.53
Date of death: 15.6.54
Age at death: 10 months

Family history: Both parents alive and well. Not related.

1st child	1946	Male	Alive and well
2nd child	1948	Female	Dead. Fibrocystic disease (Case 82)
3rd child	1950	Male	Alive and well
4th child	1955	Female	Patient

Personal history: Admitted 6.5.54 with history of chronic cough and failure to thrive - 6/12 duration. Weight gain slow and inconstant, numerous wheezing attacks with persistent tenacious sputum.

Noticable abdominal distension with passage of bulky, large foul stools.

F.H. One previous child died in Seafield Hospt. in 1948 with pulmonary and pancreatic fibrosis - confirmed by P.M.

Examination on admission: Pale, underweight, clubbed fingers, abdomen distended, febrile, prolapse of rectum.
Chest: Widespread scattered creptns. and rhonchi.
Abdomen: Distended and tympanitic.
Stool: Pale, bulky, foul.
Hb.: 70%
Fat analysis: Total fat 42.88 Gm%
Split fat 37.8 Gm% = 86.56 %
Unsplit fat 5.08 - 13.44 %
Tryptic activity - nil.
Culture: Pharyngeal swan: Staph. aureus. pyog. and B. Friedlander.
X-ray chest: Marked emphysema.
Progress: Continuous deterioration with cough, fever, weight stationary, reluctance to feed. Survived prolapse of large bowel with intussusception replaced distally.
Fat analysis: 4.6.54 Total fat 38 Gm%
Split fat 29.16 Gm% = 76.58 %
Unsplit fat 8.84 Gm% = 23.42 %
Treated with antibiotics, pancreatin, ephedrin and vitamin supplements. Died 10.30 p.m. 15.6.54

Post mortem examination:

The body is that of a very emaciated female child who looks considerably younger than the stated age of 10 months. Although the limbs, buttocks and neck are emaciated the abdomen is distended and the chest appears barrel shaped.

The tongue and tonsils appear normal and the salivary glands present no features of note. The trachea and main bronchi are full of thick tenacious green pus. The pleurae are normal. The lungs are voluminous and do not collapse down normally on opening the chest cavities. While the major portion of the lungs appear emphysematous there are areas of collapse particularly in the lower lobes. Section shows an extensive purulent bronchitis and bronchiolitis but no widespread pneumonia is seen. The pericardium is normal and the heart, which is normal in size, shows no muscular or valvular abnormality. The aorta and great vessels show no features of note.

The oesophagus and stomach show no abnormality. The small intestine is dilated but is otherwise normal. The large intestine contains bulky faeces which have a high fatty content. A portion of the sigmoid colon is abnormal due to an old haemorrhage but no evidence of intus-susception. The liver is normal in size but the capsule is slightly indrawn in places. Section shows only slight fatty change. The gall bladder and biliary passages are normal. The pancreas weighs 5 gms. and is rather small in size but shows no gross abnormality. Spleen and adrenals show no abnormality.
Kidneys are normal in size and show no features of note on section.
Ureters and bladder are normal.

Diagnosis: Fibrocystic disease of the pancreas.
Purulent bronchitis.
Emphysema.

Histological examination:

Pancreas shows typical fibrocystic disease. The ducts are plugged with acidophilic concretions which stain for mucus. There is only slight fibrosis. The gland acini are atrophic but a few still contain zymogen granules.

The bowel shows no abnormality and the Brunner's glands appear normal. Both parotid and submaxillary salivary glands appear normal. Liver shows no abnormality.
Lungs show an extensive purulent bronchitis with spread into the adjacent lung substance and early abscess formation. Some abnormality is seen in the mucous glands in the main bronchi with pus and the usual filling of the bronchi with mucus is not now seen.

Ruchill Hospital

Case No. 77 P.M.No. R 202 Sex F. Date of birth: .10.54
Date of death: 1.2.55
Age at death :

Family history: Both parents alive and well

1st child Female Born 1954 Patient

Personal history: F.T.S.D. $6\frac{1}{2}$ lbs. No known contact T.B. Cough since 2 months old. Whooping cough developed at $2\frac{1}{2}$ months. Admitted 2 weeks later because of listlessness, increasing dyspnoea and cough.

On admission: pigeon chested, slightly marasmic with bronchopneumonia and apical emphysema. Distressed. Put on aureomycin.

First X-ray negative. Staph. coagulase found in throat - put on penicillin till found to be insensitive - then on aureomycin, chloromycetin and sulphonamides. White cell response good throughout - Hb. remained around 75%.
Not dehydrated.

Feeds taken in divided doses. Suitable cough sedation and ephedrine for asthmatic element. Child improved, chest cleared a lot and then relapsed. Leucocytosis persisted, child still fed well but colour deteriorated over 24 hours. No obvious signs of lung collapse. Died 1.35 a.m. on 1.3.55.

(One loose stool reported 2 days before death - put on polymyxin prophytactically - report on swab).

Post mortem findings:

The body is that of a rather thin pale-looking child aged about 5 months. Chest is barrel shaped but no other abnormality is seen.

The upper respiratory passages are normal, but the trachea and main bronchi contain thick, greenish pus. The pleurae are normal. Both lungs are voluminous due to widespread emphysema. In addition there arewedged shaped dark areas due to partial collapse of the lung. On section a widespread purulent bronchitis is present, but no evidence of spread into the surrounding lung is noted. The appearance of the lung is similar to that seen in fibrocystic disease.
The pericardium is normal.
The heart shows no muscular or valvular lesion.
The myocardium appears of good quality.

The peritoneum, omentum and mesentery are normal. The liver is slightly enlarged and shows a moderate degree of fatty change. The alimentary tract shows no abnormality. The pancreas is normal in size and shows no evidence of cystic change. Spleen and adrenals are normal. Kidneys, ureters and bladder show no features of note.

The meninges are normal and the brain shows no abnormality.

Diagnosis: Bronchitis,
Emphysema.

Histological examination:

The pancreas shows histological changes of fibrocystic disease. Although fibrosis is not marked, there is atrophy of the acini and some of the ducts are plugged with eosinophilic concretions.

The lungs show an extensive severe purulent bronchitis with, in places, areas of collapse and bronchopneumonia. The adjacent lung is very emphysematous.

Diagnosis: Fibrocystic disease of the pancreas.

Ruchill Hospital

Case No. 78 P.M.No. R 225 Sex F. Date of birth: 13.5.39
Date of death: 7.3.55
Age at death: 17 years

Family history: Both parents alive and well

1st child Female Born 1939 Patient.

Personal history: Patient was in Ruchill, Ward So.3 in 1953 and diagnosed as bilateral bronchiectasis which was thought to be probably congenital. She was discharged on 21.9.53 and since then had been taking part in the M.R.C. bronchiectasis trial. In September '54 her general condition became poor and she was admitted on 2.12.54 when treatment with terramycin was commenced.

On 12.12.54 she became acutely bruitless and on 14.12.54 she was transferred to steam compartment for 4 days. This gave considerable relief and later there was a marked improvement in her general condition.
On 21.3.55 she became acutely dyspnoeic and was transferred to a steam compartment and given oxygen. Her condition gradually deteriorated and she died on 27.3.55.

Post mortem examination: The body is that of a rather thin, poorly developed girl aged about 16. No gross abnormality is seen on external examination.

The upper respiratory passages are normal.
Pleurae: Both lungs lie free in the chest cavity which presents no abnormality.
Lungs are very emphysematous. On palpation areas of consolidation can be felt in the lower lobes and in some instances there are small dark areas of partial collapse visible on the surface of the lungs. The bronchi are filled with thick creamy pus. They are unusually dilated and present the features of a diffuse cylindrical bronchiectasis. Some areas of partial collapse are seen around the bronchi and in the lower lobes there is some broncho-pneumonia. No fibrosis of the lung substance is present. The general features of the lungs are those of an acute purulent bronchitis with terminal bronchopneumonia.
The pericardium is normal.
The heart is small in size, but shows some

right ventricular hypertrophy.
No valvular abnormality is present.

Peritoneum, omentum and mesentery are normal and the alimentary tract presents no features of note. The liver is normal in size. An irregular scarring is present on the surface of the liver but on section no gross fibrosis is noted. The gall bladder is small in size but on section the amount of pancreatic tissue appears small and some cystic change is noted in the head of the pancreas. The main duct is dilated and contains pure mucus.
Spleen and adrenals are normal.
Kidneys, ureters and bladder present no features of note.

Diagnosis: Bronchiectasis,
Fibrocystic disease of the pancreas.

Examination of material from cysts of pancreas for trypsin - negative.

Histological examination: Lungs show extensive bronchopneumonia. Many of the bronchi are filled with pus and are dilated. In the larger bronchi the mucous glands are dilated. The pancreas shows advanced fibrocystic disease with extensive atrophy of tissue, which is partly replaced by adipose tissue. The main ducts are all dilated and many contain concretions. The liver shows hyperplasia of the bile ducts and some fibrosis is seen around the portal track.

Opinion: This is a most interesting case of fibrocystic disease in an adolescent. Only two cases are recorded in the literature of this condition in children over the age of 10 and this appears to be the oldest case of the disease yet found. In this case the pancreas is extensively damaged and yet presumably digestion was adequate or at least did not produce frank steatorrhoea.

The typical distension of mucous glands associated with this condition was seen in the bronchi and the duodenum. Liver changes of the type seen are occasionally recorded in fibrocystic disease.

Gateside Hospital, Greenock

Case No. 79 P.M.No. A69/54 Sex Date of birth:
Date of death:
Age at death: 3 months

Family history: Child was one of twins one of whom had died 2 weeks previously of pneumonia.

Histological examination: Material submitted for histological examination:

Pancreas: Shows severe fibrosis and cystic change characteristic of fibrocystic disease.

Lungs: Show an extensive severe purulent bronchitis with areas of bronchopneumonia. Evidence of oversecretion of mucus is present.

Stobhill Hospital

Case No. 83 P.M.No. SH 239/54 Sex M.

Date of birth: 2.54
Date of death: 5.7.54
Age at death: 5 months

Family history: Not available.

Personal history: Continuous respiratory infections since birth.
Difficulty in feeding. Nursed mainly in O_2.
No trypsin in stools.
Faecal fat (16th June) 30% split (pancreatin begun on 19th June)
(25th June) 70% split
Birth weight: 4 lbs. 6 oz. (2 months' premature)
Weight on 2.7.54 6 lbs. 3 ozs.

Post mortem examination: The body is that of a pale underdeveloped male infant.

Oesophagus: Normal.

Trachea, main bronchi and the entire bronchial tree are filled with greenish-yellow mucopus. On sectioning all lobes of the lung, pus is seen welling out of the smallest bronchi. The R. middle and L. lower lobes are totally collapsed. The R. apex shows a sharply demarcated area of consolidation.
Pleurae: Normal.
Pericardium: Normal.
Heart is of normal contour. Chambers, valves and septa show no abnormality.
Foremen ovale is closed.
Ductus arteriosus is closed.
Peritoneum: The mesenteric lymph nodes are enlarged, white and firm.
Stomach: Normal.
Small intestine: Normal.
Large intestine is markedly dilated but otherwise shows no abnormality.
Liver is of normal size relative to the body weight. The cut surface shows ill-defined areas of pallor.
Gall bladder and bile ducts normal.
Pancreas is of normal size (8 gm.) and appears normal macroscopically but the gland feels firmer than usual and in some parts is distinctly hard to the touch. No cysts are seen.

Spleen is of average size and normal appearance onsection.
Suprarenals normal.
Kidneys: The cut surfaces are pale but otherwise show no abnormality.

Head: Not examined.

Histological examination: Pancreas showed severe fibrosis and cystic change.

Royal Hospital for Sick Children

Case No. 84 P.M.No. 9144 Sex M. Date of birth: 9.55
Date of death: 25.11.55
Age at death: 2 months

Family history: Sib of Case No.45

Personal history: Nasal obstruction and slight cough since birth. For past 3 weeks constant cough. Vomiting with cough. Bowels loose and frequent since birth.
O/E. Small thin baby. Constant loose cough.
R.S. Expansion poor, scattered rales.
Progress: X-ray chest - chronic respiratory infection.
Duodenal juice and stool - no trypsin.
Treated with pancreatin and auroemycin and oxygen.
Gradual deterioration until death.
Tuberculin reaction: Negative.

Post mortem findings: The body was that of a small rather emaciated 9 weeks old male infant weighing 2580 gms.

Oesophagus normal.
The stomach was small but of normal proportions. The duodenum and intestine were examined but no obvious lesion was seen though there was some distension of the small gut. The pancreas was of average length weighing 7 gms. but conspicuously lobulated and quite typical of the more advanced state of fibrocystic disease. The liver weighed 150 gms. and was of normal size and shape, a little darker in colour than usual but of average consistence. On section apart from congestion no lesion was recognised. The gall bladder and ducts were

normal.
The spleen weighed 14 gms. and was a little enlarged but of average shape. It was congested but of normal consistency. On section no unusual features were recognised.
The adrenals were normal.
Regional lymph glands were considerably enlarged possibly due to a gut infection.

Right kidney 21 gms. and the left kidney 22 gms. The kidneys presented no unusual features. On section there was poor differentiation between cortex and medulla.
Pelves, ureters and bladder were normal.
Larynx and trachea contained a quantity of greenish pus which could be traced into the fine branches of the bronchi.
The lungs had smooth pleural surfaces.
Right lung 60 gms. and the left lung 44 gms. They were well expanded except for the right lower lobe which was congested, partially collapsed and shows signs of early pneumonia. No frank abscesses were recognised. From examination of the rest of the lung tissue it is probable that small foci of bronchopneumonia existed.
The thymus was normal.
The thyroid was congested but presented no other unusual features.
Regional lymph glands in the mediastinum and in the para-tracheal chain were enlarged and discrete.

Pericardium normal.
The heart weighed 28 gms. Routine examination of heart muscle, valves and chambers showed no unusual features.
The aorta was normal.

The brain was removed and sectioned.
Cerebrum 440 gms. and the cerebellum 50 gms.
No unusual features were seen. The venous sinuses were normal.

Bacteriological examination:

Pus from bronchus: Moderate number of Gram-positive cocci seen in direct film.
Moderate growth of staph. aureus obtained on culture - not sensitive to penicillin: sensitive to erythromycin: slightly sensitive to streptomycin, with few resistant colonies present in inhibition area: not sensitive to aureomycin, terramycin, chloromycetin.

Histological examination:

Pancreas: Marked fibrosis with cystic formation. The picture is quite typical of the fibrocystic lesion.

Spleen: The cellularity is compatible with a moderately severe toxaemia.

Kidney: A few early lesions of the kind typical of medullary calcinosis.

Duodenum: Marked distension of Brunner's glands with an associated duodenitis.

Lung: Severe bronchiolitis with associated pneumonia and collapse. No abscess found in the block examined.

Salivary gland, heart, medulla, pituitary, adrenal, oesophagus show no significant lesion.

Trachea: Active secretion of the mucous glands but no inflammation.

Liver: Distension of the bile ducts with some evidence of bile capillary stasis irregularly seen in some lobules. This anomaly is occasionally found associated with fibrocystic disease of the pancreas.

Royal Hospital for Sick Children

Case No. 85 P.M.No. 9170 Sex M. Date of birth:
Date of death: 1.2.56
Age at death:

Family history: Both parents alive and well. Not related.

1st child	Female	Born 1942	alive and well.
2nd child	Female	Born 1944	died - 3 weeks pneumonia.
3rd child	Miscarriage		
4th child	Male	Born 1946	died - 3 months pneumonia.
5th child	Male	Born 1948	alive and well
6th child	Male	Born 1953	alive and well
7th child	Female	Born 1954	fibrocystic disease - died 6 months
8th child	Male	Born 1955	patient

Personal history: This child is one of a family of 7. One died as a neonate with pneumonia, another in this period with gastro-enteritis. A third is a known fibrocystic disease and this is one too. He coughed and had loose stools all his life.

X-ray report: Interstitial pneumonia at Lt. hind zone.

The body was that of a very spare 5 week old male infant weighing 1900 gms.

Larynx, trachea and bronchi contained a quantity of moderate viscid pus. There was a mild inflammation of the underlying mucosa.
The lungs were of average size, the right weighing 50 gms. and the left 29 gms. The upper lobes of each lung were pink and rather over-distended though small areas of collapse were found on the posterior borders. The right lower lobe was plum-coloured, rather firm to the touch and on section a diffuse pneumonia was recognised with the small bronchi. Sections of this lobe have been taken for culture.
In the left lower lobe small foci of broncho-pneumonia were recognised but in general this lobe was of normal colour. The pleural surfaces of both lungs were smooth and glistening.
Thymus and thyroid were normal.

Pericardium normal.
The heart weighed 14 gms. and was of average size and shape. On routine examination no lesion was found in muscle, valves or chambers.
The aorta was normal.

The ductus was closed.

Oesophagus and stomach presented no unusual features. The jejunum was a little distended but no gross infection was recognised here nor in the rest of the gut which was of normal calibre. The peritoneum was normal. The liver weighed 94 gms. and was rather dark in colour but of even consistency and of average shape. On section some portal tracts appeared rather prominent but there was no cirrhosis. The gall bladder was very small and under-developed and contained clear mucus only. The spleen weighed 7 gms. and showed no unusual features. The pancreas was rather small and had a slightly pitted surface, rough and compatible with fibrocystic disease. The adrenals were normal. Regional lymph glands were discrete and congested.

Right kidney weighed 8 gms. and the left kidney 10 gms. Apart from general congestion no unusual features were found. Pelves, Ureters and Bladder were normal.

The brain was removed and sectioned. Cerebrum weighed 360 gms. and the cerebellum 28 gms. No lesion was recognised.

Bacteriological examination:

Lung: Scanty Gram positive cocci, very few in short chains, seen in direct film.
Scanty mixed growth of staph. aureus, resistant to penicillin, sensitive to aureomycin, chloromycetin and streptomycin, few colonies of B. proteus and scanty growth of B-haemolytic streptococci obtained on culture.

Swab from trachea: Abundant mixed flora of Gram positive cocci, some in short chains, and moderate number of Gram negative bacilli seen in direct film.
Abundant mixed growth of B. proteus and staph. aureus obtained on culture: the latter was resistant to penicillin, sensitive to aureomycin, terramycin, streptomycin and chloromycetin.

Histological examination:

Pancreas: Fibrocystic disease. The gland is very fibrous and the most marked cystic change is to be found in the head.

Lung: The basic lesion is a severe bronchiolitis. This is complicated by haemorrhage, an interstitial inflammation and a few foci of local pneumonia. Collapse and oedema are also found.

Trachea: Round cell infiltration and distension of mucous glands with viscid secretion.

Salivary gland, liver, heart, medulla, kidney, pituitary, adrenal, jejunum, mid-ileum, terminal ileum and sigmoid show no significant lesion.

Liver: Portal tracts are in larger number than usual and the lymphatics in them are distended. Terminal congestion.

Spleen: Excessive pigment formation.

Duodenum: Distension of Brunner's glands with viscid secretion.
The epithelium shows a subacute inflammation.

Royal Hospital for Sick Children

Case No. 87 P.M.No. 9173 Sex M. Date of birth: 14.11.55
Date of death: 10.2.56
Age at death: 7½ weeks.

Family history: Not available.

Personal history: Patient was admitted as an intestinal obstruction with a history of vomiting and irritability for 1 day. He had been coughing for 2 days. X-ray showed a R. upper lobe consolidate and inconclusive evidence of intestinal obstruction. At operation filmy adhesions near the ligament of Treitz were found partially obstructing the bowel. Post-operatively the patient was very ill following a profuse haematemesis; a blood transfusion was given. On the 7th post-operative day a R. sided empyema was aspirated and a rib resection (R 8th) performed on 27.1.56. On 1st February there was a deterioration in the patient's condition and X-ray showed a collapse of the R. lung. The patient remained on continuous oxygen therapy until his death.

Post mortem findings: The body is that of an emaciated infant, weighing 3430 gms. There is a well healed right para-median abdominal scar and a healed wound in the posterior surface of the upper part of the right chest.

The right lung (84 gms.) is adherent to the parietes over and around the site of the surfical incision. The rest of the pleural sac is normal. The lung does not fill the available space. It is of fairly uniform, firm consistency. Through the visceral pleura yellow abscesses are visible laterally and posteriorly. On section the lung is solid and flecked throughout it are yellow abscesses. In addition there is patchy dilatation of the bronchi with the formation of sacular spaces lined by a delicate membrane. The main bronchus and its branches are virtually occluded by tenacious yellow pus. This pus extends over the carina and is present in a lesser amount in the main left bronchus. Similar pus is also present in the trachea. The left pleural sac is healthy. The left lung (40 gms.) shows only patchy collapse.

The pericardial sac is normal. The heart (21 gms.) is normal. The ductus arteriosus is closed, as is the foramen ovale.

The ascending colon and the terminal ileum is adherent to the under-surface of the surgical scar. There is no evidence that any obstruction occurred here. Delicate fibrous adhesions are present round the upper jejunal loops binding them together. There is no obstruction caused directly by these adhesions but the matted loops are seen to have herniated into the lesser sac through the Foramen of Winslow. There is no evidence of permanent obstruction, but such a condition could reasonably be thought to have caused intermittent obstructive symptoms. The small intestine distally is distended by gas. The colon is quite markedly distended in its ascending and transverse parts. There is an area of narrowing stretching from the splenic flexure to the anus. Microscopy will be required to assess the significance if any of these appearances. The oesophagus and stomach are normal. The liver (1184 gms.) shows only acute congestion. Gall bladder and biliary passages appear normal. The spleen (8 gms.) is not remarkable. The pancreas appears normal. The suprarenals are similar. They do not contain much cortical lipoid.

The kidneys (R.K. 15 gm. L.K. 16 gm.) are similar. They show only mild congestion. Ureters and urinary bladder are normal.

The scalp, skull and meninges are normal. The cerebrum (380 gms) and the cerebellum (41 gms) are normal. The tongue, pharyns and larynx are normal. The thyroid gland is normal.

Bacteriological examination: Swab from (R) bronchus. Pus cells and moderate number of Gram positive cocci and Gram positive bacilli seen in direct film.
Abundant growth of staph. aureus obtained on culture, not sensitive to penicillin, sensitive to aureomycin, chloromycetin, streptomycin. Moderate growth of coliform organisms also present.

Histological examination: The typical changes of fibrocystic disease of the pancreas are present.

Sections from the jejunum show no active inflammation but a few crypts are distended and contain eosinophilic secretion.

The lung changes are those of severe bronchiectatic dilatation and pyogenic infection of the surrounding parenchyma, the changes being those typically seen in fibrocystic disease of the pancreas.

The colonic and rectal sections show normal distribution of the nerves and ganglia in the muscularis.

No relevant disease is seen in the liver, spleen, kidneys, suprarenals, pituitary, tonsil, heart, oesophagus, trachea and thyroid.

Royal Hospital for Sick Children

Case No. 88 P.M.No. 9190 Sex F. Date of birth: 12.55
Date of death: 21.3.56
Age at death: 3 months

Family history: Not available.

Personal history: F.T.S.D. Birth weight 5¾ lbs. When 2/12 old she developed a cough and frequently vomited her feeds. Her stools were thin and yellow in colour about 5/day. Her nose always seemed blocked and she did not thrive satisfactorily. One sibling born in 1954 died at 2/12 in Ruchill Hospital with collapse of left lung and infection. Child was marasmic and snuffy with a wheezy cough. Air entry was poor in both lung fields and occasional rhonchi heard. Diagnosed as fibrocystic disease and treated with pancreatin, but condition gradually became worse and she died.

Tuberculin reaction: negative.

X-ray report: Lungs are emphysematous with slight accentuation of broncho-vascular markings consistent with respiratory infection. Fibrocystic disease cannot be excluded but appearances not typical.

Post mortem findings: The body was that of an emaciated 3 month old infant with a protruberant belly.

Oesophagus normal. The stomach was within normal limits and the intestine contained light yellow faeces, sour smelling. The pancreas showed a fibe fibrosis but was of average length. The liver weighed 91 gms. and was of average size, shape and consistence and on section no lesion was recognised. Gall bladder was very small but contained a lumen with normal bile. The ducts were normal. The spleen weighed 7 gms. and it and the adrenals presented no anatomical lesion.

Right kidney weighed 8 gms. and the left kidney 9 gms. The kidneys were normal in their size, shape and colour. Pelves, ureters and bladder presented no unusual features.

Larynx, trachea and bronchi contained a quantity of thin muco-purulent secretion.

Right lung 53 gm. left lung 49 gm. Each lung had smooth pleural surfaces and were heavier than usual. On section there was a diffuse pneumonia but no abscesses had formed. Cultures have been made. Regional lymph glands were enlarged and oedematous. Thymus and thyroid normal.

Pericardium normal. The heart weighed 16 gm. and on routine examination of muscle, valves and chambers no unusual features were found. The ductus was closed.

The brain was removed and sectioned. Cerebrum weighed 340 gms. Cerebellum 34 gms. No lesion was recognised.

Bacteriological examination: Lung: Scanty Gram-positive cocci and bacilli seen in direct film. Abundant growth of staph. aureus obtained on culture, not sensitive to penicillin, aureomycin, terramycin, streptomycin or terramycin; sensitive only to chloromycetin.

Histological examination: Pancreas: Marked fibrosis of the pancreas with comparatively little cystic formation.

Lung: There is a general bronchiolitis with areas of pneumonia both lobular and interstitial in type. No frank abscesses found in the blocks examined.

Kidney: The early lesions of medullary calcinosis.

Liver: A mild increase in bile ducts in detectable and occasional collections of polymorphs in the parenchyma.

Spleen: Congestion of the pulp with excessive intracellular pigment.

Trachea: Mild submucosal round cell infiltration.

Duodenum: Some distension of Brunner's glands.

Heart, thyroid, oesophagus, pituitary, medulla, adrenal show no significant lesion.

Ruchill Hospital

Case No. 89 P.M.No. R.396 Sex F. Date of birth: 2.56
Date of death: 1.4.56
Age at death: 1 month

Family history: Not available.

Personal history: The child was admitted after a cough and sickness of 1 week's duration with clinical signs of diffuse bronchitis with fever, high pulse and respiration rate.

On X-ray there were no signs of consolidation. The child was put in an oxygen tent, and treated with penicillin and streptomycin for 7 days followed by aureomycin for 5 days, but her general condition slowly deteriorated and the child was distressed, collapsed a few times and could not be without oxygen.

She died on 1st inst. during a cardiovascular collapse.

Post mortem findings: The body is that of a well nourished child aged about 1 month old. No external evidence of disease or injury is seen.

The upper respiratory passages are normal and no gastric contents or food is present in the lungs. The trachea and bronchi contain a considerable amount of very thick, tenacious mucus which contains a considerable amount of pus. The lungs show areas of partial collapse but no marked consolidation is present. The heart shows no abnormality on external examination and no muscular or valvular lesion is noted. No congenital malformation is present.

The peritoneum, omentum and mesentery appear normal and the alimentary tract shows no features of note. Liver, spleen, pancreas and adrenals are normal. Kidneys, ureters and bladder are normal.

The meninges are normal and the brain shows no abnormality on external examination or on section.

Diagnosis: Acute bronchitis.
Fibrocystic disease.

Histological examination: Pancreas shows changes of fibrocystic disease. There is no gross fibrosis but the acinar cells contain no zymogen granules and the small canaliculi are dilated and contain plugs of mucus.

The lungs show no evidence of infection. The small bronchi are all plugged with mucus and are lined by an epithelium which contains many goblet cells.

Diagnosis: Fibrocystic disease of the pancreas.

Ruchill Hospital

Case No. 90 P.M.No. 73/56 Sex M. Date of birth: 8.8.56
Date of death: 31.8.56
Age at death: 3 weeks.

Family history: Both parents alive and well.

1st child	Male	Born 1954	Died.	Case 66
2nd child	Male	Born 1956	Patient	

Personal history: History of fever and cough since 24.8.56. Child not thriving well since.

Moderately ill on admission with no fever and an upper respiratory infection. Poorly nourished. Given Dislaquaine 100,000 units orally 4 hourly.

X-ray chest: 27.8.56 - some congestion of lung fluids.

29.8.56: Stool +ve staph. - coagulase +ve.
General condition satisfactory.
Child collapsed suddenly at 6.30 a.m. on 31.8.56.
Given coramine and O_2.
Collapsed again at evening and died.

Post mortem findings: The body is that of a small poorly nourished male infant. Subcutaneous fat is almost entirely absent.

There are no skin rashes.

Thyroid gland, thymus, oesophagus: nil of note.

Pleurae: There is no free fluid but thick gelatinous fibrinous exudate covers the entire

left lower lobe and flecks of it are adherent to the visceral pleura of the upper lobe.
Lungs: Section of the left base reveals numerous dilated bronchi filled with pus and extensive confluent bronchopneumonic consolidation. Patches of bronchopneumonia are also present in the left upper lobe.
The right lower lobe is congested but not consolidated.
Hilar and deep cervical glands are moderately enlarged.
Pericardium: nile of note.

Heart: The foramen ovale is closed. The ductus arteriosus admits a fine probe with difficulty but physiological closure appears probable. Valves and myocardium appear normal.

Peritoneum: Normal.

Stomach, small and large intestines: There is no evidence of inflammation or ulceration. Faeces are slightly greenish in colour but formed. There is no obstruction.

Pancreas: This shows no macroscopic lesion.

Spleen: This is amll, firm and congested.

Liver: This shows patchy congestion and pallor, with a toxic appearance.

Gall bladder and bile ducts: Normal.

Suprarenals: There is no haemorrhage.

Kidneys: Both have a normal appearance.

Meninges: There is no evidence of meningitis.

Brain: Section at various levels reveals no focal abnormality.

Middle Ears: There is no evidence of inflammation.

Bacteriological examination: Swabs from lung: A heavy growth of a staph. aureus obtained which produced coagulase.

Royal Hospital for Sick Children

Case No.: 91 P.M.No. 9228 Sex F. Date of birth: 1.54
Date of death: 11.6.56
Age at death: 2½ years

Family history: Both parents alive and well.

1st child	Female	Born 1947	alive and well
2nd child	Female	Born 1953	patient

Personal history: Admitted first on 3.5.56 because of frequent colds and cough. She is the second of two children - her older sister is healthy. Born at full time, bottle fed on N.D.M. From the early weeks of life her stools have been persistently bulky, greasy and foul-smelling. Although she had a voracious appetite in infancy she did not gain weight satisfactorily. Mental development normal but did not walk until 22 months. At age 13 months had attack of chest infection with fever and marked dyspnoea - this responded to penicillin but the child had never been free of cough since that time. During the past month or so, following an attack of chickenpox, she has had marked dyspnoea with severe cough and wheeze. She was diagnosed fibrocystic disease of pancreas and improved with treatment. Dismissed home and re-admitted 2 weeks later with a severe pneumonia which was treated with cryobanyamin without response. Condition deteriorated rapidly 16 hours before death.

Post mortem findings: The body is that of a rather under-developed female child weighing 10,230 gms. in which the only feature of note externally is a moderate degree of abdominal distension.

(R.L. 210 gms. LL. 260 gms).
Light fibrinous adhesions bind the lungs to the parietes on both sides posteriorly over the lower lobes laterally and the upper lobes posteriorly. There is an early patchy fibrinous pleurisy over areas of consolidation in both lungs. Section of the lungs shows patchy bronchopneumonia with a generalised severe purulent bronchitis and bronchiolitis: the major bronchi are virtually blocked by tenacious muco-pus. In addition to these more acute changes there is a moderate degree

of cylindrical bronchiectasis in the right upper lobe and in both left lobes in the mid-lung position. There is considerable acute inflammatory swelling of the hilar glands.

The pericardial sac is healthy.
The heart (68 gms) is normal externally.
Dissection shows no abnormality.

The abdominal viscera are normally situated.
There is considerable gaseous distension of the terminal ileum and the colon. Five agonal intussusceptions are present in the distal jejunum. There is no evidence of inflammation of the bowel. The mesenteric lymph nodes are not unusually prominent.
The oesophagus and stomach present no naked eye abnormality. The liver (500 gms.) is congested. The capsular surface shows a striking pattern of small white opaque spots and streaks which tend to be arranged along the vessels under the capsule. On cutting into the organ it is seen that this change is confined to the sub-capsular area. The exact significance of it is not apparent on naked eye examination alone.
The gall bladder is small and not obviously in communication with the bile ducts.
The hepatic ducts and the common bile ducts are patent.
The pancreas is not abnormal on naked eye examination.
The spleen (26 gm.) shows early deposition of fibrin on the diaphragmatic surface. The cut surface is normal.
The suprarenals are normal.

The kidneys (together 90 gms) are essentially similar. They show no naked eye abnormality.
The ureters and urinary bladder are normal.
The internal genitalia are normal.

The scalp, skull and meninges are normal.
No disease of the brain is seen externally or on section. (Cerebrum 1040 gms. cerebellum 129 gms.) The pharynx is normal. The larynx contains much muco-pus. The thyroid gland is normal. The thymus is present but not prominent.

Bacteriological examination:

Swab from trachea: Pus and epithelial cells and large number of Gram positive cocci and moderate number of Gram negative bacilli seen in direct film.
Moderate growth of staph. aureus obtained on culture not sensitive to penicillin, aureomycin, streptomycin or terramycin; sensitive to chloromycetin and furacin.
Scanty B. proteus also present.

Histological examination:

The pancreas shows a severe degree of fibrocystic change. There is replacement fibrosis of much of the acinar tissue and the ducts are blocked by eosinophilic material some of which shows commencing calcification.

The salivary gland acinar cells are laden with zymogen granules: the ducts are not apparently diseased.

The gastric mucosa and the supreficial duodenal mucosa appear normal but there is well marked cystic dilatation of Brunner's glands. Apart from an occasional gland containing eosinophilic material no unusual feature is present in the small intestine.

The small opacities under the liver capsule proved to be small areas where the parenchyma has been replaced by fibrous tissue in which only bile ducts remain. These ducts contain striking eosinophilic plugs.
Similar changes occur sparsely in the depth of the liver tissue in relation to the major septa and blood vessels.
These changes are interpreted as being part of the general disease - muco-viscoidosis.

The splenic pulp and sinuses contain numerous polymorphs: the general architecture is normal and the presence of an early pyogenic perisplenitis is confirmed.

The presence of severe acute purulent bronchitis, broncho-pneumonia and bronchitectasis is confirmed.

The adrenals, kidneys, oesophagus, pituitary and thyroid are normal.

The thymus shows no unusual histological feature.

Royal Hospital for Sick Children

Case No. 92 P.M.No. 9231 Sex M. Date of birth: 6.6.56
Date of death: 19.6.56
Age at death: 2 weeks

Family history: Not available

Personal history: Admitted aged 36 hours - vomiting (normal delivery).
Abdomen was distended. X-ray shows small bowel obstruction. At operation - free yellow fluid in peritoneal cavity, grossly obstructed and discoloured terminal jejunum. Gross meconium ileus. Double barrelled ileostomy performed. Died 19.6.56.

X-ray report: Small bowel obstruction.

Post mortem findings: The body was that of a spare 13 day old male infant, weighing 2000 gms. There was an ileostomy wound to the right of the umbilicus. This wound was clean.

Oesophagus and stomach showed no unusual features. The ileostomy was situated approximately in the middle of what remained of the small intestine. A large quantity had been removed during the operation. The upper part of the small intestine composed almost entirely of jejunum and was of normal appearance and expansion. Its contents were milky and fluid and the ileostomy opening was patent. The lower part of the small intestine comprised mainly the lower ileum. This was firm to touch containing a large quantity of sticky slightly green material. It is probable that this content had not moved, though the colour was not quite so pale as usually seen in cases of this kind, and the texture was less friable. This content stopped abruptly at the ileo-caecal valve. The large intestine was of small calibre and of healthy appearance but contained no meconium. The colon content was pale, soft and obviously a large amount of mucus was present. The loops of intestine were slightly sticky due to an early peritoneal reaction but no free fluid was found in the peritoneal cavity and the infection was very mild. The liver weighed 97 gms. and was of average shape, consistency, and colour. On section no unusual features were seen. Gall bladder and ducts were normal. The pancreas was of average length, a little

narrower than usual and finely lobular and firm to touch. The appearances were typical of those of fibrocystic disease.
The spleen weighed 9 gms. and was slightly turgid and congested. Both adrenals were of average size and appearance.

Each kidney weighed 10 gms. Routine examination showed no unusual features. Pelves, ureters and bladder were normal.

Larynx and trachea were normal. The bronchi contained a quantity of pus. The right lung weighed 56 gms. and the left lung 28 gms. Both had smooth pleural surfaces, but the middle and lower lobes of the right lung were dark, firm and uncollapsed. On section they showed numerous spots of pus and the appearance was that of a staphylococcal pneumonia. The left lung had collapsed normally and though congested showed no recognisable infection. The thymus and thyroid were normal.

Pericardium normal. The heart weighed 12 gms. Routine examination showed no unusual features. The aorta was normal, and the ductus was closing. A probe could be passed through the anterior margin of the foramen ovale.

The brain wa s removed and sectioned. Cerebrum 308 gms. Cerebellum 24 gm. No lesion was found.

Bacteriological examination: Lung: Large number of pus cells and Gram positive cocci and moderate Gram negative bacilli seen in direct film.
Abundant growth of staph. aureus obtained on blood agar; not sensitive to penicillin; sensitive to chloromycetin; resistant to aureomycin and terramycin; sensitive to streptomycin with few resistant colonies in zone of inhibition. Coliform organisms and B. pyocyaneus were also obtained from broth culture.

Histological examination: Pancreas: All the typical features of fibrocystic disease are displayed.

Intestine: The Brunner's glands of the pylorus are distended and at some levels of the ileum the glands are distended by an eosinophilic ciscid secretion. The rectum is normal. At all levels examined no nerve lesion was found.

Lung: Left lung block was congested but showed no established infection. The right lung showed marked tissue destruction with abscess formation and haemorrhage.

Bronchus: No inflammation but mucous glands active.

Spleen: Congestion with a significant increase in polymorphs, indicative of a septicaemia.

Liver: There is a peri-portal inflammation and evidence of hepatitis secondary to the septicaemia present. The swelling of the liver cells has caused obstruction of the bile canaliculi so that large numbers of bile thrombi are found. The portal tracts are more numerous than usual and in them more bile ducts than average are found. This is a less frequently found aspect of the syndrome of pancreatic fibrosis. An early cirrhosis is beginning.

Heart, pituitary, testis, thyroid, adrenal, kidney, medulla are congested but show no significant lesion.

Royal Hospital for Sick Children

Case No. 92 P.M.No. 9236 Sex F. Date of birth: 1.7.56
Date of death: 10.7.56
Age at death: 10 days

Family history: Not available.

Personal history: Full term baby, born with grossly distended abdomen.
1st operation - child about 14 hours old.
Findings: meconium peritonitis due to perforation of ileum due to prenatal volvulus. Ascites developed to a degree which made repeated paracentesis necessary. The child remained vomiting; bowels did not move.
7.7.56 - 2nd operation - Distended small bowel till anastomosis. Catheter inserted.
10.7.56 - Respiratory difficulties due to aspiration - sucked out by intubation. Child died.

Post mortem findings: The body was that of a ten day old female infant of average development. There was a transverse abdominal surgical incision which was clean and a rubber catheter as drainage into the ileum where the sutures were firm.

Oesophagus, stomach and duodenum were normal. After opening the peritoneum a thick plastic exudate was found lining the peritoneum covering the liver and spleen and causing adhesions of the loops of intestine to each other. The surgical anastamoses were firm. The small intestine was normally distended and contained fluid of average colour but the large intestine was of small calibre with a grossly underdeveloped caecum which had not fully descended. The colon content was pale and dry and similar to that seen in meconium ileus.
The regional lymph nodes were normal.
The liver weighed 130 gms. and was covered by a thick meconium exudate. On section no unusual feature was seen. Gall bladder and ducts were normal.
The spleen weighed 11 gms. and was covered by meconium exudate but within normal limits on section. The adrenals were normal.
The pancreas was nodular and fibrous and had the appearance of fibrocystic disease.

Left kidney weighed 9 gms. and the right kidney 12 gm. Both were rather low in their position

but were normal on section. Pelves, ureters and bladder normal.
Uterus and appendages normal.

Cerebrum 300 gms. and cerebellum 18 gms.
No lesion was found on section though terminal congestion was present. The venous sinuses were normal.

Larynx and trachea contained muco-pus and the epithelium was injected. The left lung weighed 40 gm. was uniformly firm to touch and plum coloured with a recent pleurisy.
On section a well established broncho-pneumonia affected both lobes. The right lung weighed 38 gms. and was well expanded and pink, but the apex of the lower lobe was the site of a broncho-pneumonia.
Thymus and thyroid were within normal limits.

Pericardium normal. The heart weighed 13 gms.
There were numerous subepicardial petechiae.
On routine examination of muscle, valves and chambers no lesion was seen. The ductus was closed and the foramen ovale allowed the passage of a small probe anteriorly.

Bacteriological examination:

Swab from peritoneum: Scanty Gram positive cocci seen in direct film.
Scanty growth of staph. aureus was obtained on culture; sensitive to chloromycetin only; not sensitive to penicillin, aureomycin, terramycin or streptomycin; it is sensitive to erythromycin and furadantin. Scanty growth of enterococci also present; moderately sensitive to chloromycetin and furadantin; not sensitive to other antibiotics.

Lung: Abundant Gram positive cocci seen in direct film.

Abundant growth of staph aureus obtained on culture; sensitive to chloromycetin, furadantin; not sensitive to penicillin, aureomycin, terramycin or streptomycin.

Histological examination:

Pancreas: The lesion is that of fibrocystic disease where the fibrosis is more marked than the ductule dilatation. In the ductules plugs of viscid secretion are usually present.

Lung: Suppurative pneumonia, typical of a staphylococcal infection.

Liver: There is an inflammatory cell infiltration of the portal tracts. Toxic swelling of the parenchymal cells has caused obstruction to the flow of bile as demonstrated by the numerous bile thrombi seen.

Trachea: Acute inflammation. The mucous glands are distended with viscid secretion.

Spleen: The picture is that of a septicaemia. The capsule is surrounded by an exudate composed of emorphous eosinophilic debris and fibrin which has stimulated a minimal fibrous and giant cell reaction. The appearance is that of a meconium peritonitis.

Heart, salivary gland, kidney, medulla show no significant lesion.

Adrenal: Normal gland covered by meconium peritonitis.

Thalamus: Autolytic change.

Intestine: Blocks from the ileum above and below the drainage tube show the typical inspissated intestinal content with the features of meconium. The glands are filled with eosinophilic viscid secretion. The nerve supply to the bowel walls looks normal but there is a meconium peritonitis of varying thickness. The large gut is within normal limits apart from the peritoneum.

Comment: The peritoneal reaction is of many days standing and it is highly probable that it started before birth.

Seafield Hospital, Ayr

Case No. 94 P.M. No. A 146/56 Sex F. Date of birth:
Date of death:
Age at death: 10/12 yrs.

Family history: Brother died in Seafield 2 years ago.
Clinical case of fibrocystic disease.
P.M. permission refused.

Personal history: Since Nov. 1955 child has had almost continuous respiratory trouble. Has been in A.C.H. Irvine and Seafield with recurrent pneumonia.
Cough +++ Cultures gave staphs, coliforms, etc.
Stools for trypsin - negative once and positive another time.
No duodenal juice available because of tremendous respiratory distress caused.
Micro - heavy deposit fat flobules: undigested vegetable debris +++.
Child responded very slowly to antibiotics: also given pancreatin with little improvement.

Post mortem findings: The body was that of a rather plump female infant. The abdomen was protuberant. There were no other external features of note.

Pericardium healthy. Heart of average size. Valves, myocardium, coronary arteries and aorta free from disease. Thymus and thyroid glands normal. There were no pleural effusions or adhesions. The air passages, both large and small, were filled with thick yellow pus. The bronchial branches throughout all lobes of both lungs appeared dilated and inflamed and there appeared to be a little peribronchial fibrosis. Multiple isolated foci of consolidation, rather haemorrhagic in character, were present in both lower lobes.

Peritoneum healthy. Oesophagus and stomach normal. The small and large intestines were irregularly dilated throughout, largely with gas. The liver was of average size and presented a normal pattern on section. Gallbladder and bile ducts healthy. The pancreas was of average size and presented no gross abnormality. Adrenals and spleen normal. The kidneys were of average size and presented a normal pattern on section. Renal pelves, ureters, urinary bladder, uterus and adnexae free from disease.

The head was not examined.

Histological examination: Routine staining of sections from skin, submandibular salivary glands, thyroid, liver, colon, ileum, jejunum, pyloric and cardiac ends of stomach show no histological abnormality.

Lymph nodes: Examination of the mesenteric lymph nodes shows reactive hyperplasia and a heavy infiltration by plasma cells.

Pancreas: Microscopy shows extensive fibrosis of the gland both inter and intra-lobular. The fibrous tissue is diffusely infiltrated by chronic inflammatory cells. The majority of the ducts and acini are dilated and filled with homogenous pink-staining material. The picture is that of cystic fibrosis of the pancreas.

Trachea: The lumen contains a little pus. The wall shows chronic inflammatory changes.

Lungs: Microscopy shows bronchiectasis with marked chronic inflammatory change in the bronchi. In some places the bronchial epithelium is seen to be undergoing metaplasia to the squamous type. In addition there is a widespread terminal acute bronchitis and bronchopneumonia.

Diagnosis: Cystic fibrosis of pancreas. Bronchiectasis. Acute bronchitis and bronchopneumonia.

Royal Hospital for Sick Children

Case No. 95 P.M.No. 9193 Sex F. Date of birth: 14.1.56
Date of death: 20.3.56
Age at death: 2 months

Family history: Both parents alive and well.

1st child		Born 1954	Died 3/12 pneumonia.
2nd child	Female	Born 1956	Patient

Personal history: Normal birth. Birth weight 7 lbs. 14 oz.
Slight cold on 22.2.56 - given nasal drops.
On 4.3.56 became dyspnoeic and toxic. Admitted 5.3.56 with collapse of left lung.
Retraction of cardiac shadow to left - no fluid.
Penicillin and strep. given. Changed to chloramphenical on 11.3.56.
X-ray on 12.3.56 showed incomplete re-aeration.
No improvement in clinical condition.
Faecal proteolytic activity (15.3.56),
Normal with 1:10 Minimal 1:20 16.3.56
Total S. Protein 5.71 gm%. Elec. album. 3.29 gm.%
1.36 0.45 0.61.
Nasal swab (cult. twice) - staph. aureus sensitive to aureomycin.
Pancreatin given on 24.3.56. Diarrhoea ++
coliform and non-lactose proteus.
Condition in spite of every antibiotic continued to deteriorate. Clinically on 23.3.56 rales throughout both lung fields. Liver and spleen enlarged ++ since admission, but increased in size latterly.

Post mortem findings: The body is that of a poorly nourished female infant, weighing 3345 gms. There is considerable abdominal distension.

The right pleural sac is healthy. The major part of the right lung is collapsed and presents a purplish external surface. There is no pleurisy however. The left pleural sac contains several fibrous adhesions between the lung and the parieties laterally and posteriorly.
The left lung shows patchy lobular collapse.
Right lung weighs 66 gms. and the left lung 57 gms.
The trachea and main bronchi on both sides are virtually plugged with viscid yellow-green pus.
The anterior part of the left lower lobe shows cystic dilatation of the terminal bronchi up to 1 cm. diameter. The cysts contain yellow-green pus. There is patchy consolidation in both lungs. The appearances are of a severe purulent

bronchitis with bronchiectasis and broncho-pneumonia.

The pericardial sac is healthy. The heart (24 gms.) is normal in all respects. The ductus arteriosus is patent but admits only a thin probe and there is marked wrinkling of the intima.

The peritoneal sac contains a slight excess of straw-coloured fluid. There is no evidence of peritonitis. The liver protrudes well below the costal margin. The intestines show gaseous distension. No particular abnormality is noted throughout the alimentary tract. The liver (1 90 gms.) shows patchy pallor but is otherwise not remarkable. The gall bladder is healthy and contains dark green bile. The biliary passages are patent. The pancreas is patchily congested and the trabecular pattern is slightly more prominent than usual. The spleen (18 gms) is normal. The suprarenals are normal.

The kidneys (R.K. 30 gms. L.K. 30 gms.) are normal. The brain (cerebrum 445 gms. cerebellum 38 gms.) shows no abnormality externally nor on section. The pharynx and larynx are normal. There is no tonsillar enlargement. The thyroid gland appears normal. The thymus is not identifiable. Blocks are taken from its usual site for histological examination.

Bacteriological examination:

Peritoneal fluid: Direct examination. No pus cells. No organisms.
Culture: No growth.

Swab from (R) bronchus: Direct examination: Few epithelial cells. No pus cells. Few gram-negative bacilli.
Culture: Abundant growth of lactose fermenting coliform organisms.

Histological examination:

The sections of the pancreas show the typical changes of fibrocystic disease. Most of the ducts contain homogeneous eosinophilic material and there is atrophy of the acini with peri-acinar fibrosis.

Representative lung sections show the effects of continuing severe pyogenic inflammation of the bronchi and bronchioles. There are occasional areas of organisation with fibrosis,

bronchiectatic and abscess cavities and more recent severe acute bronchitis and broncho-pneumonia.

The trachea shows subacute inflammatory changes with patchy squamous metaplasia of the epithelium. There is patchy dilatation of the mucous glands.

Microscopic examination shows that the thymus has undergone striking involution.

The adrenals and pituitary appear normal.

The liver and medulla show minute granulomata which are interpreted as being of infective origin and agonal. The liver in addition shows moderate fatty change but there is no evidence of cirrhosis or of bile duct abnormality.

The heart muscle, spleen, jejunum and sub-mandibular gland showed no significant abnormality.

Royal Hospital for Sick Children

Case No. 97 P.M. Fiscal Sex

Date of birth: 1.12.55
Date of death: 5.12.55
Age at death: 5 days

Family history: Both parents alive and well. Not related.

1st child	Female	Born 1951	Died. Fibrocystic disease (Case)
2nd child	Female	Born 1953	Alive and well
3rd child	Male	Born 1954	Alive and well
4th child	Female	Born 1955	Patient

Personal history: Child seemed normal at birth but on following day started to vomit which became very severe on third day of life. Bowels moved once when the child passed thick black material. On examination the child's abdomen was distended. At operation the terminalileum was seen to be grossly distended and the caecum was bound down by adhesions which were freed. The child failed to revive after operation and died in 12 hours.

Post mortem findings: The small bowel was greatly distended and contained a large amount of viscid dark green mucus. The large intestine was completely empty and was small and contracted. No organic obstruction was seen.

Histological examination: Pancreas showed early fibrocystic disease of a type commonly seen in meconium ileus.

Royal Hospital for Sick Children

Case No. 98 P.M.No. Fiscal F28/56 Sex F.

Date of birth: 24.10.56
Date of death: 26.10.56
Age at death: 3 days

Family history: Not obtainable

Personal history: The child was a N.F.T.S.D. and weighed 8 lbs. 3 oz. Immediately after its first feed the child developed bilious vomiting. No meconium was passed. On admission the abdomen was distended and laparotomy showed gross distension of the ileum with dark viscid mucus. Trypsin was injected into both the small and large intestine. The child failed to rally from the operation and died twelve hours later.

Post mortem findings: The body is that of a newly born child. The abdomen is distended. A recent surgical incision is present in the upper abdomen and loop of bowel has been drawn through this wound. A rubber catheter also protrudes from the wound.

The upper respiratory passages and trachea show no abnormality. The pleural cavities are normal. The lungs are very dark in colour and the lower lobes feel consolidated. On section there is extensive bronchopneumonia which involves the lower lobes and much of the upper lobes of both lungs. The pericardium is normal and the heart, which is normal in shape, shows no muscular or valvular lesion. No congenital malformation is present. The aorta and great vessels show no abnormality.

The peritoneum contains about 80 ccs. of blood stained fluid. The oesophagus and stomach are normal. The jejunum is dilated and contains watery fluid. A portion of the terminal ileum, which measures about 2 ft. long, has been resected and the distal end of the ileum has been dropped through the abdomen wall. A catheter is tied into the large bowel which is small and collapsed. The liver, spleen and adrenals show no abnormality. The pancreas is normal in size and the normal lobular pattern is discerned. No fibrosis or cystic change is seen on naked eye examination. Kidneys, ureters and bladder

show no abnormality.

Scalp and skull are normal. Brain shows no abnormality on external examination or on section.

Opinion: From the foregoing examination I am of the opinion that death was due to bronchopneumonia. The child suffered from fibrocystic disease of the pancreas which caused an obstruction of the small intestine due to accumulation of mucus. An operation was necessary to try to remove this obstruction and the operation carried out was suitable in type and satisfactorily performed. There was no evidence of lack of care in the administration of the anaesthesia.

Histological examination: The pancreas showed typical changes of fibrocystic disease.

Royal Hospital for Sick Children

Case No. 99 P.M.No. 9263 Sex F. Date of birth: 10.7.56
Date of death: 25.9.56
Age at death: 2 months

Family history: Not given.

Personal history: Younger of two - both Caesarian section.
Two previous still births. (Mother Rh -ve. Also 2 live children).
Birth weight 6 lbs. 9 oz. No jaundice, no cyanosis. Throve well till 3 weeks old.
21.8.56 "cold". 3.9.56 Began to vomit feeds.
4.9.56 Looked ill - two convulsions.
Cough on admission diagnosed as broncho-pneumonia. Did not respond to treatment Was thought to be fibrocystic disease although this is not confirmed by lab. findings. Attempt to aspirate ? pus in (L) pleural cavity unsuccessful.
Surgical emphysema.

Tuberculin reaction: negative.

X-ray report: Partial atelectasis of (L) lung and (R) lower lobe (1 week ago).

Post mortem findings: The body is that of a small female infant, weighing 2770 gms. There is minimal subcutaneous fat. There are no external features of note.

The pleural sacs are healthy. The right lung (62 gms.) shows patchy bronchopneumonia in the lower lobe. There is extensive acute purulent bronchitis. The left lung (63 gms.) shows confluent collapse and pneumonia with very severe purulent bronchitis. Greenish pus is virtually blocking the major bronchi and the trachea.

The pericardial sac is healthy. The heart (18 gms) is normal externally. Dissection shows that the ductus arteriosus is just patent but the intimal surface is markedly wrinkled. The foramen ovale is patent but well valved.

The oesophagus and stomach are normal. There is an 0.5 cm. diameter sub-acute duodenal ulcer on the posterior wall 1 cm. distal to the pylorus. A small erroded artery is present

in the centre of the base and blood from the ulcer is present down the length of the small intestine. The liver (107 gms.) shows only moderate congestion. The gall bladder is normal and the biliary passages patent.
The pancreas is not diseased on naked eye assessment. Microscopic examination of frozen section of the pancreas shows occasional cystic dilation of the ducts some of which contain inspissated eosinophilic material. The appearances are consistent with the diagnosis of fibrocystic disease of the pancreas.
The spleen (11 gms) is normal.

The kidneys (together 25 gms) are essentially similar and do not appear diseased.
The ureters and urinary bladder are normal.
The internal genitalia are normal.

The scalp, skull and meninges are normal.
The brain (cerebrum 385 gms. cerebellum 36 gms.) is normal externally and on section.
The pharynx is normal.
The larynx contains sticky muco-pus.
The thyroid is normal.
The thymus is within normal range but not prominent.

Bacteriological examination:

Numerous pus cells, Gram positive cocci and Gram negative bacilli seen in direct film.
Abundant mixed growth of staph. aureus and haemophilus influenzae obtained on culture; staph. aureus is sensitive to chloromycetin and streptomycin; not sensitive to penicillin, aureomycin and terramycin.
Haemophilus is sensitive to chloromycetin; moderately sensitive to aureomycin, terramycin; slightly sensitive to streptomycin; resistant to penicillin.

Swab from trachea: Numerous pus cells, Gram positive cocci, and scanty Gram-negative bacilli present in direct film.

Abundant mixed growth of staph. aureus and haemophilus influenzae obtained on culture; former is resistant to penicillin, aureomycin, terramycin; sensitive to chloromycetin and streptomycin; Haemophilus influenzae is sensitive to chloromycetin; moderately sensitive to aureomycin, terramycin; slightly sensitive to streptomycin; resistant to penicillin.

Histological examination:

The pancreas shows the typical features of fibrocystic disease.

The lungs show severe acute purulent bronchitis, confluent broncho-pneumonia and abscesses. Bacteria are numerous in the lesions.

The breast shows marked ectasia of the ducts.

The intestinal mucous glands are very active and the lumen contains eosinophilic amorphous material mixed with epithelial debris.

The spleen contains a moderate amount of haemosiderin and shows infiltration with polymorphs.

No significant lesion is seen in the heart, medulla oblongata, kidney, oesophagus, trachea, thyroid, adrenal, thymus, liver, submandibular and parotid glands.

APPENDIX III

REPORTS ON THE CLINICAL AND PATHOLOGICAL FEATURES OF SIX CASES OF COELIAC DISEASE

This appendix consists of abstracts of the clinical history and of the post mortem and histological findings in the cases which have been briefly commented on in Chapter V.

Royal Hospital for Sick Children

Case No. C1 P.M.No. 8041 Sex F. Date of birth: 15.11.46
Date of death: 29.5.49
Age at death: 2½ years

Family history: Parents both alive and well.

First child Female 2 months premature. Died 3 weeks after birth.
Second child Male Alive and well
Third child Female Patient.

Personal history: N.F.T.S.D. No abnormality seen at birth. Birth weight 7 lbs. 6 oz. The child was fed on Ostermilk and at 3 months she weighed between 13 and 14 lbs. but thereafter gained very little weight. After 3 months it was noticed that her motions were pale, bulky and offensive. The child's appetite has been good and there has been no vomiting at any time.

On 1.12.47 the child was put on to coeliac diet 2 and the motions became less frequent but were still yellow in colour.
On 20.12.47 weight was 14 lbs. 2 oz. and stools became loose again and vomiting started.
On 20.12.47 she was admitted to R.H.S.C. and her actual weight was 6 K (60% of expected weight)
On examination the abdomen was seen to be protruberant and was tense and tympanitic, but no other gross abnormality was seen.
2.1.48 duodenal intubation gave juice with a pH 6.8 which showed liquefaction of gelatine at a dilution of 1/800. Therefore, tryptic activity is fully adequate. A moderate degree of anaemia was present but no other abnormality was found on haematological examination.
Faeces were sent to Biochemistry for examination, but result is not recorded. The child was dismissed home but was re-admitted on 2.3.48 with the history of 4 days cough and on admission was found to be 62% of expected weight. The abdomen was again protruberant, and evidence of pneumonia was found. Thereafter, the child was maintained on coeliac diet No.4 but stools remained loose and cough persisted. The child was admitted for the last time on 27.3.49. Stools continued loose. Appetite was good and there was no vomiting. On admission the child weighed only 7.3 K against an expected weight of 12.9 K for her age.

On examination, pitting oedema was present on arms, legs and back. The abdomen was very tense and rounded and there was wasting of the buttocks.
Serum protein albumin 1.8 G., globulin 1.8 G Total 3.63 G.
NPN 19.2 mgm% cholesterol 147.8 mgm %
calcium 7.9 mgm phosphorus 6 mgm.
The child went downhill and died on 29.5.49.
No evidence that the duodenal intubation had been repeated was found.

Post mortem findings:

The body is that of a well developed, but slightly spare female child.
Oesophagus, stomach and small intestine showed no gross lesion. The large intestine from the ileo-caecal ring to the rectum was thickened generally, inflamed and three small ulcers in the ascending colon were observed. The features were undistinguishable from the bacillary dysentery. The regional lymph glands were a little larger than usual.
Liver was average in size, shape but was softer in consistency than usual with a diffuse light yellow colour. There was extreme fatty change. Gall bladder and ducts normal.
Pancreas was normal. On section no fibrous or necrosis was seen. Spleen normal in all respects. Adrenals lighter in colour than usual due to fatty change.
Both kidneys were normal in size, shape and consistency.
Larynx, trachea and bronchi were normal.
Both lungs had smooth pleural surfaces and no free fluid in the pleura sacs, the lower lobes of each lung were nodular due to the presence of broncho-pneumonia. When sectioned the congested pneumonic condition was easily seen.
Pericardium normal. Routine examination of the heart showed no pathological condition.
Multiple coronal sections of the brain were made, no lesion was seen.
The meninges were normal.

Histological examination:

Lung: There is a well established haemorrhagic broncho-pneumonia. The bronchioles were plugged with pus cells. The pleural lymphatics are distended by oedema fluid and there is pleural congestion.
Liver: There is albuminous fluid in the distended Bowman's capsules and marked toxic

change in the proximal tubules. Venous congestion is very marked.
Intestine: the wall is thickened due to oedema and the muscle fibres are spread. The villi are infiltrated with subacute and occasionally acute inflammatory cells.
Pancreas: There is a fine penacinor type of fibrosis evenly spread throughout the sections examined. Some ductules appear unusually patent but there is no cystic formation nor excessive dilatation of ducts. The islets are more numerous than normal.

Comment: The clinical and pathological findings prove the diagnosis of coeliac disease. Death was due to broncho-pneumonia. Further discussion on the pancreatic lesion did not clarify the significance of the lesion. Clinically this is not a case of fibrocystic disease of the pancreas as the trypsin content is normal nor is the fibrosis coarse enough to make the diagnosis histologically. The question remains open whether the pancreatic fibrosis would cause a clinical coeliac disease or not.

Royal Hospital for Sick Children

Case No. C2 P.M.No. 8344 Sex M. Date of birth: 28.5.49
Date of death: 8.2.51
Age at death: 1 year 10 months

Family history: Mother aged 37. Both parents alive and well.

First child	miscarriage	
Second child	Male	Born 1944 Well
Third child	premature	Died at 2 days
Fourth child	Male	Born 1949 Patient

Personal history: N.F.T.B. Instrumental delivery. Birth weight 10 lbs. 1 oz. The child was never breast fed but was started on F.C.N.D.M. and thrived well. It had bronchitis at 7 months but it cleared up with a short course of sulphonamide. The child was quite well until June, 1950 when mother thought the child was rather thin, but its appetite was good and bowels appeared normal. The abdomen was rather protruberant but no pallor or other abnormality was noticed. Since 16.7.50 the motions were loose and bulky and had a foul odour.

On admission 19.7.50 actual weight 8.95 K (90% of expected weight). The abdomen was slightly distended but no other gross abnormality was seen.

27.7.50. Duodenal intubation performed and a liquefaction of gelatine obtained in a dilution of 1/800. Therefore tryptic activity adequate. Stools for faecal fat 56.8 G%. The child was put on coeliac diet 4 and sent home.

Following this the child was in and out of hospital for the rest of its life but the general picture did not change. The child remained pale and anaemic and was wasted.
It was re-admitted to hospital on 3.2.51 when the weight was 7.3 K (70% of expected weight) and on admission it was seen to be a pale, ill-nourished child with a protruberant abdomen. There was considerable oedema of the lower extremities and of the forearms and eyelids. Glucose tolerance test showed a flat curve. Plasma proteins 4.25 G. Albumin 2.25 G% Globulin 2 G%.
The child went downhill and died.

Post mortem findings:	The body was that of a rather thin 20 month old male child. There was oedema of the dorsum of the feet and around the buttocks. The trachea and bronchi and pleurae appeared normal. The lungs showed irregular haemorrhagic areas of consolidation which on the whole appeared to be due to partial collapse. Gross infection of the lungs was not seen. No abnormality was noted in the alimentary tract and the pancreas appeared normal.
Histological examination:	The pancreas shows no abnormality and the case is regarded as one of coeliac disease.

Royal Hospital for Sick Children

Case No. C3 **P.M.No.** 8383 **Sex** F. Date of birth: 28.10.49
Date of death: 4.4.51
Age at death: 1 year 6 months

Family history: Mother aged 26. Patient is first child. Both parents alive and well.

Child was a N.F.T.S.D. and showed no gross abnormality at birth.
Birth weight 6 lbs. and the child was breast fed for 3 months. Child throve and developed normally until 2.1.51 when she developed pneumonia from which she recovered shortly.

On admission 21.1.51 the actual weight of the child was 9.26 K (100% of expected weight). The child looked apathetic and ill, but no gross abnormality was found.

On 31.1.51 the child developed fever and went off its feeds and pyrexia persisted in spite of treatment with penicillin.
Screening test for trypsin in stools gave a digestion of gelatine with both patient and control.

On 26.2.51 it was stated (I think this child has developed coeliac disease. She is excessively miserable, has a very poor appetite and passed bulky, pale, loose foul-smelling stools. She is still losing weight and the limbs are thin and hypotonic. The abdomen is protruberant).

Stools for faecal fat 50.2 G%.

Duodenal intubation does not appear to have been carried out, although frequent stool tests gave digestion of gelatine.

Royal Hospital for Sick Children

Case No. C4 P.M.No. 8547 Sex F. Date of birth: 6.4.50
Date of death: 25.3.52
Age at death: 2 years.

Family history: Both parents alive. Father has heart trouble.

Eight pregnancies - all children alive and well except one which died of measles at 3 years.

Personal history: Normal pregnancy. F.T.S.D. Birth weight 7 lbs. Fed on boiled cow's milk. The child throve and developed normally until 7 months when she took diarrhoea.

Subsequently the child's stools were noted to be foul smelling and fatty. The child was in and out of hospital over a period of the next year, and although she received various courses of chloromycetin and aureomycin, her chronic bronchitis and broncho-pneumonia did not clear up. The clinical picture, therefore, was regarded as very suggestive of fibrocystic disease, although this could not be confirmed by biochemical examination.

Duodenal intubation was carried out on various occasions, and although alkaline duodenal juice was obtained, some liquefaction of gelatine was shown. Faecal fat estimation 38.8 g%. Glycine and gelatine absorption curves were carried out. The child failed to thrive and died.

Post mortem findings: The body is that of a rather emaciated young female child weighing 6120 gm.

The alimentary tract shows no abnormality. The liver and gall-bladder and biliary passages appear normal. The pancreas weighs 18 gm. and seems slightly larger than normal but no other abnormality is noted.

The trachea and bronchi show mild inflammatory congestion but do not contain an excess of mucus. The lungs show slight partial collapse at the lower lobes and on section multiple small areas of broncho-pneumonic consolidation are seen in these lower lobes.

Histological examination: Pancreas and salivary glands normal. The lungs show areas of partial collapse

throughout which there are small foci of polymorph infiltration. The bronchi are not dilated with mucus and only rarely contain polymorphs.

Opinion: The histological features in this case do not support a diagnosis of fibrocystic disease of the pancreas and the case is regarded as one of coeliac disease.

Royal Hospital for Sick Children

Case No. C5 P.M.No. 8692 Sex F. Date of birth: 8.8.50
Date of death: 30.1.53
Age at death: 2 years 4 months

Family history: Both parents alive and well.

First child Normal pregnancy and delivery.

Personal history: At the age of 1 year 2 months the child had pneumonia which was treated at home by oral penicillin and sulphonamide. Thereafter the child had intermittent bouts of pyrexia associated with severe cough. Appetite has been poor but bowels were normal.

On admission child weighed 8.5 K (expected weight 12.8 K i.e. 66% of expected weight).
There was marked wasting of the muscles associated with hypotonia. No gross abnormality was found on examination. Extensive biochemical investigation revealed no gross abnormality. Duodenal intubation gave fluid with a pH of 7.9 which liquefied gelatine, therefore trypsin was present.
Faecal fat - 60% - repeated 64.7%.
The child failed to thrive and died on 30.1.53.

Post mortem examination: The body is that of a young female child. While the child appears of average height for her age there is very gross emaciation and the weight is only 6780 gms. The abdomen is not distended and the emaciation is generalised affecting the limbs and trunk. No other abnormality is seen on external examination.

The teeth are bad and particularly the incisors have been worn away almost to the level of the gum.

The tongue and tonsils show no abnormality. The salivary glands are small in size and difficult to find. The peritoneum omentum and mesentery are normal. The oesophagus and stomach show no features of note. The small and large intestine are normal in size and are empty. They show no abnormality. There is no evidence of interitis.
The liver (250 gm.) is normal in size and is dark in colour. On section it shows the features of acute venous congestion.
The gall bladder and biliary passages are normal.
The pancreas presents no abnormality; no cystic change is seen.
The adrenals together weigh 5 gm. and show no abnormality on external examination or on section.
The spleen (30 gm.) is firm in consistency and on section appears congested.

The trachea and bronchi show no gross abnormality. The pleurae of both lungs lie free in the chest cavities which present no abnormality.

The lungs (left 95 gm. and right 120 gm.) appear slightly emphsematous and do not collapse on opening the chest cavity. There is slight pulmonary oedema particularly in the lower lobes. On section no gross abnormality is seen.
The smaller bronchi do not contain pus and no evidence of pneumonia is found.

The heart shows no abnormality and the urinary system appears normal.

Histological examination:

Liver: There is acute venous congestion with a mild though clear periportal inflammation - probably a terminal infection of little significance.

Pancreas: Superficial examination of the pancreas shows no gross abnormality. There is no fibrosis or cystic change. Examination of specially stained sections show an almost complete absence of zymogen granules and it cannot be considered that this pancreas has manifested normal secreting activity.

Heart, adrenal, kidney, pituitary, medulla, thalamus show no significant lesion.

Bowel - oedema of the wall.

Lungs show partial collapse. The bronchi are not dilated with mucus and show no evidence of infection.

Salivary glands normal.

Spleen: Intensely congested. There is an infiltration of macrophages and occasional eosinophiles. No follicle formation. This is clearly abnormal, not leukaemia but possibly xanthomatosis.

Lymph node: A section of two small lymph nodes shows an appearance in the medulla of compact mono-nuclear cells indistinguishable from a xanthomatous reaction.

Summary: Clinically this case presents as a coeliac disease but certain features are lacking to make this diagnosis sure. Pathologically there is a mild pancreatic lesion and the xanthomatous condition of the lymph glands is interesting. Also the liver is abnormal and the periportal infiltration may be an early xanthomatous change. The diagnosis is not sure but the possibility of xanthomatosis has to be considered.

Gateside Hospital and
Royal Hospital for Sick Children

Case No. C6 P.M.No. RR 0370 Sex F. Date of birth:
Date of death: 26.7.55
Age at death: 7 years

Family history:

1st child	Born 1947	Female, patient.
2nd child	Born 1948	Male, premature, died.
3rd child	Born 1949	Male, alive and well.
4th child	Born 1950	Female, alive and well.
5th child	Born 1952	Female, alive and well.

Personal history: Born 17.8.47. Well until November 1952 when she developed diarrhoea and vomiting and anorexia. She also lost weight and in June 1953 was admitted to Greenock Royal Infirmary with sunburn of head and face. She still had diarrhoea and vomiting at this time and attended the Out-patient Department here where she was thought to be a case of coeliac disease and was put on a fat free diet with little improvement. The stools were pale, bulky and soft, and contained 47 G: of fat.

In September 1953 she had a swelling of the ankles and shortly afterwards developed a rash on the arms and legs. She was admitted to this hospital on 30.9.53 and was found to be very thin with a distended abdomen and short, sparse hair. She had dry skin and blepharitis. There was a red rash on the forearms and thighs, scaly over the elbows and knees. The speech was slow and she had a rather hoarse voice. Her tongue was red and slightly fissured. She was seen by the Dermatologist who reported that she had angular stomatitis and cheilosis with conjunctival injection. He suggested that this was a type of pellagra inflammation. Barium meal showed a deficiency pattern. She had a mild anaemia and her urine was normal to ordinary tests. She was treated as a coeliac initially but was very peculiar mentally and would not take her food properly. She was finally given injections of composite Vitamin B and was later treated with yeast after which she appeared to improve.

An X-ray of her wrist showed some osteoporosis. Chromatography of her urine showed gross amino-aciduria. It is reported as having

glycine, glutamic acid, aspartic acid, threonine, leucine, valine, isoleucine and tyrosine all present with a considerable excess of glutamine, histidine and alanine. When she was discharged she was very much better and there was no evidence of coeliac disease apart from dwarfism.

Post mortem examination:

Post mortem showed a rather emaciated child with a fading scaly rash still present on the knees and elbows. There was slight oedema of both lower limbs. The tongue was smooth and atrophic. The circumvallate papilla were scarcely noticeable. The thyroid and thymus glands were normal.

The lungs showed a marked lobar pneumonia of the greater portion of the left lung, but the remainder of the lung tissue appeared normal.

The pericardium and epicardium showed moderate sclerosis and the heart itself appeared to be slightly atrophied. On section, however, it showed no abnormality of the valves, chambers or heart muscle.

The striking abnormality seen in the abdomen was a large yellow liver. On section this showed marked fatty infiltration which was peri-portal in distribution. A small core of liver in the centre of the lobule was bile-stained.

The gall bladder and biliary passages were patent and the bile was of surprisingly good quality. The spleen appeared normal.

The stomach, duodenum, small and large intestines showed no evidence of ulceration. The wall throughout was rather gelatinous and thicker than normal and the rugae and villi were indistinct. Very little formed faecal material was present. It was of a pale creamy white colour.

The pancreas was normal in size and did not appear to be unduly fibrous on section. The suprarenal glands were small and the lipoid present in the cortex was pale.

Both kidneys were normal in size and of rather similar colour to the liver. On section, however, no other disturbance of normal anatomical

pattern was detected.

The uterus, tubes and ovaries and urinary bladder appeared normal.

Head: the membranes were intact and the brain itself showed no definite pathological change.

Numerous portions of the organs were taken for histological section and the liver, in view of the fact that amyloid might be a possible diagnosis, has already been sectioned. It only shows an extreme degree of fatty infiltration. The other organs will be sectioned at a later date and a further report issued.

Histological examination:

There is considerable fatty infiltration through the whole organ. The general appearance of the exocrine tissue is not grossly abnormal, but on closer inspection no zymogen granules are present and the acini appear rather small. No fibrosis is present in the gland and no excessive accumulation of mucus is present in either the main ducts or the canaliculi. The liver shows severe fatty degeneration but the portal tracts show no abnormality.

The tongue contains several large groups of both mucus and serous type of salivary gland tissue and both appear normal. There is no evidence of over-secretion of mucus in the acini and the ducts do not appear distended.

Sections of stomach and intestine show no abnormality.

The kidneys, spleen and adrenals show no gross lesion.

FIBROCYSTIC DISEASE

OF THE PANCREAS

VOLUME IV

G. B. S. ROBERTS

VOLUME IV

APPENDIX IV

This appendix contains the detailed family history of 54 fatal cases of fibrocystic disease of the pancreas.

APPENDIX V.

This appendix contains the detailed family history of 6 fatal cases of coeliac disease.

APPENDIX IV

Family history of 54 fatal cases of fibrocystic disease.

These histories were obtained from the mothers of the affected children. 42 of the visits to the childs home were made by the Misses Campbell, Ingram and Davies who were student almoners. The remaining 12 visits were made by myself. The reports included in this and the following appendix are exact copies of the proforma as filled in at the time of the visit.

FIBROCYSTIC SURVEY

Name of Patient: David MacLellan. Index Case No.: 1

Address: 25 Caird Drive, Glasgow, W.1.

No. of rooms: 2 R.& K. No. of occupants: 2 adults 1 chil

Mother: Martha McDonald Date of birth: 5.1.06.

General Health: Good Chest Trouble: No

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	F	Yes		52	
2	M	Yes		48	
3	M	Yes		46	
4	M	Yes		44	
	F	Yes		42	
5	F	Yes		40	
6	M	Yes		38	

Father: John Date of birth: 23.7.99.

General Health: Good Chest Trouble: No

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	F	Yes			
2	M	Yes			
3	M	Yes			
4					
5					
6					

Familial relationship of parents: None

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes	Good		74	
Grandfather:			Yes	65	Heart trouble.
PATERNAL Grandmother:	Yes	Good		99	
Grandfather:			Yes		? pneumonia.

Cousins: Any similar illness or early deaths? None affected

Know any other child with similar illness? No

Patient or Propositus: _____ No. in birth order: 1

Name: David Date of birth: 5.1.41.

Mother's health during pregnancy: Good

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Pneumonia If P.M.: Yes

Patient or Propositus: _____ No. in birth order: 2

Name: Finlay Date of Birth 5.6.43.

Mother's health during pregnancy: Good

If alive: Yes What illnesses: Measles, Whooping cough. No chest trouble.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: ____

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: If P.M.:

FIBROCYSTIC SURVEY

Name of Patient: Euphemia M. Davidson Index Case No.: 4

Address: 89 Otago Street, Glasgow.

No. of rooms: 4 No. of occupants: 3

Mother: Euphemia Date of birth: 22.8.12.

General Health: Good Chest Trouble: No

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	1 Half-Sister				
2					
3					
4					
5					
6					

Father: Thomas Date of birth: 17.9.17.

General Health: Good Chest Trouble: No

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	M	Yes			(Mr. Davidson is older child).
2					
3					
4					
5					
6					

Familial relationship of parents: None

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:			Yes(1912)	30's	Does'nt know
Grandfather:			Yes(1919)	30's	Does'nt know
PATERNAL Grandmother:			Yes(1955)	75	Does'nt know
Grandfather:			Yes(1954	77	Does'nt know

Cousins: Any similar illness or early deaths? None with any chest troubles or died yung

Know any other child with similar illness? No

Patient or Propositus: _____ No.in birth order: 1

Name: Euphemia Female Date of birth: 18.2.46

Mother's health during pregnancy: Very Good

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: _____ If P.M.: Yes

FIBROCYSTIC SURVEY

Name of Patient: Margaret Macaleenan. Index Case No.: 5

Address: 21 Whitehill Road, Burnbank, HAMILTON.

No. of rooms: 4 No. of occupants: 2 ad. 3 chld.

Mother: Annie Date of birth: 3.10.11.

General Health: Good Chest Trouble: No

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Adopted - does'nt know anytning about family.				
2					
3					
4					
5					
6					

Father: George Date of birth: 1.11.14.

General Health: Good Chest Trouble: nil

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	M	Yes			
2	M	Yes			
3	F	Yes			
4	F	Yes			
5	F	Yes			
6					

Familial relationship of parents: None

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:					
Grandfather:					
PATERNAL Grandmother:	Yes	Good		81	
Grandfather:	Yes	Good		82	

Cousins: Any similar illness or early deaths? No

Know any other child with similar illness? No

Patient or Propositus: _____ No. in birth order: 1

Name: Thomas Date of birth: 15.10.38

Mother's health during pregnancy: Good

If alive: _____ What illnesses: Started to be ill 4 wks.? Vomiting, not gaining weight satisfactorily.

In what Hospital: _____

Date: _____

If dead: Yes Date: _____

At Home: Yes If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: Pneumonia If P.M.: No

Patient or Propositus: _____ No. in birth order: 2

Name: James Male Date of Birth: 7.3.41.

Mother's health during pregnancy: Good

If alive: _____ What illnesses: Measles, Whooping cough - very healthy now.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 3

Name: George Date of birth: 14.5.43.

Mother's health during pregnancy: Good

If alive: _____ What illnesses: Measles, Whooping cough. Very healthy, no coughs.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 4

Name: Ann Date of Birth: 22.12.44

Mother's health during pregnancy: Good

If alive: _____ What illnesses: Child was doing quite well. Became ill and died within 24 hrs. Slight cough.

In what Hospital: _____

Date: _____

If dead: Yes Date: April, 1945.

At Home: Yes If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: Pneumonia If P.M.: _____

Patient or Propositus: _____ No. in birth order: 5

Name: Margaret Date of birth: 15.6.46.

Mother's health during pregnancy: Good

If alive: _____ What illnesses: 1 mth. old cough ? whooping.

In what Hospital: _____

Date: _____

If dead: Yes Date: _____

At Home: _____ If seen in Hospital: September

In Hospital: R.H.S.C. Where: _____

Cause of Death: _____ If P.M.: Yes

Patient or Propositus: _____ No. in birth order: 6

Name: Karen Date of Birth: 22.5.48

Mother's health during pregnancy: Good

If alive: _____ What illnesses: Measles.
No coughs.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: ____

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Alan Stevenson Index Case No.: 9

Address: 60 McIntosh Street, Glasgow. E.1.

No. of rooms: 1 R.& K. No. of occupants: 4

Mother: Agnes Date of birth: 4.17.18.

General Health: Good Chest Trouble: Pneumonia & pleurisy 4 yrs. ago.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	7 M	Yes			
2	2 F	Yes			
3					
4					
5					
6					

Father: Alan Date of birth: 28.5.07.

General Health: Very good Chest Trouble: No

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	M	Yes			
2	F	Yes			
3					
4					
5					
6					

Familial relationship of parents: None

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes	Fine			
Grandfather:			Yes(1928)	61	Heart trouble
PATERNAL Grandmother:			Yes		Does'nt know
Grandfather:	Yes	V.good		84	

Cousins: Any similar illness or early deaths? _____

Know any other child with similar illness? No

Patient or Propositus: William No.in birth order: 1

Name: _____ Date of birth: 7.1.46.

Mother's health during pregnancy: Fine

If alive: Yes What illnesses: Usual childrens.

In what Hospital: Belvidere with Scarlet fever.

Date: about 3 yrs. old.

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: Alan No. in birth order: 2

Name: _____ Date of Birth: 4.47

Mother's health during pregnancy: Very good

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: Yes Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: _____ If P.M.: Yes

_____

Patient or Propositus: Alan No. in birth order: 3

Name: _____ Date of birth: 21.2.55.

Mother's health during pregnancy: Fine

_____

If alive: Yes What illnesses: None

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Mary Laird Index Case No.: 12

Address: 190 Walton Rd., Sale, Cheshire.

No. of rooms: 1 R.& K. No. of occupants: 4

Mother: Margaret Date of birth: 7.12.16

General Health: Good Chest Trouble: None

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	F	Yes			
2	M		Yes(1926)	6½	Scarlet Fever
3					
4					
5					
6					

Father: James Date of birth: 25.5.10.

General Health: Very Good Chest Trouble: None

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	F	Yes		42	
2					
3					
4					
5					
6					

Familial relationship of parents: None

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes	Bit Breathless		69	
Grandfather:	Yes	Heart not too good		69	
PATERNAL Grandmother:			Yes(1955)	77	Heart attack
Grandfather:			Yes		Accident

Cousins: Any similar illness or early deaths? No

Know any other child with similar illness? No

Patient or Propositus: Mary No.in birth order: 1

Name: Female Date of birth: 3.5.45.

Mother's health during pregnancy: Very Good

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes Date: 18.6.48.

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: _____ If P.M.: Yes

Patient or Propositus: Margaret No. in birth order: 2

Name: Female Date of Birth: 26.1.47

Mother's health during pregnancy: Very Good

If alive: Yes What illnesses: None

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: James No. in birth order: 3

Name: Date of birth: 10.6.51.

Mother's health during pregnancy: Very Good

If alive: Yes What illnesses: None

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: Fiona No. in birth order: 4

Name: Date of Birth: 26.2.53

Mother's health during pregnancy: Very Good

If alive: Yes What illnesses: None

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: No. in birth order:

Name: Date of birth:

Mother's health during pregnancy:

If alive: What illnesses:

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

FIBROCYSTIC SURVEY

Name of Patient: Michael Coyle. Index Case No.: 13

Address: 661 Govan Road. Glasgow. S.W.1.

No. of rooms: 1 R.& K. No. of occupants: 2 ad. 1 chd.

Mother: Margaret Brady Date of birth: 24.12.07.

General Health: Fairly good Chest Trouble: No
1 kidney removed 1950.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	F	Yes	All these people are married		
2	F	Yes	with several children each		
3	F	Yes	all the children are fit and		
4	M	Yes	well. No evidence of		
5			bronchitis.		
6					

Father: Michael Date of birth: 1.9.06.

General Health: Good Chest Trouble: Gets a touch of bronchitis every winter - to wifes knowledge has always had it.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	M		Yes	60	Effects of gassing War 1.
2	M		Yes	60	Heart attack
3	M		Yes	46	Always complaining of chest - died Knightswood ?TB.
4	M		Yes	35	Pneumonia
5	F	Yes	No chest trouble		
6	F	Yes	No chest trouble.		

Familial relationship of parents: ~~None~~

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	No history		Yes	66	Thrombosis
Grandfather:	of bronchitis		Yes	66	Bronchitis but was stone polisher.
PATERNAL Grandmother:			Yes	65	Gallstones
Grandfather:	Yes	Good		85	

Cousins: Any similar illness or early deaths? No

Know any other child with similar illness? No

Patient or Propositus: _____ No.in birth order: 1

Name: Alice (No.1) Date of birth: Dec.26.

Mother's health during pregnancy: Good

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes Date: _____

At Home: Yes If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: Don't know. If P.M.: No

Patient or Propositus: _____ No. in birth order: 2

Name: James Date of Birth: Apr. 28.

Mother's health during pregnancy: Not well, kidney trouble started. Pyelitis.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: Yes Where: Rottenrow.

Cause of Death: ? Prematurity 1 mth. If P.M.: _____
don't know cause of death.

Patient or Propositus: _____ No. in birth order: 3

Name: Alice (No.2) Date of birth 20.7.29.

Mother's health during pregnancy: Kidney trouble

If alive: Yes What illnesses: Measles, chickenpox. Fit and well. Just this year has started ? asthma. Has 2 children - both fit - no chest trouble.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 4

Name: James (No.2) Date of Birth: Mar. 36.

Mother's health during pregnancy: Kidney trouble.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Gastroenteritis If P.M.: Don't know.

Patient or Propositus: _____ No. in birth order: 5

Name: Margaret Female Date of birth: 19.6.39.

Mother's health during pregnancy: Kidney trouble.

If alive: _____ What illnesses: Measles, chickenpox.
No other illness, always been very healthy. Has had several attacks of broncnitis in last few years.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.:

Patient or Propositus: _____ No. in birth order: 6

Name: Michael Date of Birth: 16.4.47

Mother's health during pregnancy: Kidney trouble.

_____

If alive: _____ What illnesses: Bronchopneumonia at 6 mths. Discharged but was very thin and never thrived. admitted to R.H.S.C.

In what Hospital: Shieldhall Hosp.

Date: _____

If dead: Yes Date: November, 1948.

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Cysts in both lungs If P.M.: Yes

Patient or Propositus: _____ No. in birth order: ____

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Isobel O'Donnel. Index Case No.: 14.

Address: c/o Morrison, 33 Tower Street, Kinning Park.

No. of rooms: 1 R. & K. No. of occupants: 2 adults, 3 ch.

Mother: Isobel Morrison. Date of birth: 24. 4. 1924.

General Health: Good. Chest Trouble: Nil.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	7 Males.	Yes.			
2	2 Females.	Yes.			
3					
4					
5					
6					

Father: Andrew. Date of birth: 18. 1. 1922.

General Health: Good. Chest Trouble: Nil.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	Yes.			
2	Male.	Yes.			
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good.			
Grandfather:	Yes.	Slight bronchitis in winter.			
PATERNAL Grandmother:	Yes.	Good.			
Grandfather:	Yes.	Good.			

Cousins: Any similar illness or early deaths? -

Know any other child with similar illness? -

Patient or Propositus: _____ No.in birth order: 1.

Name: Brian. Date of birth: 24.7.46.

Mother's health during pregnancy: Fair.

If alive: Yes. What illnesses: -

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 2.

Name: Isobel. Date of Birth: -.11.48

Mother's health during pregnancy: Kidney trouble. Forceps delivery.

If alive: _____ What illnesses: _____

In what Hospital: R. H. S. C.

Date: _____

If dead: Yes. at 6 weeks. Date: 16. 12. 48.

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: Bro. Pneumonia. If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: 3.

Name: Andrea. Date of birth: 22.6.50.

Mother's health during pregnancy: Kidney trouble (Slight).

If alive: Yes. What illnesses: Otitis media. Measles. Pneumonia. Bronchitis all the time * investigation for bed wetting.

In what Hospital: * R.H.S.C.

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 4.

Name: David. Date of Birth: 27.4.52

Mother's health during pregnancy: No well. Debilitated kidneys OK

_____

If alive: Yes. What illnesses: Pneumonia. Measles.

"Very chesty" in winter.

_____

In what Hospital: _____

_____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

_____

Patient or Propositus: _____ No. in birth order: ___

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Samuel Wylie. Index Case No.: 15.

Address: 14, Cendrew Road, Paisley.

No. of rooms: 4 apartment. No. of occupants: 5.

Mother: Ellen. Date of birth: 28. 6. 16.

General Health: Good. Chest Trouble: Had bronchitis a fortnight ago for 1st time.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	1 Male.	Yes.		41	
2	1 Female	Yes.		42.	
3					
4					
5					
6					

Father: Samuel. Date of birth: 29.9.15. Died 3.9.55. (Accident).

General Health: Chest Trouble:

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	4 Female.	Yes.			
2	2 Male.	Yes.			
3	1 Female.		1948	Over 50.	Shock.
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:			Yes.	about 1918	Thought it was as a result of a miscarriage.
Grandfather:			Yes.	"	Does'nt know.
PATERNAL Grandmother:			Yes.	About 80	
Grandfather:			Yes.		

Cousins: Any similar illness or early deaths? No

Know any other child with similar illness? No.

Patient or Propositus: Female. No.in birth order: 1

Name: Margaret. Date of birth: 14.6.35

Mother's health during pregnancy: Very good.

If alive: Yes. What illnesses: Fluid in lung.

In what Hospital: Hawkhill Sanitorium

Date: 1940.

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: Female. No. in birth order: 2

Name: Alice. Date of Birth: 4.2.36

Mother's health during pregnancy: Very good.

If alive: Yes. What illnesses: -

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: Male. No. in birth order: 3

Name: Robert. Date of birth: 5.10.38.

Mother's health during pregnancy: Very good.

If alive: Yes. What illnesses: Diphtheria.

Pneumonia.

In what Hospital: Hawkhead Sanitorium.

Date: 3 mnths. old when had pneumonia.

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: Female. No. in birth order: 4

Name: Eleanor. Date of Birth: 12.5.45.

Mother's health during pregnancy: Very good.

If alive: Yes. What illnesses: Perforated ear drum.

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: Male. No. in birth order: 5.

Name: Samuel. Date of birth: 6.12.48

Mother's health during pregnancy: Very good.

If alive: What illnesses:

In what Hospital:

Date:

If dead: Yes. 19.12.48. Date:

At Home: If seen in Hospital:

In Hospital: R.H.S.C. Where:

Cause of Death: Pneumonia. If P.M.: Yes.

Patient or Propositus: Female. No. in birth order: 6

Name: Janice. Date of Birth: 13.1.52

Mother's health during pregnancy: Very good.

If alive: Yes. What illnesses: -

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: No. in birth order:

Name: Date of birth:

Mother's health during pregnancy:

If alive: What illnesses:

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

FIBROCYSTIC SURVEY

Name of Patient: Carol Brodie. Index Case No.: 16.

Address: 3 Churchill, Paisley.

No. of rooms: 2 R. & K. No. of occupants: 3.

Mother: Mey. Date of birth: 18. 4. 15.

General Health: Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	1 Male.		1930.	21.	Pneumonia. (Had asthma but got over it).
2	1 Male.	Yes.		46.	
3	2 F.	Yes.		47,43.	
4					
5					
6					

Father: Alexander. Date of birth: 13. 6. 14.

General Health: Very prone to have colds. Chest Trouble: Bronchitis in last few years.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	1 Female.	Yes.		43.	
2					
3	* 2		Yes		
4					
5					
6					

Familial relationship of parents: None

* Mother's Grandmother died of Bronchitis.
Father's Mother lost 2 children in fnfancy, 1 of Pneumonia

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good. Pneumonia this year.		75.	
Grandfather:			Yes. 1947.	68.	Parkinson's Dis.
PATERNAL Grandmother:	Yes.	Good.		68	
Grandfather:	Yes.	Good.	9	70.	

Cousins: Any similar illness or early deaths? -

Know any other child with similar illness? Cousin's daughter's child has asthma.

Patient or Propositus: _____ No.in birth order: 1.

Name: Allan. Date of birth: 11.2.44

Mother's health during pregnancy: Sick nearly whole time.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes at 7 wks.old. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: Gastro-enteritis. If P.M.: Yes.

Patient or Propositus: Female. No. in birth order: 2

Name: Sandra. Date of Birth 27.6.46

Mother's health during pregnancy: Fine.

If alive: Yes. What illnesses: Nervous spasm, sick since birth. Lot of wind. Tummy used to swell enormously.

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: Female. No. in birth order: 3.

Name: Carol Anne. Date of birth: 23.6.48.

Mother's health during pregnancy:

If alive: What illnesses:

In what Hospital:

Date:

If dead: Yes. Date:

At Home: If seen in Hospital:

In Hospital: R.H.S.C. Where:

Cause of Death: Pneumonia. If P.M.: Yes.

Child was thin & small for her age, but seemed bright and intelligent. Eats very little. Fruit upsets her.

FIBROCYSTIC SURVEY

Name of Patient: Andrew McIntosh. Index Case No.: 17.

Address: 14, Bernkirk Ave., Drumchapel.

No. of rooms: R. & K.(Sublet). No. of occupants: 4.

Mother: Mattie McIntosh. Date of birth: 1. 5. 23.

General Health: Chest History. Chest Trouble: Bronchitis annually.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Sister.	Yes.		31.	
2					
3					
4					
5					
6					

Father: Andrew. Date of birth: 1934.

General Health: Good. Chest Trouble: None.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Alex.	Yes.		26	
2	Thomas.	Yes.		31	
3	Helen.	Yes.		33	
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	No.	Good. (had 13 children)	May 1945	Elderly.	Old age.
Grandfather:	"	Good.	"	"	"
PATERNAL Grandmother:	Yes.	Some rheumatism.	8	54	
Grandfather:	Died in Stobhill.			45 app.	Assumed result of privations as P.O.W.

Cousins: Any similar illness or early deaths? None known.

Know any other child with similar illness? No.

Patient or Propositus: Male. No.in birth order: 1.

Name: Richard. Date of birth: 1942

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Usual children's. Chest & Throat weaknesses and glands. Septic tonsils (7 yrs.).

In what Hospital: Vincent St.

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: Girl. No. in birth order:

Name: Thurze. Date of Birth: 1947

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: None.
(Saw child who looked healthy).

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: Boy. No. in birth order: 3.

Name: Andrew. Date of birth: 1949

Mother's health during pregnancy: Varicose veins. Paralysis of legs and pain.

If alive: What illnesses: RH Negative -change of blood in Robroyston Hosp.-more transfusions in R.H.S.C.

In what Hospital: Robroyston.
R.H.S.C.

Date:

If dead: Yes. Date: 1949.

At Home: If seen in Hospital:

In Hospital: R.H.S.C. Where:

Cause of Death: If P.M.: Yes.

FIBROCYSTIC SURVEY

Name of Patient: James McLaughlin. Index Case No.: 19.

Address: 8, Mabel St. Motherwell.

No. of rooms: 2 Rooms. No. of occupants: 2 adults, 1 child

Mother: Christine Waddell. Date of birth: 9. 1. 23.

General Health: Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	Yes.			No chest trouble.
2	"	"			"
3	"	"			"
4	Female.	"			"
5	"	"			"
6	"	"			"

Father: James. Date of birth: 20. 9. 23.

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes			No chest trouble.
2	"	"			"
3	Male	"			"
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:			Yes..	68.	Bronchitis every winter for a few yrs. before she died eventually heart affected.
Grandfather:	Yes.	Good.			
PATERNAL Grandmother:			Yes.	46	Cancer internally.
Grandfather:	Yes.	Good.			

Cousins: Any similar illness or early deaths? -

Know any other child with similar illness? -

Patient or Propositus: _____ No. in birth order: 1.

Name: James Walter. Date of birth: 13.2.49

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: 2 months old.
Bronchitis - "narrow windpipe"
always wheezy.

In what Hospital: Paddington Green
Children's Hospital.

Date: _____

If dead: Yes. Date: 9.9.49.

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Broncho pneumonia. If P.M.: Yes.

Pneumo-thorax. Stools-copious-bad smelling-normal colour - very soft. 5- 6 stools a day.

Patient or Propositus: _____ No. in birth order: 2.

Name: Ann Mary Date of Birth: 8.12.51

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: When child had cold always had cough. Was being treated for coeliac disease. Did not thrive properly. Very small. Walked and talked. Teeth decayed quickly. Stools 5-6 daily. Mother noticed she was similar to her first baby.

In what Hospital: Strathclyde at 1.1/12 yrs.

Date: 6. 1. 54.

If dead: Yes. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: Strathclyde . Where: _____

Cause of Death: Abcesses in lung. If P.M.: Yes.

"Pancreas affected in Some way"

Patient or Propositus: _____ No. in birth order: 3

Name: Ian. Date of birth: 31.8.54.

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Has had chesty cold once but quite healthy otherwise. Stools normal.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Joan Queen. Index Case No.: 20.

Address: 1, Princes Street, Rutherglen.

No. of rooms: 2 apt. No. of occupants: 4.

Mother: Jane Queen. Date of birth: 18. 1. 1920.

General Health: Fit. Chest Trouble: None.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	yes.			
2	Male.	yes.			
3	male.	yes.			
4	Female.	yes.			
5	Male.		Yes.		in P.O.W. Hosp. in Germany.
6	Male.		Yes.		in action.

Father: Duncan Queen. Date of birth: 2. 6. 1915.

General Health: Chest Trouble: None.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.			
2	Female.	Yes.			
3	Male.	Yes.			
4	Male.	Yes.			
5	Male.	Yes.			
6	Male & Female.		Yes.	44,41.	P. T. B.

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:			Yes.	67.	Shock.
Grandfather:			Yes.	77.	Cancer.
PATERNAL Grandmother:	Yes.			72.	
Grandfather:	Yes.			55	Pneumonia.

Cousins: Any similar illness or early deaths? _____

Know any other child with similar illness? _____

Patient or Propositus: _____ No. in birth order: 1.

Name: Hugh Date of birth: 1938

Mother's health during pregnancy: Not well.

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: Yes. Date: _____

At Home: Yes. If seen in Hospital: _____

In Hospital: Premature Congestion. Where: _____

Cause of Death: _____ If P.M.: _____

_____

Patient or Propositus: _____ No. in birth order: 2

Name: Jean. Date of Birth: 1939

Mother's health during pregnancy: Not well.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: Yes. Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: Male. No. in birth order: 3.

Name: Duncan. Date of birth: 15.1.41.

Mother's health during pregnancy: F it.

If alive: Yes. What illnesses: Measles. Whooping Cough.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 4.

Name: Bernard. Date of Birth: 1946

Mother's health during pregnancy: Not well.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 5.

Name: William. Date of birth: 8.9.1948

Mother's health during pregnancy: Fit.

If alive: Yes. What illnesses: Measles.

Whooping Cough.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 6

Name: Joan. Date of Birth: 17.3.55

Mother's health during pregnancy: Not well.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: Yes. Where: R. H. S. C.

Cause of Death: Cystic Kidneys. If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: ____

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Evelyn King. Index Case No.: 22.

Address: 6, Fuller's Gate, Fairfley, Glasgow.

No. of rooms: 4 apt. No. of occupants: 4

Mother: I sobel. Date of birth: 26. 4. 19.

General Health: Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	2 Female.	Yes		34,27.	
2	1 Female.		Yes.	6.	Rheumatic Fever.
3					
4					
5					
6					

Father: Thomas. Date of birth: 6. 2. 15.

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	8 M.	Yes.			
2	4 F.	Yes.			
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good.		65.	
Grandfather:			1946	70.	Kidney Trouble.
PATERNAL Grandmother:	Yes.	Good.		65.	
Grandfather:	Yes.	Good.		65.	

Cousins: Any similar illness or early deaths? None with chest troubles etc.

Know any other child with similar illness? No.

Patient or Propositus: Female. No.in birth order: 1.

Name: Margaret. Date of birth: 23.1.46.

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Scarlet Fever.

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: _____ No. in birth order: 2

Name: Evelyn. Date of Birth: 23.11.48

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: _____ If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: 3

Name: Thomas. Date of birth: 29.2.52.

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Poliomyelitis.

In what Hospital: Killearn. Mearnskirk.

Date: 1953. when 1 yr. 5 months old.
Still in mearnskirk.

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 4

Name: VICTOR Date of Birth: 21.1.54

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: -

Very healthy looking child.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: _____

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: John Smith. Index Case No.: 23.

Address: 7, Bank Rd., Carmyle.

No. of rooms: R. & K. No. of occupants: 3.

Mother: Eliz. Rogerson. Date of birth: 10. 12. 22.

General Health: Good. Chest Trouble: None.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	None - only child.				
2					
3					
4					
5					
6					

Father: John. Date of birth: 1934.

General Health: Good. Chest Trouble: None.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Brother.	Yes.		Not known.	
2	"	"		"	
3	"	"		"	
4	"	"		"	
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Stroke. 9 mths. ago.		60 approx.	
Grandfather:	Yes.	Good.		"	"
PATERNAL Grandmother:	Yes	Good.		60 approx.	
Grandfather:	Yes.	Good.		60 approx.	

Cousins: Any similar illness or early deaths? None known.

Know any other child with similar illness? No.

Patient or Propositus: Male. No. in birth order: 1

Name: Walter. Date of birth: -.2.48

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: None.

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: Male. No. in birth order: 3.

Name: I an. Date of Birth:-.7.53.

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Rupture.

In what Hospital: Yorkhill.

Date: April, 1955.

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: Male. No. in birth order: 2.

Name: Date of birth: 5.5.50.

Mother's health during pregnancy: Good.

If alive: What illnesses:

In what Hospital:

Date:

If dead: Yes. Date:

At Home: If seen in Hospital: Yorkhill.

In Hospital: Where:

Cause of Death: Unable to say precisely. If P.M.: Yes.

FIBROCYSTIC SURVEY

Name of Patient: William Stewart, Index Case No.: 24

Address: 49, Heron Street, Glasgow. S. E.

No. of rooms: 1 Room. No. of occupants: 2 adults, 4 ch.

Mother: Emma Buchan. Date of birth: 13. 10. 1921.

General Health: Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.			
2					
3					
4					
5					
6					

Father: John. Date of birth: 5. 7. 1919.

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.		34	
2	Male.	Yes.		30	
3	Male.	Yes.		24	
4	Female.	Yes.		21.	
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:			1926.		Childbirth.
Grandfather:	Yes.	Asthma just lately.			
PATERNAL Grandmother:	Yes.		?60.		
Grandfather:	Yes.		?60		

Cousins: Any similar illness or early deaths? -

Know any other child with similar illness? -

Patient or Propositus: _____ No.in birth order: 1

Name: Jack. Date of birth: 8.3.42.

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Mumps. Measles. Whooping Cough. No chest Trouble.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 2.

Name: Marion. Date of Birth 26.5.43.

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Mumps. Measles.
Whooping Cough. No chest trouble.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 3.

Name: Elizabeth. Date of birth: 15.12.45

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Chickenpox.
No chest trouble.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 4.

Name: William. Date of Birth: 24.6.50

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: Born with Umbilical Hernia. If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: 5

Name: Brian. Date of birth: 27.11.54

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Nil.

Very healthy - no chest trouble.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Linda Retson Index Case No.: 25

Address: 51 Fetlai Dr., Glasgow.

No. of rooms: 4 No. of occupants: 4

Mother: Susan Date of birth: 24.5.26.

General Health: Very Good Chest Trouble: No

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	F	Yes		24	
2	F	Yes		27	
3					
4					
5					
6					

Father: Thomas Date of birth: 5.11.26.

General Health: Very Good. Chest Trouble: Bronchitis when young.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	M	Yes		32	
2					
3					
4					
5					
6					

Familial relationship of parents: None

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:			Yes(1940)		
Grandfather:			Yes(1935)		
PATERNAL Grandmother:			Yes(1935)	70	No Disease
Grandfather:			Yes(1935)	70	

Cousins: Any similar illness or early deaths? Brother lost 1st child, not sure what off.

Know any other child with similar illness? No

Patient or Propositus: Linda (Case 25) No.in birth order: 1

Name: Female Date of birth: Nov.'51

Mother's health during pregnancy: Very Good

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes Date: Nov. 1951.

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Meconium Ileus If P.M.: Yes

Patient or Propositus: Linda No. in birth order: 2

Name: Female Date of Birth: 24.5.53

Mother's health during pregnancy: Very Good

If alive: Yes What illnesses:

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: No. in birth order: 3

Name: Steven Date of birth: 31.8.54.

Mother's health during pregnancy: Very Good

If alive: Yes What illnesses:

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: _____ (Case 97) No. in birth order: 4

Name: Ruth Date of Birth: 31.11.5[illegible]

Mother's health during pregnancy: Very Good

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Meconium Ileus If P.M.: Yes - Fiscal.

Patient or Propositus: _____ No. in birth order: ___

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Alison Strang. Index Case No.: 26

Address: 93, Crowlin Crescent, Cranhill, E. 3.

No. of rooms: 4. No. of occupants: 3.

Mother: _____ Date of birth: 1 908.

General Health: _____ Chest Trouble: _____

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	10 of a family.				
2					
3					
4					
5					
6					

Father: _____ Date of birth: _____

General Health: Never been ill in his life until a year ago when he had an operation for a duodenal ulcer - still in bed. Chest Trouble: _____

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Large Family. Yes.				
2					
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:			Yes.	75.	
Grandfather:					
PATERNAL Grandmother:					
Grandfather:					

Cousins: Any similar illness or early deaths? -

Know any other child with similar illness? No.

Patient or Propositus: _____ No. in birth order: ____

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: Yes. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: Stillborn. If P.M.: _____

_____

Patient or Propositus: _____ No. in birth order: 2.

Name: _____ Date of Birth: 1935

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: Yes. 3/12. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: Pneumonia. If P.M.: _____

Patient or Propositus: Male. No. in birth order: 3.

Name: _____ Date of birth: 1938.

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: Yes. 3/12. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: Pneumonia. If P.M.: _____

Patient or Propositus: Female. No. in birth order: 4

Name: _____ Date of Birth: 1941.

Mother's health during pregnancy: _____

_____

If alive: Yes. What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Very healthy looking girl.

Patient or Propositus: _____ No. in birth order: 5

Name: _____ Date of birth: 1944.

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: Yes. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 6

Name: Allison. Date of Birth: 1950

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: Yes. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Fibrocystic disease. If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: ___

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Aileen Rodgers. Index Case No.: 31.

Address: 480, Main Street, Bellshill.

No. of rooms: _____ No. of occupants: 2 adults, 2 ch.

Mother: Andrina Clark. Date of birth: 28. 5. 1920.

General Health: _____ Chest Trouble: _____

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.			
2	"	Yes.			
3	Male.		Yes.	27.	War II
4					
5					
6					

Father: Charles. Date of birth: 23. 6. 1918.

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.		Yes.	22.	T.B.Chest.
2	"	Yes.		42	No chest trouble
3	Male.	Yes.		39	
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	F.good.		70.	
Grandfather:			Yes.	66.	Chest ? T.B. ?Cancer. Worked in Sawmill several of his workmates had silicosis
PATERNAL Grandmother:	Yes.	Chronic asthma.			
Grandfather:	Yes.	Bronchitis (Worked in iron foundry Better since retiring).			

Cousins: Any similar illness or early deaths? -

Know any other child with similar illness? -

Patient or Propositus: _____ No.in birth order: ____

Name: Norman. Date of birth: 1

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Pyloric stenosis.
O.P. R.H.S.C.
Quite healthy since. Scarlet Fever.
In what Hospital: _____
Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 2

Name: Aileen. Date of Birth: 18.1.51

Mother's health during pregnancy: F. Good. Anaemia.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: 17. 4. 1951.

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: _____ If P.M.: Yes.

3 days old. Stools foul smelling-fatty. Lumps of fat-clay coloured. Not gaining weight satisfactorily. Feeding slowly. Coughing from 2 weeks old which became worse.

Patient or Propositus: _____ No. in birth order: _____

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Elizabeth Bruce. Index Case No.: 32.

Address: 122, Glenkirk Dr. Drumchapel.

No. of rooms: 3 apt. No. of occupants: 2 adults. 3 ch.

Mother: Sarah. Date of birth: 27. 5. 1920.

General Health: Good. Chest Trouble: Bronchitis.

Family of 15 children. No available information of the rest of them.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	Yes.			
2	"	Yes.			
3	Female.	Yes.			
4	"	Yes.			
5	"	Yes.			
6	"	Yes.			

Father: William. Date of birth: 13. 12. 1914.

General Health: Good. Chest Trouble: -

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.			
2	Female.	Yes.			
3	Female.		Yes.		Pneumonia.
4	Male.	Yes.			
5	Male.				
6	Male.		Yes.		T.B.Chest. Convulsions.

Father told us that his brothers & sisters seem unable to produce any children.

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:			Yes.	68	
Grandfather:			Yes.	73.	
PATERNAL Grandmother:			Yes.	78	
Grandfather:			Yes.	54	Pneumonia.

Cousins: Any similar illness or early deaths? -

Know any other child with similar illness? -

Patient or Propositus: _____ No.in birth order: 1

Name: William. Date of birth: 24.3.41

Mother's health during pregnancy: Satisfactory.

If alive: Yes. What illnesses? 1. Scarlet Fever.

2. Acute rheumatism.

Chesty.

In what Hospital: 1. Ruchill.

2. Duke St.

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 2.

Name: David. Date of Birth: 17.2.44

Mother's health during pregnancy: Satisfactory.

If alive: Yes. What illnesses: 1. Slight Pneumonia.

No chest trouble since.

In what Hospital: R. Ruchill.

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: Male. No. in birth order: 3.

Name: Joseph. Date of birth: -.1.47

Mother's health during pregnancy: Good. Cough.

If alive: Yes. What illnesses: Pneumonia.

Very healthy since.

In what Hospital: Ruchill.

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: Female. No. in birth order: 4

Name: Elizabeth. Date of Birth: 7.1.54

Mother's health during pregnancy: Good. Cough.

If alive: What illnesses:

In what Hospital:

Date:

If dead: Yes. Date:

At Home: If seen in Hospital:

In Hospital: R.H.S.C. Where:

Cause of Death: If P.M.:

Patient or Propositus: No. in birth order:

Name: Date of birth:

Mother's health during pregnancy:

If alive: What illnesses:

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

FIBROCYSTIC SURVEY

Name of Patient: Brian McCloy. Index Case No.: 34.

Address: 37, Thomson Avenue, Netherton, Wishaw.

No. of rooms: 3 apartment. No. of occupants: 2 adults, 4 ch.

Mother: Agnes. Date of birth: 16. 1. 26.

General Health: Good. Chest Trouble: Pneumonia & Pleurisy.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	Yes.		35	
2					
3					
4					
5					
6					

Father: James. Date of birth: 17. 2. 23.

General Health: Good. Chest Trouble: -

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	Yes.			
2	"	Yes.			
3	"	Yes.			
4	Female.	Yes.			
5	"	Yes.			
6	"	Yes.			
	"	Yes.			

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:			Yes.	62.	? Stroke.
Grandfather:	Yes.				
PATERNAL Grandmother:		F.Good.		75.	
Grandfather:			Yes.	75.	Natural causes.

Cousins: Any similar illness or early deaths? _____

Know any other child with similar illness? No.

Patient or Propositus: _____ No.in birth order: 1

Name: Mary. Date of birth: 18.4.44

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Measles. Chickenpox.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 2

Name: James Douglas. Date of Birth 28.7.47

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Measles. Chickenpox.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 3

Name: Malcolm. Date of birth: 29.9.48

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Measles. Chickenpox.
Slight bronchitis.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 4

Name: Brian. Date of Birth: 16.6.52

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: 3 days old.
Operation on bowel.

In what Hospital: R.H.S.C.

Date: _____

If dead: Yes. Date: July, 1952.

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Pneumonia. Disease of Kidney. If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: 5

Name: Loraine Mergt. Date of birth: 27.1.56

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: Healthy baby.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Alice Biggs. Index Case No.: 36.

Address: 2, King Street, Kilsyth.

No. of rooms: 1 R.(Very damp) No. of occupants: 3.

Mother: Annie. Date of birth: 25. 1. 18.

General Health: Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	5 F.	Yes.		45-26.	
2	3 M.	Yes.		35-28.	
3					
4					
5					
6					

Father: Reginald. Date of birth: 1920.

General Health: V.Pale & Thin. Ulcer in stomach. Chest Trouble: Bit bronchial.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	11 M.	Yes.			
2					
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Nerves but other wise alright.			
Grandfather:			Yes.	77	Broken hip Bone.
PATERNAL Grandmother:	Yes.	Good.		App.70.	
Grandfather:	Yes.	Good.		"	

Cousins: Any similar illness or early deaths? -

Know any other child with similar illness? Husband's sister's child - Dumb. Husband's other sister's child - Mongolian.

Patient or Propositus: _____ No.in birth order: 1

Name: Carol Ann. Date of birth: 5.7.45.

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 2.

Name: Thomas. Date of Birth: 5.1.49

Mother's health during pregnancy: Good. Phlebitis.

If alive: Yes. What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: _____

Name: Maud Alice. Date of birth: -.10.51.

Mother's health during pregnancy: Not very well.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. 36 wks. old. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Bowel obstruction. If P.M.: Yes.

FIBROCYSTIC SURVEY

Name of Patient: Patricia Carlton. Index Case No.: 37.

Address: 105, Couper Street, Glasgow. C. 4.

No. of rooms: 2 apt. No. of occupants: 3.

Mother: Sarah. Date of birth: 3.2.20.

General Health: Good. Chest Trouble: Bronchitis at one time.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	4 F.	Yes.		Ages ranged	
2	2 M.	Yes.		from 27-40.	
3					
4					
5					
6					

Father: Daniel. Date of birth: 17. 5. 22.

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	6 F.	Yes.		Ages ranged	
2	2 M.			from 18-38.	
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:			Yes.	43.	Cerebral haemorrhage.
Grandfather:	Yes.	Good.		66	
PATERNAL Grandmother:			Yes.	57.	Bad cold that went into chest & bad heart.
Grandfather:			Yes.	57.	Tumour in stomach

Cousins: Any similar illness or early deaths? -

Know any other child with similar illness? No.

Patient or Propositus: Female. No.in birth order: 1.

Name: Patricia. Date of birth: 9.7.51.

Mother's health during pregnancy:

If alive: What illnesses:

In what Hospital:

Date:

If dead: Yes. 3½/12. Date:

At Home: If seen in Hospital:

In Hospital: R.H.S.C. Where:

Cause of Death: Pneumonia. If P.M.: Yes.

Patient or Propositus: Female. No. in birth order: 2.

Name: Kathleen. Date of Birth: 9.1.53.

Mother's health during pregnancy: Very good.

If alive: Yes. What illnesses: Measles.

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

3rd Baby expected in June.

Patient or Propositus: No. in birth order: 3

Name: Date of birth:

Mother's health during pregnancy: Sick a lot & fairly ill.

If alive: What illnesses:

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

FIBROCYSTIC SURVEY

Name of Patient: Alexandra Young. Index Case No.: 38.

Address: 10, Wrees Avenue, Barrhead.

No. of rooms: _____ No. of occupants: _____

Mother: _____ Date of birth: _____

General Health: _____ Chest Trouble: _____

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	2 Male.	Yes			
2	3 Female.	Yes.			
3					
4					
5					
6					

Father: _____ Date of birth: _____

General Health: _____ Chest Trouble: _____

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	4 M.	Yes.			
2	2 F.	Yes.			
3					
4					
5					
6					

Familial relationship of parents: Nil.

Grandparents: Alive Health Dead Age Cause

MATERNAL
Grandmother: _____

Grandfather: _____

PATERNAL
Grandmother: _____

Grandfather: _____

Cousins: Any similar illness or early deaths? _____

Know any other child with similar illness? _____

Patient or Propositus: Female. No.in birth order: 1.

Name: Alexandra. Date of birth:-.-.40.

Mother's health during pregnancy: Good.

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: Yes. 3/12. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: _____ If P.M.: Yes.

_____

2 Miscarriages.

Patient or Propositus: Male. No. in birth order: 4

Name: Date of Birth: -.3.56.

Mother's health during pregnancy: Good.

If alive: What illnesses: None.

In what Hospital:

Date:

If dead: Yes. Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: No. in birth order:

Name: Date of birth:

Mother's health during pregnancy:

If alive: What illnesses:

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

FIBROCYSTIC SURVEY

Name of Patient: John Douglas. Index Case No.: 40.

Address: 55, Dryden St., Hamilton.

No. of rooms: e 3 Rooms. No. of occupants: 2 adults, 2 Ch.

Mother: Margaret. Date of birth: 6. 10. 19.

General Health: Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	Yes.			
2	"	"			
3	"	"			
4	"	"			
5	"	"			
6	Female.	"			Slight shadow-cured.

Father: Angus. Date of birth: 11. 7. 16.

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.			
2	"	"			
3	"	"			
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:					
Grandfather:			Yes.		Erskine Hosp. Gassing 1914-18 war.
PATERNAL Grandmother:			Yes.		T.B.Glenlea Hosp.
Grandfather:					

Cousins: Any similar illness or early deaths? No.

Know any other child with similar illness? No.

Patient or Propositus: _____ No.in birth order: 1

Name: David. Date of birth: 7.10.38

Mother's health during pregnancy: Kidney trouble, janndiced.

Confined to bed at intervals during pregnancy.

If alive: _____ What illnesses: T.B.chest at 12-14½ yrs. cured.

In what Hospital: Roadmeetings.

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 2

Name: John. Date of Birth: 8.8.41.

Mother's health during pregnancy: Kidney trouble. Jaundiced.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: 4. 10. 41.

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Jaundiced "something wrong with stomach". If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: 3

Name: Jane. Date of birth: 7.2.43.

Mother's health during pregnancy: Kidney trouble. Jaundiced.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: 4. 4. 1943.

At Home: Yes. If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 4

Name: Ian. Date of Birth: 12.9.50

Mother's health during pregnancy: Kidney trouble. Jaundiced.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: 12. 12. 1950.

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: ____

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Mother was very vague as to the cause of death of any of these infants. She said their heads were soft, but I imagine this would be caput by the description.

FIBROCYSTIC SURVEY

Name of Patient: Gerrard. Hughes. Index Case No.: 41.

Address: 12, Abbotsford Avenue, Hamilton.

No. of rooms: 4 apts. No. of occupants: 2 adults, 5 ch.

Mother: Mary Ann. Date of birth: Feb.1915.

General Health: Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	10 children. All healthy.				
2					
3					
4					
5					
6					

Father: Thomas. Date of birth: 18. 12. 10.

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	Yes.			
2	Female.	Yes.			
3	"		Yes.		T.B.
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good.			
Grandfather:	Yes.	Silicosis but fairly well now - retired.			
PATERNAL Grandmother:			Yes.		Natural.
Grandfather:			Yes.		Natural.

Cousins: Any similar illness or early deaths? No.

Know any other child with similar illness? No.

Patient or Propositus: _____ No.in birth order: 1.

Name: Thomas. Date of birth: 22.7.42

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Very healthy - No cough etc.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 2

Name: John. Date of Birth: 20.2.44

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: convulsions. If P.M.: _____

Patient or Propositus: _____ No. in birth order: 3.

Name: Jane. Date of birth: 14.3.48

Mother's health during pregnancy: _____

If alive: Yes. What illnesses: Quite healthy.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 5

Name: Joseph. Date of Birth: 13.1.50

Mother's health during pregnancy: _____

_____

If alive: Yes. What illnesses: Quite healthy.

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

_____

Patient or Propositus: _____ No. in birth order: 6

Name: Gerard. Date of birth 28.1.52

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: Yes. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Atresia Bowel. If P.M.: Yes.

Patient or Propositus. _____ No. in birth order: 7

Name: Rosemary. Date of Birth: 1954

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Quite healthy.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: _____

Name: Pregnand - E.D.D.March. To be admitted to Bellshill. Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Baby Middleton. Index Case No.: 42

Address: Mother now in America. Grandmother-38 Succoth St. W.3.

No. of rooms: _____ No. of occupants: _____

Mother: Mary. Date of birth: 2.7.30.

General Health: Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	1 M.	Yes.			
2	3 F.	Yes.			
3					
4					
5					
6					

Father: William. Date of birth: 20. 6. 30.

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	3 F.	Yes.			
2	3 M.	Yes.			
3	2 F.		Yes.	9 11	Bronchial pneumonia.
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Does'nt know.			
Grandfather:	Yes.	"	"		
PATERNAL Grandmother:	Yes.	Good.			
Grandfather:			Yes.	54.	

Cousins: Any similar illness or early deaths? No.

Know any other child with similar illness? No.

Patient or Propositus: _____ No.in birth order: 1

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: Yes - Miscarriage. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

_____

Patient or Propositus: _____ No. in birth order: 2

Name: John. Date of Birth: -.3.-.

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: Yes.10/12. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Gastro-enteritis. If P.M.: _____

Patient or Propositus: Male. No. in birth order: 3.

Name: Allen. Date of birth: 16.10.53

Mother's health during pregnancy: Very good.

_____

If alive: Yes. What illnesses: None.

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: Female. No. in birth order: 4

Name: Barbara. Date of Birth: 29.12.54

Mother's health during pregnancy: V.Good.

If alive: Yes. What illnesses: None.

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: No. in birth order:

Name: Date of birth:

Mother's health during pregnancy:

If alive: What illnesses:

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

FIBROCYSTIC SURVEY

Name of Patient: Valerian Stanley. Index Case No.: 44.

Address: 120, Brrachnye Road, Garrowhill.

No. of rooms: 3 apartment. No. of occupants: 3.

Mother: Eliz. Lamont. Date of birth: 20. 8. 24.

General Health: Very Good. Chest Trouble: None

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male				
2					
3					
4					
5					
6					

Father: Date of birth:

General Health: Chest Trouble:

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male	Yes.			
2	Male	Yes.			
3	Female.		Yes		Accident.
4	Female.		Yes.		Accident.
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:					
Grandfather:					
PATERNAL Grandmother:			Yes(1939)		Not known-happened in Poland and has no information.
Grandfather:			Yes(1953)		

Cousins: Any similar illness or early deaths? None with any chest trouble.

Know any other child with similar illness? No.

Patient ~~or Propositus~~: Valerian No. in birth order: 1

Name: Male. Date of birth: .8.52.

Mother's health during pregnancy: All right.

If alive: What illnesses:

In what Hospital:

Date:

If dead: Yes. 8/12. Date: 16. 4. 53.

At Home: If seen in Hospital:

In Hospital: R.H.S.C. Where:

Cause of Death: Pneumonia. If P.M.: Yes.

Patient ~~or Propositus~~: Paul Christopher. No. in birth order: 2

Name: _____ Date of Birth: 11.12.53

Mother's health during pregnancy: All right.

_____

If alive: Yes. What illnesses: Similar to 1st child

Proved case of Fibrocystic disease

_____

In what Hospital: R.H.S.C.(Twice).

_____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

_____

Patient or Propositus: _____ No. in birth order: ___

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: James McComisky. Index Case No.: 46

Address: 4, Church St.W.1.. 8.Millbrix Ave.W.4. (Temp.)

No. of rooms: 1 R. & K. No. of occupants: 2.

Mother: Mary Ellen. Date of birth: 24. 2. 22.

General Health: Fine. Chest Trouble: Bronchitis before married.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	7 M.	Yes.		40-23.	
2	1 F.	Yes.			
3					
4					
5					
6					

Father: Peter Date of birth: 10.6.20.

General Health: Good. Chest Trouble: Bronchial.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	5F.	Yes.		oldest about 60.	
2	Danny.		Yes.	1914-18.	Killed in war
3	James.		Yes.	42.	Cerebral haem.
4	M.		Yes.)		
5	M.		Yes.)		) Both died in infancy.
6	John.	Yes.		45.	

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good.			
Grandfather:	Yes.	Inclined to Bronchitis when working outside.			
PATERNAL Grandmother:			Yes(1948).	74	
Grandfather:			Yes(1949).	74	

Cousins: Any similar illness or early deaths? Large no. of cousins didn't know.

Know any other child with similar illness? _____

Patient or Propositus: _____ No. in birth order: 1

Name: James Date of birth: 8.2.51.

Mother's health during pregnancy: Very good but blood pressure went up.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: 9.5.52

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: _____ If P.M.: Yes.

Patient or Propositus: Stillborn. Male. No. in birth order: 2

Name: Gerard. Date of Birth:

Mother's health during pregnancy: Very good but blood pressure went up.

If alive: What illnesses:

In what Hospital:

Date:

If dead: Yes. Date: 4. 6. 53.

At Home: If seen in Hospital:

In Hospital: Yes. Where: Maternity Hospital.

Cause of Death: Stillborn Broken spine. If P.M.: Yes in Maternity Hosp.

Patient or Propositus: Joseph. No. in birth order: 4

Name: Male. Date of birth: 10.9.55

Mother's health during pregnancy: Had a cold all the time was carrying him.

If alive: What illnesses:

In what Hospital:

Date:

If dead: Yes. Date: 24. 11. 55.

At Home: If seen in Hospital:

In Hospital: R.H.S.C. Where:

Cause of Death: Fibrocystic disease. If P.M.: Yes.

FIBROCYSTIC SURVEY

Name of Patient: Joseph McKinistry. Index Case No.: 48.

Address: 78, Paisley Road.

No. of rooms: 1 R & K. No. of occupants: 2 adults, 1 chil

Mother: Eliz. Muirhead. Date of birth: 13. 11. 1933.

General Health: Good. Chest Trouble: Non.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male	Yes			
2	Female	Yes			
3	Female.	Yes.			
4	Female.	Yes.		26	Bronchitis of late.
5	Female.		Yes.	24	Pleurisy.
6					

Father: John. Date of birth: 1928.

General Health: Good. Chest Trouble:

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.			
2					
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:			Yes.		Cerebral haem.
Grandfather:	Yes.	Good.	Has bronchitis in winter.		
PATERNAL Grandmother:			Yes.		Don't know.
Grandfather:	Yes.				

Cousins: Any similar illness or early deaths? No

Know any other child with similar illness? No

Patient or Propositus: _____ No.in birth order: 1

Name: Joseph. Date of birth: 30.2.52

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: Chill. Cough.

In what Hospital: _____

Date: _____

If dead: Yes. Date: 20. 7. 52.

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Broncho-pneumonia. If P.M.: Yes.

Stools-constipated-normal colour. Gained weight normally. contented baby.

Patient or Propositus: _____ No. in birth order: 2

Name: Joan. Date of Birth 9.4.54.

Mother's health during pregnancy: _____

_____

If alive: Yes. What illnesses: No chest trouble.

Very healthy.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: ____

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Baby McKillop. Index Case No.: 49.

Address: 13, Mosside Ave., Port Glasgow.

No. of rooms: 3 apts. No. of occupants: 2 adults, 2 ch.

Mother: Roberta Lochlea. Date of birth: 21. 10. 20.

General Health: Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	Yes.			
2	Male.	Yes.			
3					
4					
5					
6					

Father: James. Date of birth:

General Health: Good. Chest Trouble: Pleurisy. Pneumonia 9 yrs. ago.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Twins.			
2	"				
3	Male.	Twins.			
4	Female.				
5	Male.	Yes.			
6	"	"			
	Female.	"			

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.				
Grandfather:			Yes.		Cardiac.
PATERNAL Grandmother:	Yes.	Quite well.			
Grandfather:	Yes.	"	"		

Cousins: Any similar illness or early deaths? _____

Know any other child with similar illness? _____

Patient or Propositus: _____ No. in birth order: 1

Name: Robert. Date of birth: 28.7.43.

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: _____

2 months premature.

Cough.

In what Hospital: _____

Date: _____

If dead: Yes. Date: 6 weeks old.

At Home: Yes. If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 2.

Name: Charles. Date of Birth: 9.3.43

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Measles.

Quite healthy.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 3

Name: James. Date of birth: 18.2.46

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Measles.

Quite healthy - no cough.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: ___

Name: Brian. Date of Birth: 7.8.52

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: 10. 8. 52.

At Home: _____ If seen in Hospital: _____

In Hospital: Yes. Where: R.H.S.C.

Cause of Death: Meconium ileus. If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: ___

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Margt. C umming. Index Case No.: 50.

Address: 149, Shawhill Rd., Glasgow.

No. of rooms: 1 R. & 1 K. No. of occupants: 2 adults, 3 ch.

Mother: Annie Kerr. Date of birth: 15. 7. 22.

General Health: Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.		1955.	35	T.B, Kidney.
2	Female.	Yes.		30.	
3					
4					
5					
6					

Father: David. Date of birth: 13. 6. 1920.

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.		26.	
2					
3					
4					
5					
6					

Familial relationship of parents: No.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good.		? 55.	
Grandfather:	Yes.	Good.		? 57.	
PATERNAL Grandmother:	Yes.	Good.			
Grandfather:			1952.		Tumour of spine.

Cousins: Any similar illness or early deaths? No.

Know any other child with similar illness? No.

Patient or Propositus: _____ No.in birth order: 1

Name: Robert. Date of birth: 28.12.50

Mother's health during pregnancy: Good - no infectious illnesses

If alive: Yes. What illnesses: Measles at 2½ yrs. uneventful recover. Scarlet fever 1955 - mild attack no complications

In what Hospital: Belvedere.

Date: 1953.

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 2.

Name: Margaret. Date of Birth: 16.4.52

Mother's health during pregnancy: Good - no infectious illnesses.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: 19. 9. 52.

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C Where: _____

Cause of Death: _____ If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: 3

Name: David. Date of birth: 12.1952

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Whooping cough.-mild. no complications. No chest trouble.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Confined at home. After the passing of meconium mother says she did not remember seeing a normal stool. Stools green & bulky. Child did not thrive and she thought she was underweight. Slight cough at first which became worse. The mother cannot recall any other outstanding symptoms.

Patient or Propositus: _____ No. in birth order: 4

Name: Ann Barbara. Date of Birth: 27.9.54.

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: No illnesses. Chest O.K. Just a bit chest when she has a cold.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: 1 month pregnant. No. in birth order: ___

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Charles Linley. Index Case No.: 53.

Address: 7. Cowdenhill Rd.Knightswood,Glasgow.

No. of rooms: 3 R. & K. No. of occupants: 2 adults.

Mother: Date of birth:

General Health: Chest Trouble:

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	The couple did not wish to discuss the				
2	matter at all and I did not press them but				
3	did find out that -				
4	There was one other child 10 yrs.ago died.				
5	Then the child that died R.S.C.H 3 yrs.ago -				(? cause.
6					intestinal obstruction.

Father: Date of birth:

General Health: Chest Trouble:

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1					
2	No history of chest trouble in the family.				
3					
4					
5					
6					

Familial relationship of parents:

Grandparents: Alive Health Dead Age Cause

MATERNAL
Grandmother: _____

Grandfather: _____

PATERNAL
Grandmother: _____

Grandfather: _____

Cousins: Any similar illness or early deaths? _____

Know any other child with similar illness? _____

Patient or Propositus: _____ No. in birth order: 1

Name: _____ Date of birth: 1945

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: Yes. Date: _____

At Home: Yes. If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

_____

Patient or Propositus: _____ No. in birth order: 2.

Name: _____ Date of Birth: 1952

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: Yes. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Intestinal obstruction. If P.M.: _____

_____

Patient or Propositus: _____ No. in birth order: ____

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Phyllis Goodwin. Index Case No.: 54

Address: 62, Pollokshaws Rd.

No. of rooms: 1 Room. No. of occupants: 2 adults, 2 ch.

Mother: Mary McGovern. Date of birth: 21.11.1932.

General Health: Good. Chest Trouble: Slight Bronchitis every winter.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.		30.	No chest trouble.
2	"	"		28	do.
3	Male.	"		27	do.
4	Male.	"		23	do.
5	Female.	"		21	do.
6	Female.	"		19	do.
	Female.	"		14	do.

Father: John. Date of birth: 13. 3. 1932.

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	5 Females.	Yes.			No chest trouble.
2	5 Males.	Yes.			
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes..	Good. A bit chesty last few years.		42.	
Grandfather:	Yes.			44	
PATERNAL Grandmother:	Yes	Yes.			
Grandfather:	Yes.	Yes.			

Cousins: Any similar illness or early deaths? _____

Know any other child with similar illness? _____

Patient or Propositus: _____ No. in birth order: 1

Name: Phyllis Date of birth: 14.1.52

Mother's health during pregnancy: Good. Cough.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. 6 weeks old. Date: February, 1953.

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Pneumonia. If P.M.: _____

Patient or Propositus: _____ No. in birth order: 2.

Name: Phyllis. Date of Birth: 25.3.54

Mother's health during pregnancy: Good - not chesty.

If alive: Yes. What illnesses: Whooping cough (not immunised). 3 months ago. Chest O.K. Health very good - well nourished child.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 3

Name: John. Date of birth: 17.6.55

Mother's health during pregnancy: Good until two weeks before delivery. Duke St. Hosp. 2 months. very bad bronchitis.

If alive: Yes. What illnesses: Whooping cough at 10 wks. old. (2) Bronchopneumonia.

In what Hospital: 1) Ruchill for 8 weeks (2) Knights for 3 months (Wd. 7).

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Francis McAllister. Index Case No.: 55.

Address: 64A, Florence St. Glasgow.

No. of rooms: 1. No. of occupants: 2 adults, 1 ch.

Mother: Hannah Spence. Date of birth: 17. 10. 27.

General Health: Good. Chest Trouble:

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.		40.	
2	Male.	Yes.		38	
3	Male.	Yes.		36	
4	Male.	Yes.		34	
5	Male.	Yes.		32	
6	Ursula.	Yes.		30.	

Father: Francis. Date of birth: 13. 6. 29.

General Health: Good. Chest Trouble: Nil.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.			
2	"	"			
3	"	"			
4	Male.	"			
5	"	"			
6	"	"			

Familial relationship of parents: None

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good.		64	
Grandfather:	Yes.	Good.		62	
PATERNAL Grandmother:	10 yrs.dead no history.				
Grandfather:	? " " "				

Cousins: Any similar illness or early deaths? _____

Know any other child with similar illness? _____

Patient or Propositus: Female. No.in birth order: 1.

Name: Carol. Date of birth: 15.2.50.

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: Slight.
X-ray R.H.S.C. Pneumonia.

In what Hospital: _____

Date: _____

If dead: Yes. 2/12. Date: _____

At Home: _____ If seen in Hospital: Belvedere at at 7 weeks old.

In Hospital: Yes. Where: _____

Cause of Death: Pneumonia. If P.M.: Yes.
Belvedere.

Patient or Propositus: Male. No. in birth order: 2.

Name: Francis. Date of Birth: 28.2.52

Mother's health during pregnancy: Good.

If alive: What illnesses: Cold-pneumonia.

In what Hospital: R.H.S.C.

Date:

If dead: Yes. Date:

At Home: If seen in Hospital:

In Hospital: R.H.S.C. Where:

Cause of Death: Pneumonia. If P.M.: Yes.

Patient or Propositus: No. in birth order: 3

Name: Thomas. Date of birth: 7.5.1954

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Nil.

Slight cold nothing else.

Slight cold and a bit chesty at time of report. The child appears to be quite healthy and very well nourished.

~~In what Hospital~~:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

FIBROCYSTIC SURVEY

Name of Patient: Alexander Abernethy. Index Case No.: 56

Address: 40, Woodstock Rd. Lanark.

No. of rooms: 3 apts. No. of occupants: 2 adults, 2 ch.

Mother: Mary. Date of birth: 14. 3. 1926.

General Health: Good. Chest Trouble: Nil.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.		41.	
2	Male.	Yes.		40.	
3	"	Yes.		36.	
4	Female.	Yes.		34.	
5	"	Yes.		32.	
6	Male.	Yes.		28.	

Father: David. Date of birth: 1. 6. 1921.

General Health: Good. Chest Trouble: Nil.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	Yes.		32.	
2	Female.	Yes.		29.	T.B. treated-Switz. Lobectomy-fit now.
3	"	"			
4	"	"			
5	Male.		Yes.		Motor accident.
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:			1955.	62	Ca. of stomach.
Grandfather:	Yes.	Yes.		65.	Smokers cough.
PATERNAL Grandmother:	Yes.	Good.	Asthma fairly severe.		
Grandfather:	Yes.	Good.			

Cousins: Any similar illness or early deaths? -

Know any other child with similar illness? -

Patient or Propositus: Female. No. in birth order: 1.

Name: Janice. Date of birth: 26.1047

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Nil - very healthy child.

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: _____ No. in birth order: 2

Name: Alexander. Date of Birth 23.2.52

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: Road Meetings. Hosp.
Pneumonia. Bronchitis.

In what Hospital: _____

Date: 15. 12. 1952.

If dead: Yes. Date: 27. 7. 1952.

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Fibrocystic disease. If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: 3

Name: Mary Lynn. Date of birth: 8.9.55

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Nil -appears to be a
healthy child. Bonny & contented.
No chest trouble.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Mary Anne Forrest. Index Case No.: 57

Address: 84, Clyde St., Carluke.

No. of rooms: _____ No. of occupants: 2 adults, 2 Ch.

Mother: Anne Martin. Date of birth: 14. 10. 21.

General Health: Good. Chest Trouble: Nil.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	Yes.		32.	
2	"	Yes.		30.	
3					
4					
5					
6					

Father: James. Date of birth: 22. 1. 11.

General Health: Good. Chest Trouble: Nil.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.			No chest trouble.
2	"	Yes.			do.
3	Male.	Yes.			do.
4	Male.	Yes.			do.
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good.			No chest trouble.
Grandfather:	Yes.	"			do.
PATERNAL Grandmother:	Yes.	Good.			do.
Grandfather:	Yes.	Good.			do.

Cousins: Any similar illness or early deaths? -

Know any other child with similar illness? -

Patient or Propositus: _____ No.in birth order: 1

Name: Mertin. Date of birth: 11.2.51

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Fibrocystic. R.H.S.C.

Had cold this year-chest, last col

2 yrs.ago. Keeps quite well. Does not keep to rigid diet but Mother very sensible & varies same. Has not started school yet but starting in summer.

~~In what Hospital~~:

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 2

Name: Mary Anne. Date of Birth: 19.8.53

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. 19.12.53. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: _____ If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: 3

Name: James Thomas. Date of birth: 15.5.55

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: No coughs or colds.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Baby McNally. Index Case No.: 59

Address: 326, East Muriehall St., Coatbridge.

No. of rooms: 2 Rooms, K & B. No. of occupants: 2

Mother: Margt. Anne Collins. Date of birth: 20. 6. 24.

General Health: Generally good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Sister.	Yes.		36.	
2	Brother.	Yes.		32.	
3	Brother.	Yes.		24	
4					
5					
6					

Father: Robert Andrew. Date of birth: 6. 1. 26.

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.-			A child died of pneumonia-wives in England lost touch.
2					
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good till 1955- Rheumatoid Athritis.		57.	
Grandfather:	"	Good.		58	
PATERNAL Grandmother:	Yes.	Good.		60	
Grandfather:	"	"		59	

Cousins: Any similar illness or early deaths? None.

Know any other child with similar illness? None.

Patient or Propositus: Boy. No.in birth order: 1

Name: John. Date of birth: Dec.48.

Mother's health during pregnancy: Good.

If alive: What illnesses: Stoppage of Bowel.

In what Hospital:

Date: Dec.1948-Day after birth.

If dead: Yes. Date:

At Home: Yes. If seen in Hospital:

In Hospital: Where:

Cause of Death: Stoppage of Bowel. If P.M.: No.

Patient or Propositus: Girl. No. in birth order: 2

Name: Yvonne Kerr. Date of Birth: 15.4.52

Mother's health during pregnancy: Good.

If alive: What illnesses: Whooping Cough at 3mths
A bronchial weakness. Strained heart.
Pneumonia.

In what Hospital: Stobhill.

Date:

If dead: Yes. Date: 30. 4. 53.

At Home: If seen in Hospital: Stobhill.

In Hospital: Where:

Cause of Death: Pneumonai. If P.M.: Yes.

Patient or Propositus: Girl. No. in birth order: 2

Name: Audrey. Date of birth: 8.8.54

Mother's health during pregnancy: Good, until last month when some pressure fairly low down.

If alive: What illnesses: 2 days after birth
green vomiting.

In what Hospital: Bellshill.

Date:

If dead: Yes. Date: 12. 8. 54.

At Home: If seen in Hospital: Yorkhill.

In Hospital: Where:

Cause of Death: Paralysis of Bowel. If P.M.: Yes.

FIBROCYSTIC SURVEY

Name of Patient: Peter Adams. Index Case No.: 60

Address: 95, Wilverton Rd., Knightswood, Glasgow.

No. of rooms: 3, apts. No. of occupants: 2 adults.

Mother: Katherine. Date of birth: 15. 1. 1930.

General Health: Good. Chest Trouble: Slight cough.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	Yes.		27	
2	Male.	Yes.		25	
3					
4					
5					
6					

Father: Peter. Date of birth:

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	Yes.			
2	Female.	Yes.			
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good.			No chest trouble.
Grandfather:			Yes.	?	
PATERNAL Grandmother:	Yes.	Good.			
Grandfather:			Yes.	?	T.B.Chest.

Cousins: Any similar illness or early deaths? -

Know any other child with similar illness? -

Patient or Propositus: _____ No.in birth order: 1

Name: Linda. Date of birth: 22.2.51

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: _____

In what Hospital: Knightswood at 7 months.

Date: _____

If dead: Yes. Date: Dec.1950.

At Home: _____ If seen in Hospital: _____

In Hospital: Yes. Where: Knightswood.

Cause of Death: ? Pneumonia. If P.M.: Yes.

From Birth: Stools bulky. Thin child. Not gaining weight normally. Always had cough.

Patient or Propositus: _____ No. in birth order: 2

Name: Peter. Date of Birth: 4.4.53

Mother's health during pregnancy: Good. Cough.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: at 5 months old.

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Fibrocystic disease. If P.M.: Yes.

Mother noticed both childrens symptoms followed same pattern except perhaps Peter a little more sever. More thin etc. cough ++

Patient or Propositus: _____ No. in birth order: ___

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: James Jarvie. Index Case No.: 61.

Address: 22, Annathill Terrace, Glenboig, Nr. Coatbridge.

No. of rooms: R. & K. No. of occupants: 4.

Mother: Isabella Ballantyne. Date of birth: Nov. 1924

General Health: Good. Chest Trouble: None.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.		34.	T.B. Throat-2yrs. ago whileworking on a farm - well now.
2	"	"		32	
3	Male.	"		30.	
4	Female.	"		26.	
5	Female.	"		21.	
6	Male.	"		18.	
	Female.	"		14.	

Father: Andrew. Date of birth: 1918.

General Health: Good. Chest Trouble: None.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Different Father, same Mother-2 half brothers				
2	of whom Mrs. Jarvie knew nothing.				
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good.		54.	
Grandfather:	"	"		55	
PATERNAL Grandmother:	Yes.	Good.		77	
Grandfather:	"	"		"	

Cousins: Any similar illness or early deaths? None known.

Know any other child with similar illness? No.

Patient or Propositus: Female. No.in birth order: 1

Name: Ruby. Date of birth: 10.47.

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Abscess in throat gland.

In what Hospital: Yorkhill.

Date: 1949.

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: Male. No. in birth order: 2

Name: Andrew. Date of Birth:-.10.48.

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: None.

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: Male. No. in birth order: 3.

Name: James. Date of birth: 8.6.54.

Mother's health during pregnancy: Good, but difficult birth-9lbs.

If alive: What illnesses: Mrs. Jarvie said baby did well during first 2 months & gained 2 lbs. in 1st month After going on Nat. Dried Milk in 3rd month, it began to waste. Treated for Pneumonia by Dr. Clarke, Glenboig.

In what Hospital: Yorkhill 1 month.

Date:

If dead: Yes. Date: November, 1954.

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: Pneumonia. If P.M.: Yes. Yorkhill.

FIBROCYSTIC SURVEY

Name of Patient: Thomas Rudden. Index Case No.: 62.

Address: c/o Dunlop, 1258 London Rd., Glasgow.S.E.

No. of rooms: 1 Room. No. of occupants: 1 adult, 3 ch.

Mother: Sarah Dunlop. Date of birth: 29. 9. 25.

General Health: Fair. Undernourished girl. Chest Trouble: T.B.Not active. attending Belvedere.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	Yes.		28.	T.B.Lung.Treated Belvedere O.P.
2	"	"		25	
3	"	"		34	
4	"	"		36	
5	Female.		Yes.	37.	C.S.Meningitis. Many years ago.
6					

Father: Joseph. Date of birth: 11. 11. 23.

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	? 7 children all alive and well.				
2	No history of chest trouble.				
3	Very vague about them all.				
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:			Yes.	37 yrs.	T.B. Chest. Haemoptysis.
Grandfather:			Yes.	?	
PATERNAL Grandmother:	Don't know anything.				
Grandfather:					

Cousins: Any similar illness or early deaths? No.

Know any other child with similar illness? No.

Patient or Propositus: _____ No. in birth order: 1

Name: Jean. Date of birth: 13.7.50

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Measles. Mild Bronchitis.

In what Hospital: -

Date:

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 2

Name: Andrew. Date of Birth:-.12.52

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Measles.

1) T.B.Meningitis at 8 months.

2)Enteritis at,1.4/12 yrs.

In what Hospital: 1)Knightswood.

2) Belvedere.

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 3

Name: Thomas. Date of birth:30.6.53

Mother's health during pregnancy: Good apart from chest.

Being trated for T.B.Lung.Belvedere for past 5 yrs.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. 5 months. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Pyloric stenosis. If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: 4.

Name: June. Date of Birth: 15.6.55

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: No illnesses.
Stayed in Millbrae home for 3 month
from Birth - B.C.G.
In what Hospital: _____
Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: ____

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____
In what Hospital: _____
Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

All the children have colds at time of report. Andrew looks very pale and seedy. The three children are coughing slightly, but Mother says this is only since they have had "the cold". She was waiting for her Dr. to call when I was there.

FIBROCYSTIC SURVEY

Name of Patient: Gordon Lindsay Morrison. Index Case No.: 63.

Address: 43, Beltane Street, Glasgow. C. 3.

No. of rooms: 3 Rooms. No. of occupants: 2.

Mother: Ishbel Paterson. Date of birth: 2. 10. 28.

General Health: Very Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.		Yes.	10mnths.	Couldnt remember but not from same thing as her son.
2					
3					
4					
5					
6					

Father: Gordon Charles. Date of birth: 30. 4. 21.

General Health: Very Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.			Suffers from Asthma.
2	Female.	Yes.			
3	Female.	Yes.			
4	Male.		Yes.	42	Disseminated Sclerosis.
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Poor, due to old age.			
Grandfather:		Yes.			
PATERNAL Grandmother:		Yes.		84.	
Grandfather:		Yes.			

Cousins: Any similar illness or early deaths? No illness.

Know any other child with similar illness? No.

Patient or Propositus: Boy. No.in birth order: 1

Name: Gordon Morrison. Date of birth: 3 1.3.54

Mother's health during pregnancy: Very Good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: 9. 12. 54.

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Gastro-enteritis. If P.M.: Yes.

As result of P.M.parents told child died of Fibrocystic Disease of Pancreas.

2nd Child expected in March.

FIBROCYSTIC SURVEY

Name of Patient: Anne McQuilken. Index Case No.: 64

Address: 15, tassie Street, Glasgow. E. 1.

No. of rooms: 2 R. & K. No. of occupants: 2.

Mother: Sarah. Date of birth: 11. 6. 18.

General Health: Perfect. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	4 M.	Yes.		Oldest 48.	
2	2 F.	Yes.			
3					
4					
5					
6					

Father: James. Date of birth: 27. 10. 17.

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	4 M.	Yes.		Oldest 53	
2	3 F.	Yes.		Youngest 39.	
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:			Yes. 1937	53	Cerebral Haem.
Grandfather:			Yes. 1932.	46	Pneumonia.
PATERNAL Grandmother:			Yes. 1931.	67.	Cancer.
Grandfather:			Yes. 1950.		Athritis.

Cousins: Any similar illness or early deaths? Not sure, but some dead, didn't know cause.

Know any other child with similar illness? 'All fine' but sister-in-law had blue-baby.

Patient or Propositus: Male. No. in birth order: 1

Name: James. Date of birth: 13.12.40

Mother's health during pregnancy: Very Good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. 5½/12. Date: 31. 5. 41.

At Home: _____ If seen in Hospital: _____

In Hospital: Homopathic Nursing Home Mount Vernon. Where: _____

Cause of Death: Gastro-enteritis. If P.M.: No.

Child seemed weak & ill and didn't thrive.

Patient or Propositus: Female. No. in birth order: 2

Name: Sadie. Date of Birth: 14.11.42

Mother's health during pregnancy: Very good.

If alive: Yes. What illnesses: Pneumonia.

In what Hospital: Stobhill.

Date: 7 years ago.

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: Female. No. in birth order: 3

Name: Anne. Date of birth: 21.1.54

Mother's health during pregnancy: Very Good.

If alive: What illnesses:

In what Hospital:

Date:

If dead: Yes. 11/12. Date: 25. 12. 54.

At Home: If seen in Hospital:

In Hospital: R.H.S.C. Where:

Cause of Death: Bronchial Pneumonia. If P.M.: Yes.

Child was very healthy & lively. Trouble first started when put on to bottle at 5½ months. Was taken into R.H.S.C. for observation and caught pneumonia.

FIBROCYSTIC SURVEY

Name of Patient: Joseph C.M.Young. Index Case No.: 65

Address: 4, West Stewart Street, Hamilton.

No. of rooms: _____ No. of occupants: _____

Mother: Elizabeth. Date of birth: 2. 4. 1920.

General Health: Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	3 StepBrothers.				
2	Female.	Yes.			
3	"	"			
4	"		Yes.	?	
5					
6					

Father: Male. Date of birth: 12. 11. 1910.

General Health: Good. Chest Trouble: Nil.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	Yes.			
2	"	"			
3	Female.	"			
4					
5					
6					

Familial relationship of parents: N one.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:			Yes.		Cer. Haemorrhage
Grandfather:			Yes.		Fever.
PATERNAL Grandmother:			Yes.		
Grandfather:			Yes.		Shock.

Cousins: Any similar illness or early deaths? -

Know any other child with similar illness? -

Patient or Propositus: _____ No. in birth order: 1

Name: Colin. Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: _____

At Home: R.H.S.C. If seen in Hospital: _____

In Hospital: Yes. Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 2

Name: Andrew. Date of Birth: 1.3.47

Mother's health during pregnancy: _____

If alive: Yes. What illnesses: Measles, etc.

Quite Healthy.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 3

Name: Joseph. Date of birth: 17.10.54

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Patrick Thomson. Index Case No.: 66

Address: Arrow View, Ardrisheig.

No. of rooms: _____ No. of occupants: _____

Mother: _____ Date of birth: _____

General Health: _____ Chest Trouble: _____

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1					
2					
3					
4					
5					
6					

Father: _____ Date of birth: _____

General Health: _____ Chest Trouble: _____

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1					
2					
3					
4					
5					
6					

Familial relationship of parents: _____

_____

Patient or Propositus: _____ No. in birth order: 1

Name: Patrick. Date of Birth: 7.3.55

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: 15. 3. 55.

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Meconium Ileus. If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: 2

Name: William. Date of birth 8.8.56

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Y es. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: Ruchill. Where: _____

Cause of Death: Pneumonia. If P.M.: Yes.

FIBROCYSTIC SURVEY

Name of Patient: Janet Adam. Index Case No.: 67

Address: Quarter Cottage, Dunipace, DENNY.

No. of rooms: 2 R. & K. (only use one room). No. of occupants: 3.

Mother: Elizabeth. Date of birth: 13. 7. 27.

General Health: Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	2 M.			32, 22.	
2	2 F.			39, 26.	
3					
4					
5					
6					

Father: John. Date of birth: -.10.1926.

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Only child.				
2					
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good.		67	
Grandfather:			Yes. 1955.	69	Blockage in back passage of bowel.
PATERNAL Grandmother:	Yes.	Good.		63	
Grandfather:	Yes.	Good.	9	59.	

Cousins: Any similar illness or early deaths? All healthy.

Know any other child with similar illness? No.

Patient or Propositus: Female. No.in birth order: 1

Name: Janette. Date of birth: 24.11.51

Mother's health during pregnancy: Good but had a fall.

Child was premature by 1 month. 5 lb.6oz.at birth.

If alive: What illnesses:

In what Hospital:

Date:

If dead: Yes. Date: 24. 8. 55.

At Home: If seen in Hospital:

In Hospital: R.H.S.C. Where:

Cause of Death: Pneumonia. If P.M.: Yes.

Was very intelligent child for her age.

Patient or Propositus: Female No. in birth order: 2

Name: Elizabeth. Date of Birth: 18.12.55

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: None.

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Child looked healthy.

Patient or Propositus: No. in birth order:

Name: Date of birth:

Mother's health during pregnancy:

If alive: What illnesses:

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

FIBROCYSTIC SURVEY

Name of Patient: Ann Broadfoot. Index Case No.: 68

Address: 269, Leithland Rd., Glasgow.S.W.3.

No. of rooms: 1 Room. No. of occupants:

Mother: Jane Emery. Date of birth: 18.9.35.

General Health: Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	4 Females.			32.	
2	8 Males.				
3	1		Yes.	1.1/12.	Meningitis.
4					
5					
6					

Father: Alexander. Date of birth: 1. 9. 35.

General Health: Severe asthma. Takes tablets & uses inhaler all the time. Chest Trouble: Asthma.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.	Kidney removed.	13.	
2	Male.	Yes.	Asthma. (Tablets & Inhaler).	15.	
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good. Pleurisy.		54	
Grandfather:	Yes.	F.Good. Cough-x-ray neg.		59	
PATERNAL Grandmother:	Yes.	Good.		No chest trouble.	
Grandfather:	Yes.	Good.		No chest trouble.	

Paternal uncle died of T.B.chest.

Cousins: Any similar illness or early deaths? -

Know any other child with similar illness? -

Patient or Propositus: _____ No.in birth order: 1

Name: Ann. Date of birth: 7.4.55.

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: Rectal Haemorrhage.

In what Hospital: Stobhill for 2 days (at 2 day age).

Date: _____

If dead: Yes. Date: 31. 8. 55.

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Pneumonia.Fibrocystic Disease. If P.M.: yes.

Patient or Propositus: _____ No. in birth order: 2

Name: _____ Date of Birth: _____

Mother's health during pregnancy: ? Miscarried at 2 months.

Health quite good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: ___

Name: _____ Date of birth: _____

Mother's health during pregnancy: Health good. Pregnant. E.D.D.

11.5.55. Attending Souther General. To be adm. at least 2 mnths before delivery. No movement. Foetal heart not heard.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Robert Heining. Index Case No.: 69

Address: 133, Main St., Wishaw.

No. of rooms: 4 Rooms. No. of occupants: 2 adults, 1 Ch.

Mother: Mary. Date of birth: 22.2.23.

General Health: Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.		47	
2	Male.	Yes.		44	
3	"	"		38	
4	"	"		34	
5	"	"		28	
6					

Father: Robert. Date of birth: 20. 10. 24.

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	Yes.		27	
2	Male.	Yes.		24.	
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good.		70.	
Grandfather:			Yes.	70.	Kidney trouble.
PATERNAL Grandmother:	Yes.	Late diabetic.			
Grandfather:	Yes.	Good.			

Cousins: Any similar illness or early deaths? _____

Know any other child with similar illness? _____

Patient or Propositus: _____ No.in birth order: 1

Name: Audrey. Date of birth: 1.2.50.

Mother's health during pregnancy: Fairly good but always sick.

If alive: _____ What illnesses: Chest trouble.

? Asthma ? Pneumonia.

In what Hospital: Aberdeen Sick Childrens.

Date: _____

If dead: Yes. Date: 27. 1. 51.

At Home: _____ If seen in Hospital: _____

In Hospital: Aberdeen S.C. Where: _____

Cause of Death: Lung abcess with early bronchiectasis. Pancreas not examined. If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: 2

Name: William. Date of Birth: _____

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Very healthy.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: Twin. No. in birth order: 3

Name: Robert. Date of birth: 5.9.55.

Mother's health during pregnancy: Very sick.

If alive: _____ What illnesses: Operation R.H.S.C.

In what Hospital: _____

Date: _____

If dead: Yes. Date: 6.9.55

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Fibrocystic Disease. If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: Twin. 3.

Name: David. Date of Birth: 5.9.55

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

Operation.

_____

In what Hospital: _____

_____

Date: _____

If dead: Yes. Date: 23. 9. 55.

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: Fibrocystic Disease. If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: ___

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Catherine Abraham. Index Case No.: 71.

Address: 17, Wellbree, Fairhill Rd., Hamilton.

No. of rooms: 4 Apts. No. of occupants: 2 adults, 3 Ch.

Mother: Margaret Welby. Date of birth: 6. 3. 23.

General Health: Good. Chest Trouble: No occasional cough in winter - X-ray-Neg.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	Yes.		31.	
2	"	"		27.	
3	Female.	"		31.	
4	"	"		29.	
5	"	"		40.	
6	"	"		38.	

Father: John. Date of birth: 17. 1. 21.

General Health: Good. Chest Trouble: Nil.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	Yes.			
2	"	"			
3	Female.	"			
4	"	"			
5	"	"			
6	"	"			

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good.		71.	
Grandfather:			Yes.	63.	Asthma. Died Hairmyres. 10 yrs. ago.
PATERNAL Grandmother:	Yes.	Good.	No chest trouble.		
Grandfather:	Yes.	Good.	"	"	"

Cousins: Any similar illness or early deaths? _____

Know any other child with similar illness? _____

Patient or Propositus: _____ No. in birth order: 1

Name: Ann. Date of birth: 12.1.50.

Mother's health during pregnancy: _____

If alive: Yes. What illnesses: Measles. Whooping Cough. 1) Impetigo. 2) Tonsillectomy.

In what Hospital: 1) Mother Ch. Hosp. 2) Hairmyres. Slight cough at times.

Date: 1) 1953. 2) 1955.

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 2.

Name: Maureen. Date of Birth: 24.3.51.

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Measles. Whooping Cough. 1) Impetigo. Cough & Cold at this time. 2) Tonsillectomy.

In what Hospital: 1) Motherwell. 2) Hairmyres.

Date: 1) 1953. 2) 1955.

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 3.

Name: John. Date of birth: _____

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Bronchitis. Coughs at night. To have X-ray later on. Had cough last year.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 4

Name: CATHERINE Date of Birth: 11.6.55

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: Developed cough at 6 weeks. Stools-bulky-fatty-foul smelling. Not gaining weight satisfactorily.

In what Hospital: R.H.S.C.

Date: 3 months old.

If dead: Yes. Date: Oct.1955.

At Home: _____ If seen in Hospital: _____

In Hospital: R.H.S.C. Where: _____

Cause of Death: _____ If P.M.: -

Patient or Propositus: _____ No. in birth order: ___

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Ann McKinnon. Index Case No.: 72

Address: c/o Reid, 53, Craigmuir Rd., Ferguslie Pk., Paisley.

No. of rooms: 1 Room. No. of occupants: 2 adults.

Mother: Kathleen. Date of birth:

General Health: F. Good. Chest Trouble: Bronchitis in Winter.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	Yes.			
2	"	"			
3	"	"			
4	Female.	"			
5					
6					

Father: John. Date of birth: 31. 7. 33.

General Health: Good. Chest Trouble: -

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.			Robroyston. Mild T.B.- cured.
2					
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:			Yes.		?
Grandfather:			Yes.		?
PATERNAL Grandmother:	Yes.				
Grandfather:			Yes.	36.	Pneumonia.

Cousins: Any similar illness or early deaths? -

Know any other child with similar illness? -

Patient or Propositus: _____ No.in birth order: 1

Name: Ann. Date of birth: 13.5.55

Mother's health during pregnancy: _____

If alive: _____ What illnesses: Gastro-enteritis.

In what Hospital: Hawkhead.

Date: _____

If dead: Yes. Date: 16. 11. 55.

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: Bronchopneumonia. If P.M.: Yes.

FIBROCYSTIC SURVEY

Name of Patient: Alan Preston. Index Case No.: 75

Address: 51, Lothian Rd., Stewarton.

No. of rooms: 4. No. of occupants: 5.

Mother: Margaret. Date of birth: 1. 9. 16.

General Health: Good. Chest Trouble: Nil.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1					
2					
3	10 Brothers & Sisters. All alive & well.				
4					
5					
6					

Father: Date of birth: 5. 7. 1908.

General Health: Good. Chest Trouble: Nil.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1					
2					
3	15 Brothers & Sisters. All alive & Well.				
4					
5					
6					

Familial relationship of parents: Nil.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.			76	
Grandfather:			Yes.	62.	Cerebral Haem.
PATERNAL Grandmother:			Yes.		
Grandfather:			Yes.		

Cousins: Any similar illness or early deaths? All well.

Know any other child with similar illness? No.

Patient or Propositus: _____ No.in birth order: 1

Name: James. Date of birth: 8.4.41.

Mother's health during pregnancy: _____

_____

If alive: Yes. What illnesses: Nil.

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

_____

Patient or Propositus: _____ No. in birth order: 2

Name: Eileen. Date of Birth: 15.8.42

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Nil.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 3

Name: Allan. Date of birth: 28.10.53

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: Yes. Where: Seafield Hospital, Ayr.

Cause of Death: Fibrocystic. Pneumonia If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: 4

Name: Mary. Date of Birth: 29.3.56

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Nil.

Thriving.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: ____

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Jane Pirrie. Index Case No.: 76.

Address: 15, Corsehill Rowe, Springside, Kilmarnock.

No. of rooms: 2. (Condemned property only 1 room in ~~use due to damp~~) No. of occupants: 4.

Mother: Margaret. Date of birth: 1920.

General Health: Fairly Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	1 Ml.	Yes.			
2	1 Half-sister.	A. & W.			
3	4 Half-Brothers.	A. & W.			
4					
5					
6					

Father: Crawford. Date of birth: 29. 11. 23.

General Health: Good; Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	2 M.	Yes.			
2					
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good.		70.	
Grandfather:			Yes. 1926.	Young.	Heart.
PATERNAL Grandmother:	Yes.	Good.			
Grandfather:			Yes.	59.	Bronchial chest.

Cousins: Any similar illness or early deaths? _____

Know any other child with similar illness? _____

Husband had 5 cousins in one family all died in infancy. Didn't know cause.

Patient or Propositus: Male. No.in birth order: 1

Name: Donald. Date of birth: 15.12.46

Mother's health during pregnancy: Very good.

If alive: Yes. What illnesses: Bronchitis.

Scarlet Fever.

In what Hospital: O.P. Sun-ray treatment at Kilmarnock Infirmary for bronchitis.

Date: 1947.

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ Female. No. in birth order: _____

Name: _____ Annie. _____ Date of Birth: Jan[illegible]

Mother's health during pregnancy: _____ Very Good. _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: August, 1948.

At Home: _____ If seen in Hospital: _____

In Hospital: Yes. Where: Seafield.

Cause of Death: Fibro-cystic. If P.M.: _____

Patient or Propositus: _____ No. in birth order: _____

Name: _____ John. _____ Date of birth: Sep.5

Mother's health during pregnancy: _____ Good. _____

If alive: Y es. What illnesses: Whooping Cough.

Pneumonia.

In what Hospital: Irvine Central.

Date: 1951.

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 4

Name: Jane. Date of Birth: 17.8.53

Mother's health during pregnancy: Not good. Poultice back due to pain.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: 15.6.54.

At Home: _____ If seen in Hospital: _____

In Hospital: Yes. Where: Seafield.

Cause of Death: Fibro-cystic. If P.M.: Yes.

5th Baby expected in July.

Patient or Propositus: _____ No. in birth order: ___

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Elizabeth McConnachie. Index Case No.: 77.

Address: 36, Cowlairs Rd., Glasgow.

No. of rooms: 1. No. of occupants: 2.

Mother: Jean. Date of birth: 29. 11. 1932.

General Health: Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	2 Male.	Yes.			
2	2 Female.	Yes.			
3	Thinks there were other 3 who died at birth.				
4	Mrs. McConnachie is the youngest daughter.				
5	The two brothers are younger than her.				
6					

Father: Robert. Date of birth: 8. 5. 27.

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	3 M.	Yes.			
2	3 F.	Yes.			
3	1 F.		Yes.	Didn't know.	Didn't know.
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good.			
Grandfather:	Yes.	Good.			
PATERNAL Grandmother:	Yes.	Good.			
Grandfather:	Yes.	Good.			

Cousins: Any similar illness or early deaths? None with bronchitis etc.

Know any other child with similar illness? No.

Patient or Propositus: _____ No. in birth order: 1

Name: Elizabeth. Date of birth: 6.10.54

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: 1. 3. 55.

At Home: _____ If seen in Hospital: _____

In Hospital: Ruchill. Where: _____

Cause of Death: _____ If P.M.: Yes.

Another baby expected very soon.

FIBROCYSTIC SURVEY

Name of Patient: Elizabeth Allison. Index Case No.: 78

Address:

No. of rooms: 2. No. of occupants: 3.

Mother: Date of birth: 11. 7. 1909.

General Health: Good. Chest Trouble: Nil.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1		Yes.			
2		Bronchitis.			
3					
4					
5					
6					

Father: Date of birth:

General Health: Good. Chest Trouble: Nil.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1		Yes.			
2					
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:					
Grandfather:					
PATERNAL Grandmother:					
Grandfather:					

Cousins: Any similar illness or early deaths? No.

Know any other child with similar illness? No.

Patient or Propositus: _____ No.in birth order: 1.

Name: Elizabeth. Date of birth: 13.5.39

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: Yes. Where: Ruchill.

Cause of Death: Fibrocystic Disease. If P.M.: Yes.

Bronchiectasis.

FIBROCYSTIC SURVEY

Name of Patient: Edward Brown. Index Case No.: 85

Address: 6, Grace St., Glasgow. C. 3.

No. of rooms: 1 Room & Kitchen. No. of occupants: 2 Adults, 4 Ch.

Mother: Amelia Paton. Date of birth: 13. 4. 1923.

General Health: Good. Chest Trouble: No. Xray - Neg.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.		30.	Being treated at Law - T.B.Chest.
2	"	Yes.			
3	Male.	Yes.			
4	"	"			
5	"	"			
6					

Father: Archibald. Date of birth: 7. 4. 1920.

General Health: Good. Chest Trouble: Smokers cough. Duodenal ulcer.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.			Severe Asthma. X-ray - Neg.
2	"	"			
3	Male.	"			
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good.			Very bad cough.
Grandfather:	Yes.	Good.			
PATERNAL Grandmother:			Yes.		Cancer.
Grandfather:	Yes.	Good.			

Cousins: Any similar illness or early deaths? -

Know any other child with similar illness? -

Patient or Propositus: _____ No. in birth order: ___

Name: Rebecca (Mrs. Browns daughter of prev. marriage) Date of birth: 19.1.42.

Mother's health during pregnancy: Good.

If alive: Yes.

What illnesses: Pneumonia at 7 yrs. Abscess in lung. 1955-Pneumonia X-ray - Neg.

In what Hospital: 1) Mearnskirk. 2) Robroyston.

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 2.

Name: Amy. Date of Birth: 11.44.

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: 3 weeks old.

At Home: _____ If seen in Hospital: _____

In Hospital: Yes. Where: Duke St.,

Cause of Death: Pneumonia. If P.M.: Yes.

Stools Green ++ Cough ++

Miscarriage at 8 weeks.

Patient or Propositus: _____ No. in birth order: 3

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 4

Name: Archibald. Date of Birth: 19.2.46

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: 2½ months old.

At Home: _____ If seen in Hospital: _____

In Hospital: Yes. Where: Lightburn.

Cause of Death: Pneumonia. If P.M.: Yes.
Gastro-enteritis.

Patient or Propositus: _____ No. in birth order: 5

Name: James. Date of birth: 24.9.48

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Dysentery-epidemic in Street. Summer of 1954.
1955- Pneumonia.

In what Hospital: 1) Ruchill.
2) Ruchill.

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 6

Name: Hugh. Date of Birth: 6.2.53

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: Dysentery. Summer 1954.
This child is healthy and does not have coughs.

In what Hospital: Ruchill.

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 7

Name: Marjory. Date of birth: 3.8.54

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: 1954. Enteritis.
1955. Fibrocystic Dis. of pancreas.

In what Hospital: Yorkhill.
Yorkhill.

Date: _____

If dead: Yes. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: Yes. Where: R.H.S.C on 20. 2. 5[illegible].

Cause of Death: _____ If P.M.: No.

Patient or Propositus: _____ No. in birth order: 8

Name: Edward. Date of Birth: 16.12.5[illegible]

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: 6. 2. 1956.

At Home: _____ If seen in Hospital: _____

In Hospital: Yes. Where: R.H.S.C.

Cause of Death: Fibrocystic disease. If P.M.: Yes.
Pneumonia.

Patient or Propositus: _____ No. in birth order: _____

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Sheila Wilson. Index Case No.: 94.

Address: _____

No. of rooms: _____ No. of occupants: _____

Mother: _____ Date of birth: _____

General Health: _____ Chest Trouble: _____

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1					
2					
3					
4					
5					
6					

Father: _____ Date of birth: _____

General Health: _____ Chest Trouble: _____

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1					
2					
3					
4					
5					
6					

Familial relationship of parents: _____

_____

Patient or Propositus: _____ No. in birth order: 1

Name: David. Date of Birth: 12.4.53.

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: 21.9.53.

At Home: Yes. If seen in Hospital: Seafield.

In Hospital: _____ Where: _____

Cause of Death: Fibrocystic disease. If P.M.: No.
Bronchopneumonia.
This case was proved clinically.

Patient or Propositus: _____ No. in birth order: 2.

Name: Shiela. Date of birth: 1.7.55.

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: 18. 5. 56.

At Home: _____ If seen in Hospital: _____

In Hospital: Yes. Where: Seafield, Ayr.

Cause of Death: Fibrocystic. If P.M.: Yes.

APPENDIX V

Family history of 6 fatal cases of coeliac disease.

FIBROCYSTIC SURVEY

Name of Patient: Eileen Preston. Index Case No.: C.1.

Address: 12, Arnprior Quad., Castlemilk.

No. of rooms: 3 apts. No. of occupants: 2 adults, 2 ch.

Mother: Sarah. Date of birth: 20. 1. 1911.

General Health: Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Male.	Yes.			
2	Female.	"			
3	"	"			
4					
5					
6					

Father: Charles. Date of birth: 10. 8. 1909.

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.			
2	"	Yes.			
3	Male.		Yes.	52 yrs.	Pneumonia.
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good.			
Grandfather:			Yes.		1914. War. Casualty.
PATERNAL Grandmother:	Yes.				
Grandfather:			Yes.	74.	Natural causes

Cousins: Any similar illness or early deaths? -

Know any other child with similar illness? -

Patient or Propositus: _____ No.in birth order: 1

Name: Kathleen. Date of birth: 24.1.40

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: Premature. 1 month. If P.M.: _____

Died 3 weeks old. Cause - Chill.

Patient or Propositus: Male. No. in birth order: 2.

Name: Charles. Date of Birth: 23.7.43

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: Measles. Chickenpox.
No chest trouble. Very healthy.

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: No. in birth order: 4

Name: David. Date of birth: 11.4.49

Mother's health during pregnancy:

If alive: What illnesses:
Measles. Chickenpox. No coughs.
Quite healthy.

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: _____ No. in birth order: 3

Name: Eileen. Date of Birth: 15.11.46

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: Diarrhoea.

In what Hospital: Prestwick Home.

Convalescent.

Date: _____

If dead: Yes. Date: 29. 5. 49.

At Home: _____ If seen in Hospital: _____

In Hospital: Y s. Where: R.H.S.C.

Cause of Death: Pneumonia. If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: ____

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Mary Lavelle. Index Case No.: C.2.

Address: 38, Closeburn Street.

No. of rooms: 3 apartment. No. of occupants: 4.

Mother: Kathleen. Date of birth: 4.0.24.

General Health: Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	2 F.	Yes.	(Mrs. Lavelle is the 2nd youngest		
2	2 M.	Yes.			
3					
4					
5					
6					

Father: Thomas. Date of birth: 19. 2. 02.

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	5 M.	Yes.	(Mr. Lavelle is the oldest).		
2	3 F.	Yes.			
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:			Yes. 1948.	56.	Ca. of stomach.
Grandfather:	Yes.	Good.			
PATERNAL Grandmother:			Yes.		
Grandfather:			Yes.		

Cousins: Any similar illness or early deaths? None with bronchitis etc.

Know any other child with similar illness? No.

Patient or Propositus: Female. No. in birth order: L.

Name: Mary. Date of birth 28.10.49

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: 2. 4. 50.

At Home: _____ If seen in Hospital: _____

In Hospital: Yes. Where: Knightswood. R.H.S.C.

Cause of Death: _____ If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: 2

Name: Sadie. Date of Birth: 31.1.52

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 3

Name: Thomas. Date of birth 23.2.54.

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Georgina Burrows. Index Case No.: C.3.

Address: 41, Meadowside, Queenzieburn, Nr.Kilsyth.

No. of rooms: 5 apt. No. of occupants: 9.

Mother: Sarah. Date of birth: 19. 3. 11.

General Health: Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	4 M.	Yes.			
2	3F.	Yes.			
3	2 F.		Yes.	1 baby, other 2 yrs.	
4	2 M.		Yes.	5 & 10.	Tubes in neck narrow?. Poison.
5					
6					

Father: Andrew. Date of birth: -. 6. 1900.

General Health: Quite Good. Stomach Trouble. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	2 M.	Yes.			
2	1 F.	Yes.			
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good.		63.	
Grandfather:	Yes.	Good.			
PATERNAL Grandmother:			Yes.	70's.	
Grandfather:			Yes. 1951.	82.	Something to do with bowel.

Cousins: Any similar illness or early deaths? Don't know.

Know any other child with similar illness? No.

Patient or Propositus: _____ No. in birth order: 1

Name: Robert. Date of birth: 1 .10.41

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: Male. No. in birth order: 2.

Name: Alan. Date of Birth: 26.10.42

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses:

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: Male. No. in birth order: 3.

Name: Gordon. Date of birth: 28.11.43

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses:

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: Female No. in birth order: 4

Name: Violet. Date of Birth: 2.5.46.

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses:

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: Female. No. in birth order: 5.

Name: June. Date of birth: 30.6.47

Mother's health during pregnancy: Good.

If alive: What illnesses:

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: Male. No. in birth order: 6

Name: Andrew. Date of Birth: 17.3.49

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses:

In what Hospital:

Date:

If dead: Date:

At Home: If seen in Hospital:

In Hospital: Where:

Cause of Death: If P.M.:

Patient or Propositus: No. in birth order: 7

Name: Georgina. Date of birth: 7.4.50.

Mother's health during pregnancy: Good.

If alive: What illnesses:

In what Hospital:

Date:

If dead: Yes. Date:

At Home: If seen in Hospital:

In Hospital: Yes. Where: R.H.S.C.

Cause of Death: If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: 8

Name: Margaret. Date of Birth: 3.8.51.

Mother's health during pregnancy: Good.

If alive: Yes. What illnesses: None.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: _____

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Moira Gallacher. Index Case No.: C.4.

Address: 73, Middleton St., Alexandria.

No. of rooms: 2. No. of occupants: 2.

Mother: Jessie. Date of birth: 1.2.15.

General Health: V.Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	1 F.	Yes.			
2					
3					
4					
5					
6					

Father: Alexander. Date of birth: 17.12.12.

General Health: Good. Chest Trouble: None.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	1 M.	Yes.			
2					
3					
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
					Oper. for
MATERNAL Grandmother:			Yes. 1939.	52.	Gall Bladder.
Grandfather:			1949.	62.	Thrombosis.
PATERNAL Grandmother:			Yes. 1953.	Over 70.	Heart Failure.
Grandfather:			Yes. 1953.	do.	do.

Cousins: Any similar illness or early deaths? -

Know any other child with similar illness? -

Patient or Propositus: F. No. in birth order: 1.

Name: Moira. Date of birth: 8.8.50

Mother's health during pregnancy: V. Good.

If alive: What illnesses:

In what Hospital:

Date:

If dead: Yes. Date:

At Home: If seen in Hospital:

In Hospital: Yes. Where: R.H.S.C.

Cause of Death: Chest. If P.M.: Yes.

FIBROCYSTIC SURVEY

Name of Patient: Ian Murray. Index Case No.: C.5

Address: 91, Westcliffe, Dumbarton.

No. of rooms: 3. No. of occupants: 3.

Mother: Margaret. Date of birth: 24.3.13.

General Health: Good. Chest Trouble: No.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	2 F.	Yes.			
2	1 M.		Yes 1938.	21.	Pneumonia.
3					
4					
5					
6					

Father: Andrew. Date of birth: 17.11.08.

General Health: Very Good. Chest Trouble: None. Bronchial catarrh when child. Pneumonai wher 37.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	1 F.	Yes.	14.12.05.		
2					
3					
4					
5					
6					

Familial relationship of parents: No.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Good.		67	
Grandfather:	Yes.	Athritis.		67.	
PATERNAL Grandmother:			Yes. 1908.		Died in childbirth.
Grandfather:			Yes. 1921.	50.	Cardiac heart.

Cousins: Any similar illness or early deaths? 1 died in 'flue epid. years ago.

Know any other child with similar illness? -

Patient or Propositus: _____ No. in birth order: 1

Name: _____ Date of birth: _____

Mother's health during pregnancy: Fine.

_____

If alive: _____ What illnesses: _____

_____

_____

In what Hospital: _____

_____

Date: _____

If dead: 3/12 miscarriage. Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

_____

Patient or Propositus: _____ No. in birth order: 2

Name: Andrew. Date of Birth: 2.9.44

Mother's health during pregnancy: Fine.

If alive: Yes. What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: Premature. No. in birth order: 3

Name: _____ Date of birth: 6.2.47.

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Lived 2 days. Date: _____

At Home: Yes. If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 4

Name: Ian. Date of Birth: 28.5.49

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: Yes. Date: 6.8.51.

At Home: _____ If seen in Hospital: _____

In Hospital: Yes. Where: R.H.S.C.

Cause of Death: Coeliac. If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: ____

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

FIBROCYSTIC SURVEY

Name of Patient: Anne Best. Index Case No.: C.6.

Address: 2, Whitelees Rd., Greenock.

No. of rooms: 3 apts. No. of occupants: 2 adults, 4 ch.

Mother: Sarah. Date of birth: 21.2.1925.

General Health: Good. Chest Trouble: None.

Mother's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.			
2	"	"			
3	Male.	"			
4	"	"			
5	"	"			
6					

Father: James. Date of birth: 19.9.24.

General Health: Good. Chest Trouble: No.

Father's sibs:	Sex	Alive & Well	Dead	Age	Cause
1	Female.	Yes.			
2	Male.	Yes.			
3	"	"			
4					
5					
6					

Familial relationship of parents: None.

Grandparents:	Alive	Health	Dead	Age	Cause
MATERNAL Grandmother:	Yes.	Yes.			
Grandfather:			Yes.		Cardiac.
PATERNAL Grandmother:	Yes.				
Grandfather:	Yes.				No chest trouble.

Cousins: Any similar illness or early deaths? -

Know any other child with similar illness? -

Patient or Propositus: _____ No.in birth order: 1

Name: Ann. Date of birth: 17.8.47

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: Measles. Chickenpox. R.H.S.C. at 5 yrs. treated coeliac disease. Greenock eye Inf.- Cataract. 1955-operated.

In what Hospital: _____

Date: _____

If dead: Yes. Date: 26.7.55.

At Home: _____ If seen in Hospital: _____

In Hospital: Yes. Where: R.H.S.C. Gateside.

Cause of Death: Pneumonia. If P.M.: Yes.

Patient or Propositus: _____ No. in birth order: 2.

Name: James. Date of Birth 5.5.48

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: 2 months premature.

In what Hospital: _____

Date: _____

If dead: Yes. Date: 7.5.48.

At Home: _____ If seen in Hospital: _____

In Hospital: Yes. Where: Ruchill.

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 3

Name: Matthew. Date of birth: 2.7.49.

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: Measles. Purpura.

In what Hospital: R. Infirmary, Greenock.

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 4

Name: Elizabeth. Date of Birth: 12.11.50

Mother's health during pregnancy: _____

_____

If alive: _____ What illnesses: Measles.No chest trouble.

_____

In what Hospital: _____

_____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

_____

Patient or Propositus: _____ No. in birth order: 5

Name: Mary. Date of birth: 10.7.52.

Mother's health during pregnancy: Good.

_____

If alive: _____ What illnesses: Measles.No chest trouble.

_____

In what Hospital: _____

_____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: 6

Name: James. Date of Birth: 5.7.55

Mother's health during pregnancy: Good.

If alive: _____ What illnesses: Nil.

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____

Patient or Propositus: _____ No. in birth order: ____

Name: _____ Date of birth: _____

Mother's health during pregnancy: _____

If alive: _____ What illnesses: _____

In what Hospital: _____

Date: _____

If dead: _____ Date: _____

At Home: _____ If seen in Hospital: _____

In Hospital: _____ Where: _____

Cause of Death: _____ If P.M.: _____