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INTRODUCTION

FLUID INTAKE IN CARDIAC OEDEMA

with reference to

A Factor in Aetiology

THESIS for the Degree of DOCTOR OF MEDICINE
of the University of Edinburgh

by

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I N T R O D U C T I O N

The origin of this work was a desire to ascertain how far it is necessary to limit fluid-intake in cases of Cardiac Oedema, and this problem largely resolved itself into studying the behaviour of salt and water in the body. With this in view it is important to note the following points :-

Among the many important functions of Sodium Chloride the undermentioned are those most pertinent to the present subject.

- (a) It helps to maintain the osmotic pressure of the blood and accounts for two-thirds⁽¹⁾ of this pressure.
- (b) It plays a part in maintaining the acid-base balance.
- (c) It is especially important in relation to the distribution and equilibrium of water in the body.

In addition to these points it is known that even if abnormal amounts of Sodium Chloride are ingested the surplus Chloride soon leaves the circulation and the blood Chloride level is not materially altered. In the absence of vomiting or diarrhoea there are two routes by which this superfluous salt can escape: (1) The kidney removes a certain amount, but as this organ even

when normal is unable to excrete urine containing more than⁽²⁾ 2%, it follows (2) that the remainder must immediately pass to the tissues, later returning gradually to the blood to be excreted.

Along these lines Baird⁽³⁾ and Haldane were able to produce oedema in normal people by giving 35 - 40 grammes of Sodium Chloride.

Further, it is known that the level of Blood Chloride is not quite constant and can be influenced by other constituents of the blood such as urea and sugar, which also help to maintain a normal osmotic pressure, and there is a play and interchange among such substances, so that osmotic pressure may be kept as constant as possible. This is apparently of more importance to the organism than the actual quantitative composition of the blood. In this connection⁽⁴⁾ Hamburger injected a horse with several litres of Sodium Chloride of such strength as would have been expected to double the osmotic pressure, yet in a very short time the osmotic pressure was normal again, though the various constituents of the blood remained abnormal for a considerably longer period. Thus a fluid which might have grossly disturbed osmotic pressure failed to do so and passed to the tissues or was removed by the kidney.

Of water it need only be said that the organism is not capable of retaining it without at the same time retaining salts, and therefore water if given alone and without salt must soon be excreted, unless there is some factor at work in the tissues of the body such as colloidal attraction of water. (M. Fischer)⁽⁵⁾ Such a condition would cause a deficient renal excretion even though the renal tissue itself were normal.

It is apparent that the problem of fluid intake in Cardiac Oedema cannot be separated from the question of the origin of Oedema, and this in turn depends upon the mechanism of fluid exchange in the tissues.

The current theory of normal fluid exchange, based on the work of Starling,⁽⁶⁾ Govaerts,⁽⁷⁾ and Slade & Clausen,⁽⁸⁾ assumes that fluid leaves the circulation and passes to the tissues via the arterial capillaries, returning via the venous capillaries, and this flow and return is said to be balanced and directed by :-

A. (Oncotic pressure + Osmotic pressure) versus

B. (Hydrostatic pressure).

Further, the colloids hold a key position, for they are said to be incapable of passing through undamaged vessels and therefore are most important in keeping fluid in the circulation.

Thus it is easily seen that if A. is higher than B. fluid will remain in circulation, and if B. is higher than A. fluid will pass to the tissues.

To complete this introductory review of fluid intake it is now necessary to look at the modern theories of Cardiac Oedema. The one holding most acceptance at present finds expression in the work of Krogh⁽⁹⁾ and others, and is based on the above conception of fluid exchange in the tissues. It asserts that Oedema results solely from one of two causes:

(a) Either the colloidal (oncotic) osmotic pressure is lower than normal, or

(b) The capillary pressure is higher.

Though of undoubted value it does not entirely explain the circumstances and may be criticised on the following points :-

(1) Kylin⁽¹⁰⁾ and others have shown that in many cases of Cardiac Oedema oncotic pressure is not below normal limits.

(2) At present methods of measuring capillary pressure are not entirely reliable.

(i) The method of Von Kries has been criticised by Hill who states that the pressure must be too high because it measures

It occurs (a) the skin resistance,
can exist with (b) the pressure of other vessels in the
part,
remains low
(c) causes obstruction in the circula-
tion.

(ii) The method of Hill and McQueen⁽¹¹⁾ also measures
skin resistance and arterial pressure and
therefore is also unreliable.

(iii) Great accuracy has been claimed for the method
of Carrier and Rehberg, i.e., direct mea-
surement by introducing a fine glass tube
into a capillary loop. Obviously it is a
difficult and delicate procedure to pierce
a capillary loop in such a way as not to
introduce the factor of trauma, and for
this reason results may not be wholly
reliable.

However, we can by indirect methods form some
opinion as to the value of capillary pressure in
Cardiac Oedema. Oedema is of course a symptom of
cardiac insufficiency, and Starling,⁽¹²⁾ who was able
to produce artificial heart failure, found that while
pressure in the large veins is increased, that in the
venules and capillaries is actually below normal.

In addition, cases of Cardiac Oedema⁽¹³⁾ are
reported in which venous pressure is not raised above
normal.

It seems unlikely that a high capillary pressure can exist while the pressure of the veins and venules remains low.

(3) Cases of high venous pressure without Oedema are reported. (14)

(4) As will be seen from later figures, venous pressure in cases of Cardiac Oedema is seldom excessively raised, though it is usually above normal.

(5) Oedema can be produced in normal individuals by the device of raising venous and capillary pressure.

Method. Pressure is applied to the veins of the arm by means of the armlet of a sphygmomanometer, in which the pressure is gradually raised until Oedema occurs. An accurate signal of the moment of occurrence of Oedema is claimed to be obtained by the following arrangement: The lower part of the arm is enclosed in a platismograph which is connected to a water manometer. As the pressure in the armlet is raised the pressure in the platismograph is also seen to rise steadily, and eventually a point is reached where the pressure in the platismograph suddenly shoots up rapidly. This is taken to be the point where Oedema begins to form. A similar method has been used by others, but I have been unable to trace the literature. It was found that the pressure in

the armlet required to produce Oedema was usually about 50 - 60 mm. Hg. and was seldom as low as 40 mm. Hg.

The following table shows a few of the results, which are typical of a series of cases.

Case No.	Time taken to produce Oedema	Pressure on Armlet at moment of Oedema	Type of Case	Blood Pressure
9	10 mins.	60 mm. Hg.	No Oedema	110/230
24	15 mins.	60 mm. Hg.	No Oedema	190/100
19	10 mins.	55 mm. Hg.	No Oedema	196/100
4	10 mins.	80 mm. Hg.	Oedema	105/60
15	10 mins.	100 mm. Hg.	Oedema	220/125
10	7 mins.	60 mm. Hg.	Oedema	170/118

A pressure of 50 or 60 in the armlet probably means that the capillary pressure approximates to this, which is very high even for cases of Oedema. It is noticeable that it requires a higher pressure in the armlet to produce Artificial Oedema where true Oedema already exists. This is not what would be expected if the capillary pressure were already raised, as it is said to be in Cardiac Oedema. In such circumstances one would expect that a much lower pressure would be required, but clearly other

factors may exist, such as pressure of the Oedema itself.

CONCLUSIONS.

(i) This would suggest that capillary pressure may not be higher in Cardiac Oedema, but these figures are by no means conclusive.

(ii) It seems that to produce Oedema by raising capillary pressure alone a pressure of about 50 - 60 mm. Hg. is required, which is much higher than is likely to exist in conditions of Cardiac Oedema.

(6) As to hydrostatic pressure, it has been proved⁽¹⁵⁾ that venous stasis results in a loss of Chloride and water into the tissues, but there is a relatively greater loss of Chloride than of water, and this in itself suggests that some factor in addition to that of pressure must play a part in so producing Oedema, for hydrostatic pressure alone would cause water and salt to be lost in the same proportion.⁽¹⁶⁾

(B) Martin Fischer's⁽¹⁷⁾ theory assumes an acidosis of the tissues with consequent attraction of fluid. This has been disproved by Schade,⁽¹⁸⁾ who along with

others then suggested that there might be an alkalosis of tissues. This has not been confirmed.

(C) Hülse⁽¹⁹⁾ holds that Oedema is due to disturbance of the salt equilibrium of the tissues in favour of salt retention but no actual proof or confirmation of this has been established.

It will be seen that in all these theories there are weak points, and that none will fully explain all the facts of Cardiac Oedema.

There are other hypotheses based on these more important ones, but for the purpose of this paper it is not necessary to review them more fully.

standard diet.

P L A N

The following plan of treatment was adopted for the cases :-

Stage 1. Patients examined after being under hospital conditions for one week.

" 2. Salt free diet and 160 ozs. of fluid daily for 4 - 5 days.

" 3. 30 grammes of salt + 160 ozs. fluid daily for 3 - 4 days.

" 4. Percentage of cases had: 18 ozs. of fluid + standard hospital diet.

" 5. Percentage of cases: 18 ozs. of fluid + salt free diet.

" 6. Percentage of cases: (a) 18 ozs. of fluid + salt free diet, followed by (b) salt free diet + 160 ozs. of fluid.

" 7. Percentage of cases: Glucose intravenously and by mouth, about 200 grammes in 24 hours.

Cases were allowed a rest of one or two days between each stage of treatment.

When not receiving salt free diet patients had a

standard diet.

The usual procedure was sometimes altered, because it is clear that there may be some difference in results according to the sequence in which the above measures are adopted. It was found however that a rest between the stages assured reliability in the results.

In some instances the patient's condition made it undesirable to give salt, and sometimes treatment had to be discontinued because of an unfavourable reaction. Fluid intake and urine output were carefully measured over a 24 hourly period.

The problem is attacked along two main lines :-

- (1) from the point of view of fluid retention or Oedema by weighing.
- (2) from the point of view of Hydraemia, and it is claimed that evidence of Hydraemia may be obtained from the following blood determinations :-
 - (a) Osmotic pressure of serum.
 - (b) Serum Protein percentage.
 - (c) Haemoglobin percentage.
 - (d) Refractive index of blood serum.
 - (e) Chloride percentage.
 - (f) Viscosity.

Blood urea was examined in a number of cases and the alkali reserve estimated with a view to the question of acidosis. Venous pressure was taken in most cases at different stages.

In a number of cases renal function was examined. Electrocardiograms were taken throughout.

Freezing point, with a Beckman's Thermoconst (cryoscopy).

Each specimen of serum was left exposed to the air for 12 hours so that gaseous interchange could take place. In this way a constant CO_2 level was secured.

The depression of the freezing point of serum gives a direct measurement of the molecular concentration and direct information as to hydration. So far as can be ascertained the method has not been used hitherto for this particular purpose.

Normal depression for serum is given as $.50^{(20)}$ but $.55 - .53$ may be considered the normal limits. Concentration of serum varies directly with depression of the freezing point.

Osmotic Pressure. Forster⁽²¹⁾ has shown that osmotic pressure stands in definite relationship to the percentage of albumin and globulin in the blood.

METHODS

Weight. By carefully adjusted weighing machine at the same time each day, the patient always wearing the same clothing.

Osmotic Pressure of Serum was determined by the indirect method of finding the depression of the freezing point, with a Beckmann's Thermometer (Cryoscopy).

Each specimen of serum was left exposed to the air for 12 hours so that gaseous interchange could take place. In this way a constant CO₂ level was assured.

The depression of the freezing point of serum gives a direct measurement of the molecular concentration and direct information as to Hydraemia. So far as can be ascertained the method has not been used hitherto for this particular purpose.

Normal depression for serum is given as .56⁽²⁰⁾ but .55 - .58 may be considered the normal limits. Concentration of serum varies directly with depression of the freezing point.

Oncotic Pressure. Farkas⁽²¹⁾ has shown that oncotic pressure stands in definite relationship to the percentage of Albumin and Globulin in the blood,

and gives these figures :-

1% of Albumin = 68 mm. water.

1% of Globulin = 25 " "

This method appears to be sufficiently reliable as a basis for estimating oncotic pressure.

Normal colloidal osmotic pressure is given as 300 - 400. (22)

Total Protein, Albumin and Globulin percentages were determined by gravimetric method.

The refractive index of the blood serum was taken in all cases by the Abbe refractometer.

Reiss⁽²⁴⁾ elaborated tables of Protein percentages based on these indices, but Neuhausen⁽²⁵⁾ and Reoch have shown that there is a factor of error in converting the refractive index of serum into Protein percentages. For this reason the indices themselves are shown and are quite sufficient for purposes of comparison.

In Table VII the indices had to be converted to Protein percentages because there is no comparison between the index of serum and that of a transudate.

Haemoglobin Percentage was determined by the Klett colorimeter, using acid Haematin method with Newcomer's⁽²⁶⁾ Standard Plate. A 100% was taken to

be 13.88 grammes per 100 ccs., as given by Haldane⁽²⁷⁾

Blood Urea. (Archer)⁽²⁸⁾

Blood Chloride was determined by the method of Whitehorn.⁽²⁹⁾

Blood Sugar. Determined by method of Folin⁽³⁰⁾ and Wu.

Alkali Reserve by direct method of Van Slyke and Cullen.⁽³¹⁾

Normal reading = 38 - 70.

Blood Viscosity was ascertained by the Hess viscosimeter.

Normal reading = 4 - 6.

Venous Pressure was measured directly from the basilic vein, with a needle and water manometer measuring inches.

Normal reading is about 4".

Renal Efficiency Tests. These were conducted in a number of cases, and several methods were used.

McLean's Urea method gave variable results.

De Wesselow's salt excretion did not appear reliable in every case.

The Karūnyi-Volhard⁽³²⁾ method is simple and in our opinion reliable. It depends on the ability of the kidney to pass dilute or concentrated urine, and the degree of dilution or concentration is determined on the depression of the freezing point.

The test is conducted as follows :-

Dilution. (a) After emptying the bladder, 1500 ccs. of water are given at 9 a.m. Specimens are taken at 10 a.m. and 11 a.m.

Concentration. (b) From 11 a.m. till 11 a.m. the following day no fluids are allowed and a specimen of urine taken.

A normally dilute urine should give a reading of .3 to .9.

A normally concentrated urine should give a reading of 2.5 to 3.0.

Is there any evidence of diabetes in Table I?

From results in Table I it may be claimed that excessive amounts of salt and water have produced

Diabetes.

The following points lend support to the claim-

ANALYSIS OF RESULTS

Table I.

Excessive Salt and Water Intake.

This Table shows that large quantities of salt and an extra amount of fluid almost invariably cause an increase of weight, and this is the case whether Oedema is present or not. There are one or two cases which are exceptions and these all show a good renal function, and a diuresis after salt.

For the majority of cases however it is quite evident that excessive salt and fluid must be most injurious when Oedema is present, and harmful even to the non-oedematous.

From these points it is clear that salt and fluid intake on the one hand and salt and fluid excretion on the other have an important bearing in determining the onset of Oedema.

Is there any evidence of Hydraemia in Table I?

From Results in Table I it may be claimed that excessive amounts of salt and water have produced Hydraemia.

The following points lend support to the claim :-

- (a) In the majority osmotic pressure is lower. This is most apparent in cases which have been able to take full amounts of salt and water; and it is suggested that if all cases were to take a maximum amount of salt and water the result would be the same in almost every case.
- (b) Refractive indices and Haemoglobin percentage are frequently lower. These need not run parallel to the osmotic pressure as they measure different values.
- (c) Where the fall in osmotic pressure is pronounced the refractive index and Haemoglobin percentage are also lower. This occurs in cases which had the largest amounts of salt and fluid, and of course would be expected if the blood is more dilute.
- (d) Viscosity is on the whole lower. Viscosity depends on the red cell count to some extent and if there is Hydraemia this will diminish. In gross cardiac failure it is known that viscosity is lower.

Alkali Reserve in Table I.

In all cases - one excepted - where marked Oedema followed the administration of salt and water - there is an increase in the alkali reserve.

This may be explained as follows :-

Either (1) Increase of Chloride in the tissues may be followed by a discharge of CO_2 with a resultant swing towards the alkaline side; or (2) Increased Sodium ion may affect the acid-base balance.

Increase of alkali reserve in Oedema runs contrary to the theory of M. Fischer.

Venous Pressure in Table I.

Usually in cases of Oedema the venous pressure is seen to be higher than normal, but is not raised excessively.

Two renal cases with Oedema, one of Nephrosis, and one of Glomerular Nephritis, show a normal venous pressure, as do non-oedematous cases.

A most interesting fact is that when there is marked increase of Oedema, following salt and water administration, venous pressure is not correspondingly raised. This would seem to show that the Oedema produced by salt and fluid is not identical with true cardiac failure, and some factor which causes a raised venous pressure is absent.

Viscosity in Table I.

Viscosity is seen to be higher than normal in cases of Oedema, though in gross failure where Hydraemia probably exists it is lower. It tends to fall after large quantities of salt and fluid, that is, tends to follow osmotic pressure. This, as mentioned before, must depend on a dilution of the blood.

Conclusions from Table I.

- I. Excessive salt and water may cause Oedema in non-oedematous subjects and increase a pre-existing Oedema.
- II. This depends on renal excretion of salt.
- III. Excessive salt and water may produce Hydraemia.
- IV. Alkali reserve tends to be higher after excessive salt and water intake.
- V. In Oedema produced by giving excessive salt and water venous pressure is not raised.

Table II.

Salt Free Diet and Large Quantities of Fluid.

This Table shows that large quantities of fluid in conjunction with a salt free diet do not increase a pre-existing Oedema, and that there may even be a decrease as shown by a loss of weight.

Osmotic pressure tends to be higher, and the refractive index and Haemoglobin percentage follow it. It might be said that the blood becomes thicker. It is clear therefore there is no Hydraemia, no increase of blood volume, no increased cardiac strain, and no impairment of the nutritive quality of the blood.

Why this should occur is not altogether obvious; but it is clear that fluid alone acts as a diuretic. The urine is practically salt free. The body retains such salt as is available, probably endeavouring to maintain osmotic pressure, and for the same reason removes fluid which is not required. This depends on a good renal excretion for water.

Blood urea is lower and is probably flushed through the kidneys by the increased passage of fluid.

Alkali reserve is diminished, as CO_2 is probably washed from tissues.

Blood Chloride is not much altered, which helps to show how the body is utilising all available Chloride to maintain osmotic pressure constant.

Urine Chloride diminishes greatly and sometimes disappears. Urine output is usually considerably increased.

Conclusions from Table II.

- I. On salt free diet plus excessive fluid Oedema diminishes.
- II. The blood tends to become thicker, and therefore cardiac strain will be diminished.
- III. Blood urea is lower, as there is more fluid available to wash it out of the circulation.
- IV. Excessive fluid given with a salt free diet is not injurious to oedematous cases.

Table III.

Standard Diet and Restricted Fluid.

This Table shows effects of restricting fluid on a standard diet. The results do not differ much from those of normal conditions and no inference can be drawn from them.

Table IV.

Salt Free Diet with (a) Excessive Fluid,
(b) Restricted Fluid.

This Table compares excessive fluid intake and restricted fluid intake on a salt free diet.

Weight is on the whole a little higher on excessive fluid, but otherwise there is surprisingly little difference.

Where blood urea is high excessive fluid reduces

the level.

Alkali reserve remains fairly constant.

Conclusion.

It seems scarcely necessary to restrict fluid severely on a salt free diet.

Table V.

Effects of (a) Excessive Salt and Water, and
(b) Salt Free Diet and Excessive Fluid.

This Table shows fluid and salt intake, urine excretion, and weight, on excessive salt and water and excessive water without salt.

It also shows renal tests in some cases, and it is noticeable that the cases which have lost weight on salt or have gained only slightly are those with the best renal function as indicated by dilution and concentration tests.

This suggests the importance of kidney function as a determining factor in Oedema.

Table VI.

This Table shows that after Glucose weight tends to increase, and that there must therefore be some fluid retention in the body.

In the blood determinations there is no evidence of any Hydraemia, in fact the contrary occurs.

Osmotic pressure is higher, and refractive indices and Haemoglobin percentage tend to be higher.

It follows therefore that fluid must be retained in the tissues, for some reason, and when the blood Chloride figures are examined a possible explanation is found.

These figures are lower in the majority of cases, and it may be assumed that Chloride has passed to the tissues taking fluid with it, for it is not found to be increased in urine. This is part of the mechanism for keeping the osmotic pressure constant. In this case Chloride has had to give place to Glucose.

Glucose, if given in sufficient quantity, may produce diuresis, but these cases did not have sufficient to produce this effect.

Table VII.

This Table shows a comparison of blood and transudate.

Transudates show comparatively high figures for Protein.

This shows the permeability of capillaries to colloidal substances under certain conditions.

D I S C U S S I O N

As indicated before the original purpose of this paper was to investigate the simple straightforward problem of whether or not the fluid might be given in cases of Cardiac Oedema. It is claimed that the question can be answered without hesitation on the figures in the Tables.

Large quantities of fluid may be given provided salt is excluded from the diet, and are not in the least detrimental to the condition of the patient. Indeed it may be suggested that they are beneficial, for the following reasons:

(i) Excessive fluid acts as a diuretic, and as such may in some cases produce a diuresis which, having commenced, will continue to such an extent as to diminish the oedematous condition considerably. This form of diuresis has the advantage of being independent of any drug which acts on the kidney, and I do not see how fluid by itself can in any way damage renal tissue.

(ii) In conditions of Cardiac Oedema it is known that renal function falls below normal and therefore there is often retention of metabolic products which should be excreted, and these must of necessity react

unfavourably on the patient's condition. If large quantities of fluid are given it is claimed that such nocuous products are flushed through the kidney, and benefit accrues to the patient on this account.

(iii) There seems to be a thickening of the blood and this would tend to diminish cardiac strain and give a better nutritive quality to the blood.

It is of course obvious that results obtained from giving salt free diet, and at the same time restricting fluid intake, must also be investigated. It cannot be said that any advantage is found in limiting fluid, and of course such beneficial effects as are claimed from large quantities of fluid are lost.

If salt is given with extra fluid the patient's condition deteriorates rapidly, and even if fluid is restricted there is still no benefit. It is clear then that salt is most dangerous in Cardiac Oedema. This of course has long been known, but this evidence led to the conclusion that salt may have some importance as a factor in Cardiac Oedema.

It would of course be impossible to discuss Cardiac Oedema in a paper of this size, or to review the literature fully, and no attempt to do so is made. Reference is made only to such points as are relative to salt and fluid intake in Oedema.

Taking this view, are there any features of Oedema which may receive a more complete explanation by study of salt and fluid intake and excretion?

Dealing first with the question of Oncotic Pressure, if it can be shown in some case that this is normal or not greatly diminished, then it can be said that a low colloid pressure is not an essential to the causation of Cardiac Oedema.

As has been seen, Kylin and others showed that in some cases at least this pressure is normal, and we are not aware that this statement has been disproved. Further, in some of our own cases we found that the oncotic pressure lay between 330 and 370. Of course our method may be criticised in that it is not direct and therefore inaccurate, but no one has shown that the formula of Farkas contains any gross error, and we may reasonably claim some reliability for these figures. If so, it must be admitted that they are suggestive, although it cannot be claimed that they would serve as a proof.

The second question is that of capillary pressure. In Cardiac Oedema this is undoubtedly raised but cannot be a complete explanation of Oedema, for the following reasons, already noted :-

i.e. (i) A low pressure may exist in cases of Oedema,
(ii) A higher pressure may exist in cases without
Oedema, and

(iii) When Oedema is produced artificially it
requires a pressure of 40 - 60 mm. mer-
cury in the veins to produce Oedema.
The pressure in Oedema is not likely to
be so high as this.

(iv) In Oedema produced with salt and water in
normal individuals it cannot be said that
venous pressure is raised and therefore
probably not capillary pressure.

Again, therefore, it may reasonably be claimed that a
raised capillary pressure is not necessary to a con-
dition of Oedema.

Krogh and others emphasised the importance of a
low colloidal pressure in Oedema, for colloids were
said to hold fluid in circulation because they were
impermeable to normal capillaries. But in conditions
of Cardiac Oedema it has been shown () that colloids
are permeable to the capillaries. In fact Eppinger
formulated a theory on these lines. The figures in
Table VI support this view.

If Martin Fischer's theory of colloidal attrac-
tion for fluid were correct, then we might expect that

renal excretion would remain the same whether or not the patient had a salt diet or a salt free diet. But this is not so. This has been recognised by Hulse, who then showed the importance of salt in Cardiac Oedema and formed a theory along those lines.

The question is asked, Is it necessary to assume a disturbance of equilibrium in the tissues in favour of salt retention? Can another explanation be found?

There is one point in connection with Cardiac Oedema which is well known to every clinician, but which has escaped the notice of scientists who have studied Oedema. This is that long before Oedema appears there is a diminution in renal output, which suggests that the efficiency of the kidney is impaired. The question is, Is the efficiency of the kidney impaired more for one product of renal excretion than for another? In other words, Is the kidney function impaired for fluids alone or for solids alone, or for both? On our findings, we suggest that the kidney function for salt is more affected than that for fluid.

Table V makes it quite apparent that the kidney in Cardiac Oedema can still excrete fluid, whereas the ability to excrete salt or salt and fluid is in comparison greatly diminished. It has never been proved

that the kidney has any special function for excreting salt, apart from fluid, but the above would suggest that in Cardiac Oedema at least there is some separation of the two functions. On this evidence it is claimed that the early diminution of urine output in Cardiac disease is due to the inability of the kidney to excrete salt, which in turn necessitates the retention of fluid.

In Table V it is readily seen that the kidney has passed large quantities of water, but salt and water together have presented a difficulty which the kidney has not been able to overcome. From the same Table we see that, whereas some cases have shown a gross and dangerous increase of Oedema on salt and fluid, others have not been affected to the same extent; and further we see that the less the case has been affected, the better is the renal function. Therefore, on the whole, in those cases where excess of salt and water has produced severe Oedema, salt excretion is deficient. The suggestion is that Oedema occurs on salt and water, and not on water without salt; because the kidney is able to excrete water alone, but not salt. This is the first point in our hypothesis of salt being a factor in the etiology of Cardiac Oedema.

Salt is retained in the body. What happens to the retained salt? It is seen from Table I that it does not remain in the blood, since the blood Chloride level remains at a fairly constant level, and there is no case in which salt was lost from the bowel or from the stomach; therefore, as Hamburger found in his experiment, the excess of Chloride has passed the tissues and of course has drawn fluid with it. This causes fluid retention in the tissues.

The question is then asked, Why has the Chloride not remained in the blood? We have quoted physiologists who tell us that the osmotic pressure of the blood is of prime importance to the organism. It is clear that, if the excess of salt remains in circulation it must upset osmotic pressure, and therefore, the avenue of the kidney being blocked, the only route of escape remaining is the tissues. Here we see the factors of salt excretion and osmotic pressure combining to drive salt and fluid to the tissues.

Having noted the importance of osmotic pressure, it seemed that the next step was to attempt to upset the osmotic pressure of the blood in some way and to observe what happened under these conditions. If we gave a substance which was known to have an effect on osmotic pressure, then we might expect an alteration

in one of the following ways :-

- (a) The osmotic pressure itself might change, or
- (b) There might be an alteration in some of the constituents of the blood, or
- (c) Fluid retention might occur.

It is well known that Glucose has an effect on osmotic pressure, and Glucose was therefore given to patients. It was found (as will be seen from Table VII) that after Glucose there was an increase of weight. This occurred much too rapidly to be accounted for by an increase in the fat of the body, and also to a greater extent than would have been expected if fat had been formed from the Glucose given. It may therefore be assumed that fluid was retained in the body. From the blood determinations is there anything which will show how this occurred? In most cases osmotic pressure is higher, and this is what would be expected, but at the same time it is noticeable that the blood Chloride is diminished in almost all cases. There has been no appreciable increase of urine Chloride, and therefore the suggestion is that Chloride has passed from the blood to the tissues, taking fluid with it. That is, one stage of Oedema has been accomplished by factors which were meant to disturb osmotic pressure of the blood.

From the foregoing an attempt is made to make it clear that a diminished salt excretion plus a physiological effort of the body to maintain a constant osmotic pressure is responsible in some measure for Oedema.

Salt is retained, because of insufficient excretion by the kidney, and being unable to remain in the blood passes to the tissues. This causes Oedema. To produce this state in normal cases it is necessary to give an excessive amount of salt, but in cases of Cardiac disease the amount of salt in an ordinary diet is sufficient.

It must be emphasised that there is no suggestion that this is the sole factor in Cardiac Oedema.

- (v) Excess of fluid and salt free diet may start a diarrhea.
- (vi) Study of salt and fluid intake in Oedema suggested the importance of salt as a factor in Cardiac Oedema.
- (vii) Salt excretion is deficient in conditions of Cardiac Oedema but fluid excretion remains good.
- (viii) Salt is therefore retained in circulation which upsets osmotic pressure of blood. Surplus salt therefore driven into tissues and

SUMMARY AND CONCLUSIONS

- (i) Cases were examined with a view to determining the advisability of giving fluid in Cardiac Oedema.
- (ii) It was found that fluid might be given so long as a salt free diet is maintained.
- (iii) Salt free diet is of the utmost importance in Cardiac Oedema.
- (iv) Excessive fluid and salt free diet may help the kidney to remove waste products of metabolism and this is beneficial to patient. There also seems to be a thickening of the blood.
- (v) Excess of fluid and salt free diet may start a diuresis.
- (vi) Study of salt and fluid intake in Oedema suggested the importance of salt as a factor in Cardiac Oedema.
- (vii) Salt excretion is deficient in conditions of Cardiac Oedema but fluid excretion remains good.
- (viii) Salt is therefore retained in circulation which upsets osmotic pressure of blood. Surplus salt therefore driven into tissues and


takes fluid with it.

- (ix) Administration of salt in Oedema is dangerous and if given in sufficient quantities may produce Hydraemia.
- (x) In this type of Hydraemia alkali reserve is raised and there is therefore probably no acidosis.
- (xi) Venous pressure is also not raised and therefore it is probable that neither is capillary pressure.
- (xii) Colloidal osmotic pressure is normal in some cases.
- (xiii) Glucose if given in sufficient quantity causes increase in weight.
- (xiv) This appears to be due to mechanism for keeping osmotic pressure constant and Chloride is driven to tissues taking fluid with it.
- (xv) The suggestion is made that a deficient salt excretion may be one factor in Cardiac Oedema.

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DEFINITION OF DEGREE OF OEDEMA

1. Slight: Swelling of ankles on exertion for a few hours -
dyspnoea on moderate exercise.
2. Present: Pitting of ankles even when resting in bed for
48 hours - dyspnoea on slight exertion.
3. Marked: Gross swelling of legs + hepatic enlargement,
ascites, and orthopnoea.

Case No.	Before Salt and Water										After Salt and Water										Clinical Condition	
	Osmotic Pressure	Venous Pressure	Haemoglobin	Refractometer	Blood Viscosity	Blood Chloride	Blood Urea	Alkali Reserve	Weight	Osmotic Pressure	Venous Pressure	Haemoglobin	Refractometer	Blood Viscosity	Blood Chloride	Blood Urea	Alkali Reserve	Weight	Fluid Intake on day before	Fluid Intake on day of Blood taking	Nature of Disease	Oedema
1	.592	4	70	-	627	-	43.3	8-3	6.548	4.2	68	-	-	620	-	-	9-2½	-	-	Myocarditis	Cardiac Oedema	
2	.550	9	60	-	420	-	38.5	5-3	6.549	7.5	49.3	-	-	415	-	40.1	5-13	-	-	Valvular Rheumatism	Slight Oedema	
3	.585	8	71	-	390	-	32.5	9-10	6.586	4	80	-	-	430	-	59.5	9-12	46	66	High B.P. and Fibrillation	Oedema	
4	.561	5	66	1.3474	585	-	34.5	6-2	6.608	11	70	1.3470	8.8	600	-	43.3	6-10½	80	80	Valvular and Fibrillation	Severe Oedema	
5	.507	8	78	1.3485	560	-	39	7-13½	6.545	7	79	1.3458	7.5	595	-	43.3	8-4½	80	60	Valvular Disease	Slight Oedema	
6	.583	2½	80	1.3450	500	-	67.1	11-9	6.558	2½	79	1.3470	6.4	495	-	52.6	10-8½	122	120	Acromegaly	Oedema	
7	.551	8	82	1.3470	580	-	47.7	14-0	6.592	13	85	1.3469	8.2	570	-	47.7	14-9	80	52	Valvular Fibrillation	Slight Oedema	
8	.563	5½	77	1.3440	500	-	52.6	6-1½	6.587	-	77	1.3470	-	500	-	57.4	6-8½	30	24	Valvular Disease	Slight Oedema	
9	.569	4½	79	-	502	-	57.4	7-12	6.553	-	67	1.3470	7.2	500	-	67.1	8-0	118	136	Angina, H.B.P.	No Oedema	
10	.558	11½	78	1.3499	480	-	71.9	9-1	6.552	-	80	1.3480	7.4	495	-	71.9	9-3	56	39	Valvular Disease, Syphilitic	Marked Oedema	
11	.579	-	88.5	1.3474	415	-	52.6	9-5	6.555	9½	84	1.35	-	420	-	67.2	9-8	42	74	Valvular Disease	Marked Oedema	
12	.530	-	71	1.3500	450	-	71.6	7-9	6.545	8	72	1.3482	-	392	-	52.8	7-9½	64	120	High B.P.	Slight Oedema	
13	.567	-	84	-	400	-	52.8	13-5½	6.563	-	88	1.3470	-	450	-	52.8	13-12	36	36	Valvular Disease	Slight Oedema	
14	.566	10½	86	1.3520	540	46	43	10-1	6.572	8½	85	1.3472	-	420	-	52.8	9-13¼	100	100	High B.P. Myocarditis	No Oedema	
15	.522	-	73.4	1.3475	415	-	22	9-4½	6.533	14	65	1.3452	-	540	57	43.3	9-11	16	9	Valvular Disease, & Fibrillation	Marked Oedema	
16	.562	8	86	1.3495	400	-	57.2	15-0½	6.583	-	90	1.3480	-	480	78	32.8	14-8	104	42	High B.P.	Oedema	
17	.577	2	92	1.3460	390	68	57	11-12	6.588	-	86	1.3458	-	435	90	38.5	12-13	60	55	Nephrosis	Oedema	
18	.596	½	88	1.3442	420	44	48.1	12-1½	6.587	-	82	1.3432	-	465	41.5	38.5	12-8	60	55	Glomerular Nephritis	Oedema	
19	.565	3	91	1.3470	510	44	52.8	10-7	6.564	9	91	1.3478	-	420	37	33.8	10-5½	90	100	High B.P.	No Oedema	
20	.561	11	83	1.3490	420	58	52.8	7-11½	6.569	8	80	1.3482	-	405	49	52.8	8-3	100	100	Fibrillation	Slight Oedema	
21	.576	7	88	1.3462	435	65	57.4	9-7½	6.597	-	89	1.3468	-	510	36	33.8	9-2	86	24	High B.P.	Slight Oedema	
23	.567	-	95	1.3510	395	45	52.8	8-2	6.585	-	88	1.3480	-	405	32	43.3	8-8½	100	100	Valvular Disease	Slight Oedema	
24	.573	-	91	1.3479	459	52	48.1	9-13½	6.590	-	92	1.3450	-	497	51	48.1	10-6½	100	86	High B.P.	No Oedema	
25	.556	-	93	1.3500	510	38	52.8	6-10½	6.564	-	94	1.3452	6	525	37	52.8	7-3½	120	120	High B.P.	No Oedema	
26	.563	-	97	1.3488	520	49	48.1	11-10½	6.574	-	95	1.3480	6.6	525	46	52.8	12-2	120	120	High B.P. and Valvular Disease	Slight Oedema	
41	.559	-	76	1.3498	562	33	48.1	7-12½	6.561	-	68	1.3500	-	585	31	38	7-11½	120	124	Myocarditis Specific	No Oedema	
32	.564	-	81	-	525	51	52.8	10-7½	6.558	-	73	-	-	535	41	43.3	10-13½	120	120	High B.P.	No Oedema	
34	.576	-	81	1.3450	410	60	-	6-1½	6.588	-	73	1.3490	-	430	53	-	6-2½	64	66	Valvular Disease	Severe Oedema	

* 30 grammes salt.
 ϕ 20 grammes salt.

Case No.	Before Salt Free Diet and Fluid										After Salt Free Diet and 8 Pints Fluid										Clinical Condition	
	Osmotic Pressure	Haemoglobin	Refractometer	Blood Viscosity	Blood Chloride	Blood Urea	Alkali Reserve	Venous Pressure	Weight	Osmotic Pressure	Haemoglobin	Refractometer	Blood Viscosity	Blood Chloride	Blood Urea	Alkali Reserve	Venous Pressure	Weight	Fluid Intake M. day before	Fluid Intake M. day of B.	Nature of Disease	Oedema
1	.592	70	-	-	627	-	43.3	4	.616	60%	-	-	610	-	-	-	-	8-8	-	-	Myocarditis ? origin	Present
2	.550	60	-	-	420	-	38.5	9	.552	65%	-	-	400	-	-	33.2	-	5-4	-	-	Valvular - Rheumatic	Slight
3	.585	71	-	8	390	-	32.5	8	.590	73%	-	8.4	486	10	-	47.7	10	9-12	32	36	Fibrillation, High B.P.	Present
4	.561	66	1.3477	7.2	585	-	34.5	5	.623	72.2	1.3475	7.8	480	4½	-	46.9	4½	6-1	126	120	Fibrillation, Valvular	Marked
5	.507	78	1.3485	7.6	560	-	39	8	.593	80.3	1.3502	8	495	-	-	48.5	-	7-9½	120	120	Valvular	Slight
6	.583	80	1.3450	6.8	500	-	67.1	2½	.551	77%	1.3445	7	485	-	-	62.3	-	10-12	160	160	Fibrillation, Acromegaly	Present
7	.551	82	1.3470	7.6	580	-	47.7	8	.562	80	1.3495	8	500	14½	-	42.9	14½	13-11½	120	120	Valvular	Slight
8	.563	77	1.3440	7.2	500	-	52.6	5½	.592	81	1.3490	7.6	505	11½	-	57.4	11½	6-2	140	150	Valvular	Present
9	.569	79	-	7.4	502	-	57.4	4½	.554	84	1.3491	6.9	500	3½	-	57.4	3½	7-7½	96	96	High B.P., Syphilitic	None
10	.558	78	1.3499	7.6	480	-	71.9	11½	.541	79	1.3499	7.6	520	8½	-	52.6	8½	8-13	76	60	Valvular, Syphilitic	Marked
12	.530	71	1.3500	-	450	-	71.6	-	.557	76	1.3470	-	500	-	-	57.2	-	7-7	64	64	High B.P.	Slight
13	.567	84	-	-	400	-	52.8	-	.575	85	1.3500	-	390	-	-	-	-	13-5½	44	18	Valvular Disease	Slight
14	.566	86	1.3520	-	540	46	43.3	10½	.558	85	1.3480	-	472	-	-	38.5	-	9-8	18	24	High B.P.	None
15	.522	73.4	1.3475	-	415	-	22.1	-	.331	75	1.3470	-	400	65	-	-	-	9-5½	24	24	Fibrillation, Valvular	Marked
16	.562	86	1.3495	-	400	-	57.2	8	.575	91	1.3470	-	395	-	-	67.2	-	14-10	76	60	High B.P.	Present
17	.577	92	1.3460	-	390	68	57	2	.569	88	1.3470	-	350	85	-	45.1	2	12-5½	60	42	Nephrosis	Marked
18	.596	88	1.3442	-	420	44	48.1	½	.598	86	1.3442	-	450	45	-	38.5	2½	12-0½	80	80	Glomerular Nephritis	Marked
19	.565	91	1.3470	-	570	44	52.8	3	.566	95	1.3472	-	390	41	-	52.8	6	10-1½	90	66	High B.P.	None
20	.561	83	1.3490	-	420	58	52.8	11	.543	88	1.3520	-	400	35	-	48.1	8	7-12½	80	58	Fibrillation	Slight
21	.576	88	1.3462	-	435	65	57.6	7	.548	94	1.3460	-	414	54	-	43.3	6½	9-3	75	50	High B.P.	Slight
22	.549	80	1.3482	-	550	55	38.5	7½	.550	70	1.3481	-	490	38	-	24.2	17½	10-8	80	100	Valvular Disease	Marked
23	.567	95	1.3510	-	395	45	52.8	-	.556	93	1.3450	-	372.5	36	-	43.3	-	8-1½	100	100	Valvular	None
24	.573	91	1.3479	-	459	52	48.1	-	.551	93	1.3490	-	457.5	63	-	48.1	-	9-13½	100	100	High B.P.	None
25	.556	93	1.3500	-	510	38	52.8	-	.561	94	1.3490	6.4	520	36	-	52.8	-	6-10½	80	80	Fibrillation	Slight
26	.563	97	1.3488	-	520	49	48.1	-	.571	97	1.3470	7	510	41	-	52.8	-	11-4½	100	120	High B.P., Valvular	Marked
33	.541	91	1.3480	-	405	49	48.1	-	.573	90	1.3470	8.4	430	39	-	43.3	-	9-4½	90	70	Valvular, Syphilitic	Marked
34	.576	81	1.3450	-	410	60	-	-	.566	82	1.3460	7.9	390	49	-	-	-	6-1½	36	40	Valvular Disease	Marked
35	.571	102	1.3490	-	540	36	52.8	-	.581	90%	1.3490	-	572.5	35	-	38.5	-	10-11	100	100	High B.P.	None
36	.574	97	1.3480	-	555	34	48.1	-	.566	88	1.3530	-	560	28	-	43.3	-	9-1½	100	100	Valvular	None
47	.583	79	1.3490	-	500	33	33	-	.575	74	1.3529	-	495	30	-	39	-	11-13½	120	120	Myocarditis	Slight
48	.570	77	1.3490	-	510	38	43	-	.584	76	1.3499	-	500	38	-	38	-	10-1	120	120	Slight, Valvular, Rheumatic	Marked
49	.575	73	1.3498	-	520	31	43	-	.586	71	1.3479	-	510	34	-	-	-	8-9	120	120	Slight, Valvular, Rheumatic	Marked

T A B L E III

Case No.	Normal Conditions										Ordinary ^{Standard} Diet + 18 ozs. of Fluid										Clinical Condition			
	Osmotic Pressure	Haemoglobin	Refracto-meter	Viscosity	Blood Chloride	Blood Urea	Alkali Reserve	Venous Pressure	Weight	Osmotic Pressure	Haemoglobin	Refracto-meter	Viscosity	Blood Chloride	Blood Urea	Alkali Reserve	Venous Pressure	Weight	Fluid Intake B. day before	Fluid Intake day of B.	Urine on day before	Urine day of B.	Nature of Disease	Oedema
12	.530	71	1.3500	-	450	-	71.6	-	7-9	.560	76	1.350	-	502	-	67.2	2	7-10	18	18	21	21	High B.P.	Slight
13	.567	84	-	-	400	-	52.8	-	13-3½	.567	84	-	400	-	52.8	-	-	13-5½	18	18	14	14	Valvular	Slight
14	.566	86	1.3520	-	540	46	43.3	10½	9-12½	.755	84	1.3500	-	465	-	38.1	-	9-12½	18	18	15	16	High B.P.	None
17	.577	92	1.3460	-	390	68	57	2	11-12	.567	92	1.3475	-	474	73	43.3	3	11-12½	18	18	28	14	Nephrosis	Present
18	.596	88	1.3442	-	420	44	48.1	½	12-1½	.552	90	1.3452	-	425	51	45.1	1½	12-0½	18	18	14	20	Glomerular Nephritis	Present
19	.565	91	1.3470	-	510	44	52.8	3	10-1	.590	88	1.3462	-	540	37	52.8	-	10-1	18	18	24	20	Hyper B.P.	None
20	.561	83	1.3490	-	420	58	52.8	11	7-11½	.563	85	1.3500	-	450	49	52.8	-	7-12	18	18	26	16	Fibrillation	Slight
21	.576	88	1.3462	-	435	65	57.6	7	9-7½	.595	90	1.3470	-	555	35	43.3	-	9-7	18	18	14	18	High B.P.	Slight
23	.567	95	1.3510	-	395	45	52.8	-	8-2	.565	94	1.3575	-	385	42	43.3	2½	8-1	18	18	26	15	Valvular	Slight
24	.573	97	1.3479	-	459	45.2	48.1	-	9-12½	.572	92	1.3441	-	420	68	38.5	3	10-0	18	18	-	-	High B.P.	None
27	.556	96	1.3487	-	570	48	43.3	-	10-5½	.548	93	1.3489	-	562	65	38.8	-	10-5	18	18	20	16	Myocardial	None
28	.574	87	1.3478	-	570	58	43.3	-	11-1½	.584	89	1.3478	-	535	63	39.2	-	11-12½	18	18	28	22	Fibrillation	Present
29	.562	86	1.3460	-	500	51	-	-	8-4½	.573	83	1.3458	-	545	70	-	-	8-6½	18	18	16	18	Valvular	Present
30	.554	88	1.3472	-	535	36	52.8	7	11-10½	.546	88	1.3490	-	555	48	-	-	11-8½	18	18	16½	26	High B.P.	Marked
31	.587	98	1.3480	-	570	68	52.8	11	10-1½	.569	103	1.3510	-	575	65	38.1	-	10-0	18	18	19	10	Valvular	Marked
50	.571	80%	1.3470	-	580	31	38	-	7-1½	.581	83	1.3570	-	595	30	33	-	7-2	18	18	28	20	Specific	None
51	.569	82%	1.3460	-	585	38	38	-	10-2	.578	80	1.3500	-	590	49	34	-	7-13½	18	18	12	13	Specific	Marked

Case No.	Salt Free and Fluid										Salt Free and 18 ozs. Fluid										Clinical Condition						
	Osmotic Pressure	Haemoglobin	Refracto-meter	Blood Viscosity	Blood Chloride	Blood Urea	Alkali Reserve	Venous Pressure	Weight	Urine day before B.	Urine day or B.	Blood Sugar	Fluid Intake in ozs.	Osmotic Pressure	Haemoglobin	Refracto-meter	Blood Viscosity	Blood Chloride	Blood Urea	Alkali Reserve	Venous Pressure	Weight	Urine day before B.	Urine day or B.	Blood Sugar	Nature of Disease	Oedema
12	.557	76	1.3470	-	500	-	57.2	-	7-7	64	64	64	64	.545	70	1.3490	-	500	-	67.2	-	7-11½	22	32	-	H.B.P.	Slight
13	.575	85	1.3500	-	390	-	-	-	13-5½	50	18	18	50	.562	91	1.3450	-	420	15	52.8	15	13-4½	26	28	-	Valvular Disease	Slight
14	.558	85	1.3480	-	472	-	38.5	-	9-8	100	24	24	100	.556	85	1.3480	-	472	-	38.1	-	9-12¾	14	25	-	High B.P.	None
16	.575	91	1.3470	-	395	-	67.2	14½	14-10	76	60	60	76	.566	92	1.3500	-	390	9	52.8	9	14-2	30	34	-	High B.P.	Present
17	.569	88	1.3470	-	350	85	45.1	2	12-5½	60	42	42	60	.558	88	1.3454	-	345	10½	52.8	10½	12-7	36	20	102	Nephrosis	Present
18	.598	86	1.3442	-	450	45	38.5	2½	12-0¾	60	80	80	60	.565	88	1.3442	-	430	49	57.2	-	12-0	18	16	49	Glomerular Nephritis	Present
19	.566	95	1.3472	-	390	41	52.8	6	10-1¼	90	66	66	90	.585	93	1.3480	-	450	27	52.8	-	10-0	28	16	27	High B.P.	None
20	.543	88	1.3520	-	400	35	48.1	8	7-12½	80	58	58	80	.585	86	1.3520	-	400	37	43.3	8	7-12	8	20	37	Fibrillation	Slight
21	.548	95	1.3460	-	414	54	43.3	6¼	9-3	100	50	50	100	.550	-	1.3460	-	500	42	38.5	-	8-13½	28	43	42	High B.P.	Slight
23	.556	93	1.3450	-	372.5	63	48.1	-	8-11½	100	100	100	100	.557	96	1.3481	-	360	47	48.1	-	8-1	12	14	47	Valvular Disease - Fibrillation	None
24	.551	93	1.3490	-	457.5	63	48.1	-	9-13½	100	100	100	100	.541	92	1.3418	-	487.5	54	43.3	-	9-12¼	-	-	54	High B.P.	None
31	.566	88	1.3530	-	560	28	43.3	-	9-1¼	100	100	100	100	.558	101.5	1.3515	-	495	69	43.3	-	9-8½	18	10	69	Valvular Disease	Marked
47	.575	74	1.3529	-	495	30	39	-	11-13¾	120	63	63	120	.586	72	1.3490	-	540	35	38	-	11-12½	26	32	35	Myocardial Specific	Slight
48	.584	76	1.3499	-	500	38	38	-	10-1	120	60	60	120	.576	79	1.3490	-	565	34	42	-	10-1½	26	75	34	Valvular Rheumatism	Slight
49	.586	71	1.3479	-	510	34	-	-	8-9	120	102	102	120	.569	69	1.3499	-	540	45	47	-	8-7	26	26	45	Valvular Rheumatism	Slight

Case No.	Total Extra Salt in Grammes	Total Extra Water on Salt. in ozs.	No. of days on extra salt & water	Urine excretion last 2 days of salt	Urine excretion last 2 days of salt free	Salt		Salt Free		Total extra water on salt free	No. of days on salt free & extra water	Dilution	Concentration	Difference	Clinical Condition	
						Weight	Increase or Decrease in lbs.	Weight	Increase or Decrease in lbs.						Nature of Disease	Oedema
1	120	800	5	154/71	116/116	9-2½	+ 13½	8-8	+ 5	782	5				Myocarditis	Present (Cardiac)
2	120	640	4	68/96	166/134	5-13	+ 9	5-1	- 3	640	4				Valvular, Rheumatic	Slight
3	150	350	5	16/49	25/24	10-2	+ 6	9-12	+ 2	280	5				High B.P. and Fibrillation	Present
4	120	300	4	39/42	67/86	6-12½	+ 12½	6-1	+ 1	498	4				Valvular and Fibrillation	Severe
5	120	410	5	30/38	91/99	8-4½	+ 5	7-12	- 1½	546	5				Valvular	Slight
6	150	800	5	132/96	78/120	10-8½	- 14½	10-12	- 11	800	5				Acromegaly - vomited on salt. Fibrillation	Present
7	150	484	5	30/41	80/83	14-9	+ 9	13-12	- 2	580	5				Valvular	Slight
8	90	270	3	8/14	100/85	6-8½	+ 7	6-2	+ ½	570	5				Valvular Disease	Present
9	120	440	4	40/16	44/38	8-1	+ 3	7-10	- 2	334	4				Angina and High B.P.	None
10	120	305	4	20/10	76/60	9-3	+ 3	8-13	- 2	289	4				Valvular - Syphilitic	Severe (Cardiac)
12	60	250	3	46/34	59½/71	7-11¼	+ 2¼	7-7	- 2	212	3	.384	.616		High B.P.	Slight
13	60	378	3	100/44	46/44	13-12	+ 6½	13-5½	-	162	3	.441	.844		Valvular Disease	Slight
14	60	300	3	36/54	18/23	10-0	+ 2	9-8	- 4½	66	3	.165	1.414		High B.P.	None
15	60	230	3	16/9	0/22	9-11	+ 6¼	9-5½	+ 1	78	3	.989	.323		Fibrillation	Marked (Cardiac)
16	60	266	3	14/12	20/28	14-8	+ 6½	14-10	- 4½	206	3				High B.P.	Present
17	60	179	3	28/24	12/12	12-13	+ 15	12-5¼	- 6¼	162	3	.956	.732		Nephrosis	Present (Renal)
18	60	177	3	14/10	24/44	12-8	+ 7¼	12-0¼	- ½	148	3	1.593	.360		Fibrillation & High B.P.	Present
19	60	310	3	42/90	51½/28	10-5½	+ 4½	10-1½	+ ½	220	3	.253	1.143		High B.P.	None
20	60	306	3	49/80	16/50	8-3	+ 2¼	7-12½	+ 1¼	164	3	.372	.993		Auricular Fibrillation	Slight (Cardiac)
21	60	196	3	20/70	82/110	9-2	- 5½	9-3	- 4½	260	3	.280	1.226		High B.P.	Slight
23	60	280	3	21/68	26/15	8-5	+ 3	8-1½	- ½	300	3				Fibrillation	None
24	60	272	3	48/60	76/101	10-6½	+ 7	9-13½	-	276	3				High B.P.	None
25	80	480	4	92/110½	71/72	7-3½	+ 6	6-10¼	- ¼	414	4	.190	1.123		Fibrillation	Slight
26	80	486	4	49/50	125/120	12-2	+ 5½	11-4½	- 6	540	4	.720	.223		Valvular Disease & High B.P.	Slight
32	80	520	4	107/104	56/56	10-8	+ ½	10-8	+ ½	440	4	.127	1.066		High B.P.	None
34	60	162	3	10/12	14/14	6-2½	+ 1	6-1½	-	252	5		1.167		Valvular Disease	Present

Case No.	Before Glucose										After Glucose, without extra Fluid										Clinical Condition				
	Osmotic Pressure	Haemo-globin	Refractometer	Blood Viscosity	Blood Chloride	Blood Urea	Blood Sugar	Alkali Reserve	Venous Pressure	Weight	Osmotic Pressure	Haemo-globin	Refractometer	Blood Viscosity	Blood Urea	Blood Sugar	Blood Chloride	Alkali Reserve	Venous Pressure	Weight	Fluid Intake day before	Fluid Intake day after B. Glycerin	Nature of Disease	Oedema	
4	.561	66	1.3477	7.2	585	-	-	34.5	5	6-2	.594	72	1.3500	-	-	-	510	43.3	-	6-10 $\frac{1}{4}$	24	-	Fibrillation, Valvular	Marked	
6	.583	80	1.3450	6.8	500	-	-	67.1	2 $\frac{1}{2}$	10-0	.562	73	1.3469	-	-	-	495	43.3	-	10-3 $\frac{1}{2}$	36	-	Fibrillation, Acromegaly	Present	
10	.558	78	1.3499	7.6	480	-	-	71.9	11 $\frac{1}{2}$	9-1	.645	80	1.3482	-	-	-	427.5	-	-	9-3	34	-	Valvular, Syphilitic	Marked	
12	.530	71	1.3500	-	450	-	-	71.6	-	7-9	.549	74	-	-	-	-	450	67.2	-	7-9	30	24	High B.P.	Slight	
13	.567	84	-	-	400	-	-	52.8	-	13-5 $\frac{1}{2}$	.582	88	1.3491	65	-	-	450	67.2	-	13-7	36	36	Valvular	Slight
14	.566	86	1.3520	-	540	46	-	43	10 $\frac{3}{4}$	9-12 $\frac{1}{2}$	.584	86	1.3472	61	-	-	465	52.8	-	9-9 $\frac{1}{4}$	40	36	Hyperpiesia	None
17	.577	92	1.3460	-	390	68	-	57	2	11-12	.553	90	1.3500	78	-	-	390	43.3	4 $\frac{1}{2}$	13-11 $\frac{1}{2}$	40	40	Nephrosis	Marked	
18	.596	88	1.3442	-	420	44	-	48.1	$\frac{1}{2}$	12-1 $\frac{1}{2}$	.559	88	1.3452	24	-	-	450	48	5	12-7 $\frac{1}{2}$	40	40	Glomerular Nephritis	Marked
19	.565	91	1.3470	-	510	44	-	52.8	3	10-1	.572	92	1.3470	44	-	-	480	52.8	-	10-5	40	36	Hyperpiesia	None	
20	.561	83	1.3490	-	420	58	-	52.8	11	7-11 $\frac{1}{4}$	.551	83	1.3490	41	-	-	430	52.8	-	8-0 $\frac{1}{4}$	40	40	Fibrillation	Slight
21	.576	88	1.3462	-	435	65	-	57.6	7	9-7 $\frac{1}{2}$	.551	92	1.3442	38	-	-	550	52.8	-	9-3 $\frac{1}{4}$	46	36	Hyperpiesia	None
24	.573	91	1.3479	-	459	52	-	48.1	-	9-13 $\frac{1}{2}$	.560	94	-	60	-	-	450	52.8	-	10-2 $\frac{1}{2}$	36	36	Hyperpiesia	None
23	.567	95	1.3510	-	395	45	-	52.8	-	8-2	.564	94	-	36	-	-	390	48.1	-	8-2	36	36	Valvular	Slight	
35	.571	102	1.3490	-	540	36	-	52.8	1	10-11 $\frac{1}{2}$	.596	98	1.3500	-	-	-	585	48.1	-	11-1	100	100	Hyperpiesia	None
36	.574	97	1.3480	-	555	34	-	48.1	8 $\frac{1}{2}$	9-5 $\frac{1}{4}$	.592	97	1.3512	39	-	-	555	48.1	-	9-1	100	100	Valvular	Marked
40	.560	85	1.3497	-	600	38	-	43.3	-	5-6	.590	88	1.3510	39	-	-	570	43.3	-	5-7	100	36	Valvular, Specific	Slight	
41	.556	76	1.3498	-	562	33	-	48.1	-	7-12	.559	78	1.3510	30	-	-	510	38.2	-	7-11	100	100	Myocarditis	None	
42	.565	65	1.3491	-	-	29	-	33	-	8-8	.574	65	1.3490	33	-	-	570	38	-	8-10 $\frac{1}{4}$	120	120	Fibrillation	None	
43	.561	85	1.3502	-	615	35	-	38	-	11-8 $\frac{1}{4}$	.573	108	1.3490	33	-	-	600	-	-	11-13 $\frac{1}{2}$	120	120	Fibrillation	Slight
44	.574	73	1.3500	-	520	44	-	43	-	10-5 $\frac{1}{4}$	.581	94	1.3485	38	-	-	510	38	-	10-8	120	120	Hypertension	None
45	.569	102	1.3500	-	279	32	-	43.3	-	10-12 $\frac{1}{2}$	.579	98	1.3489	41	-	-	510	38	-	10-13	120	120	" Specific	None
46	.565	79	1.3483	-	600	34	-	39	-	8-8 $\frac{1}{2}$	.586	76	1.3485	28	-	-	570	33.8	-	8-9	120	120	Rheumatic Valves	Present
Extra Fluid without Glucose																									
Case No.																									
42	.571	63	1.3490	-	550	30	-	33	-	8-10	.571	63	1.3490	30	-	-	550	33	-	8-10	120	120	Fibrillation	None	
43	.575	110	1.3498	-	580	32	-	33	-	11-12	.575	110	1.3498	32	-	-	580	33	-	11-12	120	120	Fibrillation	Slight	
45	.578	89	1.3492	-	540	39	-	47	-	10-12	.578	89	1.3492	39	-	-	540	47	-	10-12	120	120	Hypertension, Specific	None	
46	.577	93	1.3497	-	600	42	-	39	-	8-10	.577	93	1.3497	42	-	-	600	39	-	8-10	120	120	Rheumatic Valves	Present	

After Glucose and Fluid

Before Glucose and Fluid

T A B L E VII

Case No.	Blood						Fluid					Site from which withdrawn
	Osmotic Pressure	Haemoglobin	Chloride	Urea	Alkali Reserve	Protein %	Osmotic Pressure	Chloride	Urea	Alkali Reserve	Protein %	
1	-	80	-	-	-	7.42	.496	390	-	52.8	2.21	Peritoneum
2	-	-	-	-	-	-	.524	447	21	86.2	2.21	Peritoneum
3	.580	-	500	49	43.3	9.14	.539	594	31	38.2	2.21	Peritoneum
4	.568	92	452	44	37.6	6.34	.631	615	27	-	2.83	Pleura (Exudate)
5	-	-	-	-	-	-	.538	310	27	-	2.83	Peritoneum
6	.557	67	400	61	48.1	7.42	.498	427	25	52.8	2.21	Peritoneum
7	.558	76	430	67	38.1	6.87	.507	418	23	33.1	-	Peritoneum
8	.559	70	330	77	43.3	8.49	.512	360	27	-	2.83	Peritoneum
9	.551	96	-	34	43.3	9.14	.562	495	28	52	2.83	Pleura
10	-	-	-	-	-	-	-	-	-	29.1	1.08	Legs

CASE REPORT NOTES

Case 1.

Age, 21.

Sex, Female.

Complaints: Headache, dizziness, palpitations.

History: Pre-cordial pain and shortness of breath 3 years.
Now much worse. Easily tired. Pain in back and legs,
thought to be rheumatic, from time to time.

APPENDIX

Previous History: Cholera at 4.
Cholera at 13.
Typhoid at 17.
Scarlet Fever and Diphtheria.

Examination: Nutrition fairly good; no cyanosis. Carotid
pulsation.

Pulse: 86; regular; poor volume; vessels not palpable.

R.F.: 110/75.

Heart: Area 2nd, 5th space, 4 1/2 inches from mid-line.
Dilated.

Sound: Mitral systolic; accentuated pulmonary 2nd.

Liver: Enlarged.

Edema of feet.

Wassermann: negative.

Diagnosis: Rheumatic Valvular Disease.

C L I N I C A L N O T E S

Case 1.

Age, 21.

Sex, Female.

Complaint: Headache, dizziness, palpitations.

History: Praecordial pain and shortness of breath 3 years.
Now much worse. Easily tired. Pain in back and legs,
thought to be rheumatism, from time to time.

Previous History: Chorea at 4.
Chorea at 13.
Tonsillitis at 17.
Scarlet Fever and Diphtheria.

Examination: Nutrition fairly good; no cyanosis. Carotid
pulsation.

Pulse: 86: regular: poor volume: vessels not palpable.

B.P.: 110/75.

Heart: Apex beat, 5th space, $4\frac{1}{2}$ inches from mid-line.
Localised.

Sounds: Mitral systolic: accentuated pulmonary 2nd.

Liver: Enlarged.

Oedema of feet.

Wassermann negative.

Diagnosis: Rheumatic Valvular Disease.

Case 1.

RESULTS

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.592			.616	.548			
Haemoglobin %	70			69	68			
Refractive Index								
Blood Chloride in mgs. %	627			610	620			
Blood Urea in mgs. %								
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	40							
Blood Viscosity								
Venous Pressure in inches	4				4.2			
Weight in stones and lbs.	8-3			8-0 8-0 8-0	9-0 9-2½ 9-2½			
Fluid Intake in ozs.								
Urine, 24 hrs., in ozs.				116	144 154			
Urine Chloride in mgs. %	554			385	655 720			

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test
Depression of Freezing Point (Osmotic Pressure)			
Sp. Gravity			
Urea %			

Case 2.

Age, 21.

Sex, Female.

Complaint: Shortness of breath, pain.

History: Two years ago, Acute Catarrh; since then, poor health; has cough, shortness of breath on exertion and swelling of feet; occasional palpitation.

Previous History: Diphtheria 9 years ago.
Pains in legs and joints 5 years ago.
Several attacks of Tonsillitis.

Examination: Thin, cyanosis of face, pulsation in neck, clubbing of fingers.

Pulse: 110 - regular, vessel wall not palpable.

B.P.: 120/85.

Heart: Apex beat, 6th space, 5 inches from middle line, diffuse.

Sounds: Mitral systolic - tricuspid systolic, pulmonary 2 accentuated.

Liver: Enlarged.

Oedema of legs.

Wassermann negative.

Diagnosis: Rheumatic Endocarditis.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.550			.552	.549			
Haemoglobin %	60			65	49.3			
Refractive Index								
Blood Chloride in mgs. %	420			400	415			
Blood Urea in mgs. %								
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	38.5			33.2	40.1			
Blood Viscosity								
Venous Pressure in inches	9				7.5 - 8			
Weight in stones and lbs.	5-3 5-1 5-1 5-1			5-1 5-1 ³ / ₄ 5-4	5-9 ¹ / ₂ 5-13			
Fluid Intake in ozs.								
Urine, 24 hrs., in ozs.	20 62			166 134	134 68 96			
Urine Chloride in mgs. %	1015 620			None 30	240 720			

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test
Depression of Freezing Point (Osmotic Pressure)			
Sp. Gravity			
Urea %			

Case 3.

Age, 43.

Sex, Male.

Complaint: Shortness of breath, cough, giddiness and easily tired.

History: Two years ago - sudden breakdown of health, began to suffer from attacks of breathlessness at night - developed a cough - very breathless on exertion - feet began to swell - was treated for a while in hospital.

Previous History: Passed A.I. during the War. Slight dysentery.

Examination: Distressed dyspnoeic. Jugular pulsation.

Pulse: 120 ? and irregular.

B.P.: 125/60 ?

Heart: Apex beat - 5th space, $4\frac{1}{2}$ inches from middle line - no bruit.

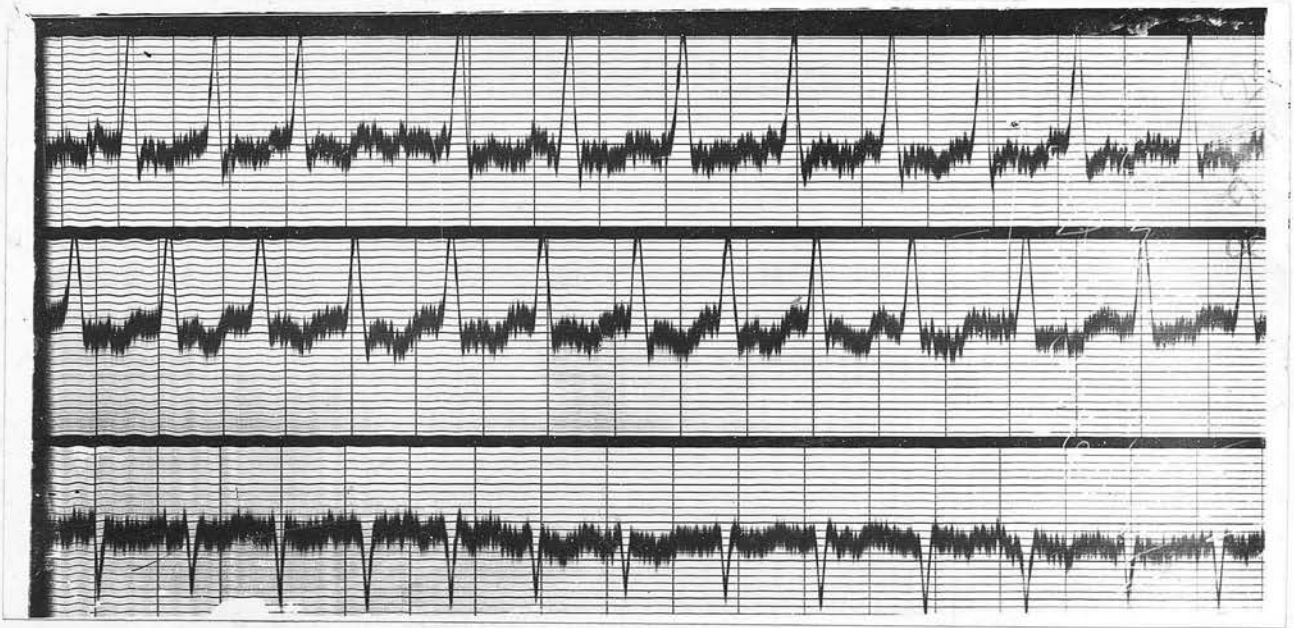
Liver: Enlarged and pulsating.

Oedema of ankles.

Wassermann negative.

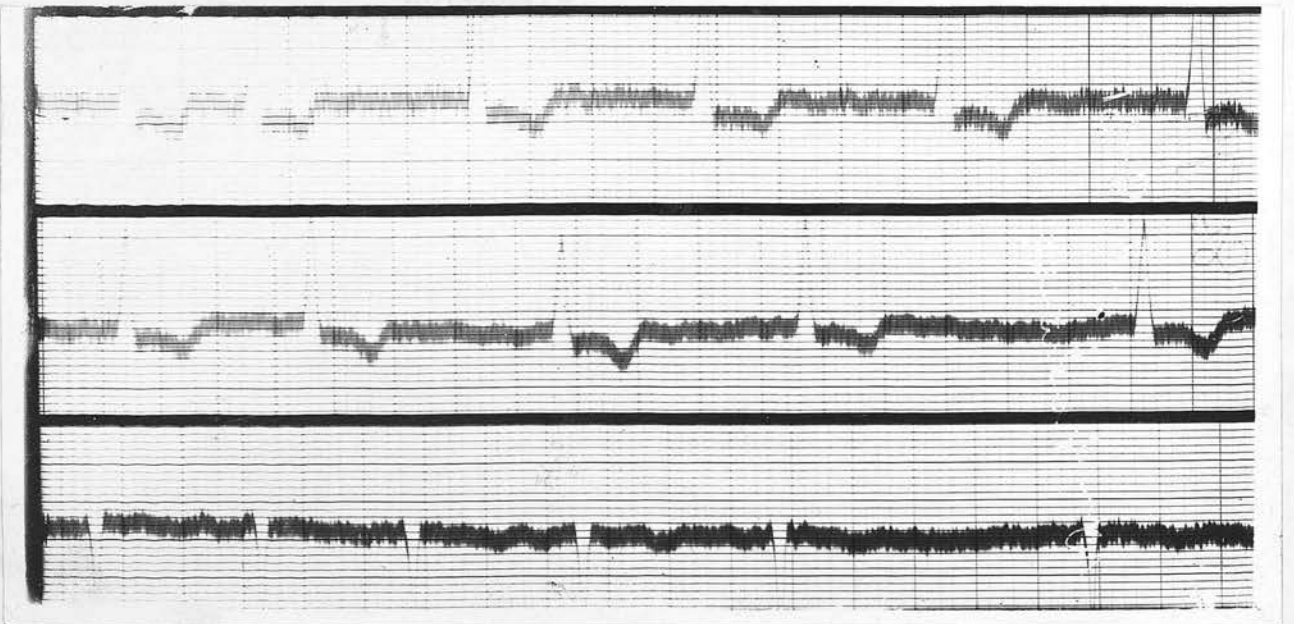
Diagnosis: Auricular Fibrillation.

Case 3



Lead I - 5 inches from
right arm - Wilson.

Lead II - 5 inches from
left arm - Wilson.



Case 4.

Age, 19

Sex, Female.

Complaint: Breathlessness - palpitation and exhaustion.

History: Pains in joints - when at school 6 years ago - An attack of Acute Rheumatism 2 years ago.

Previous History: Chorea, 7 years ago.

Examination: Poor nutrition - Cyanosis.

Pulse: 150 - rhythm irregular - volume poor.

B.P.: 105/60 ?

Heart: Apex beat - 6th space - 5 inches from middle line ? - diffuse.
Systolic thrill.

Sounds: Mitral systolic - re-duplicated pulmonary.

Liver: Enlarged and pulsating.
Ascites - Oedema of ankles and legs.

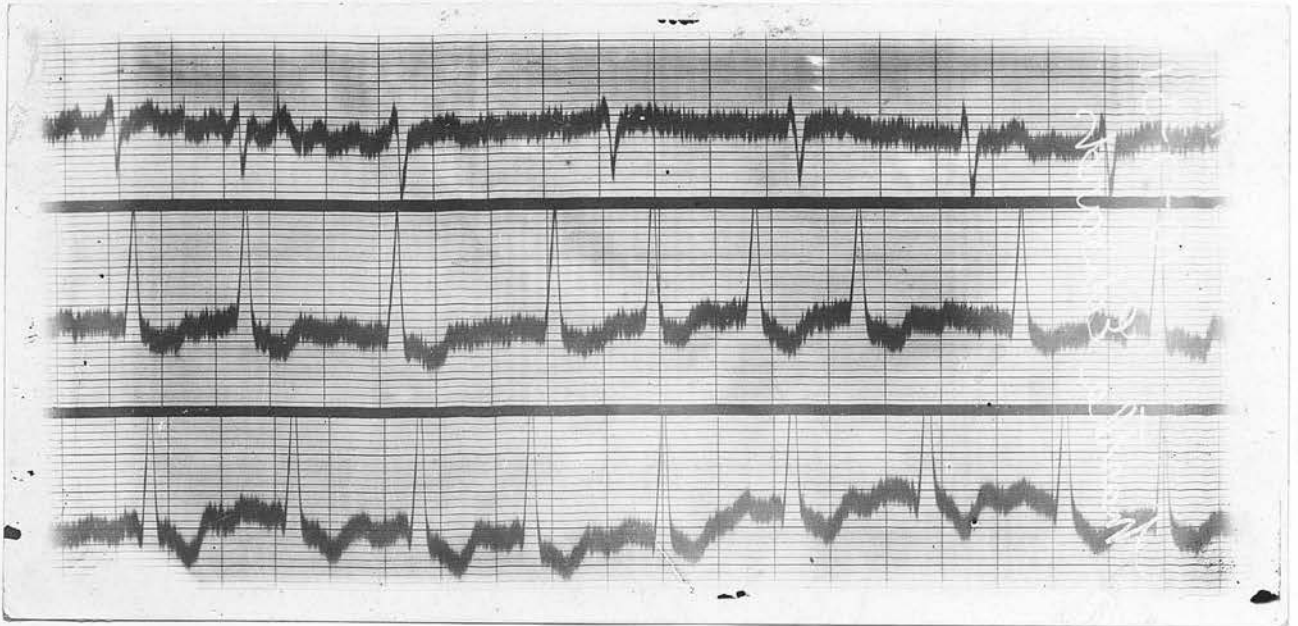
Wassermann negative.

Diagnosis: Rheumatic Carditis.
Auricular Fibrillation.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.561			.623	.608	.594		
Haemoglobin %	66			72.2	70	72		
Refractive Index	134.774			134.75	134.7	135		
Blood Chloride in mgs. %	585			480	600	510		
Blood Urea in mgs. %								
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	34.5			46.9	43.3	43.3		
Blood Viscosity	7.2			7.8	7.4			
Venous Pressure in inches	5			4 $\frac{1}{2}$	11			
Weight in stones and lbs.	6- 0 6- 1 $\frac{3}{4}$			6- 0 $\frac{1}{2}$ 6- 0 $\frac{1}{4}$ 6- 0 $\frac{1}{4}$ 6- 1	6- 4 $\frac{3}{4}$ 6- 9 $\frac{1}{4}$ 6- 12 $\frac{1}{2}$ 6- 10 $\frac{1}{2}$			
Fluid Intake in ozs.	30 30			126 126 126 120	120 120 80 80			
Urine, 24 hrs., in ozs.	22			46 67 86	74 39 42			
Urine Chloride in mgs. %	625			525 50 30	990 965			

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test
Depression of Freezing Point (Osmotic Pressure)			
Sp. Gravity			
Urea %			

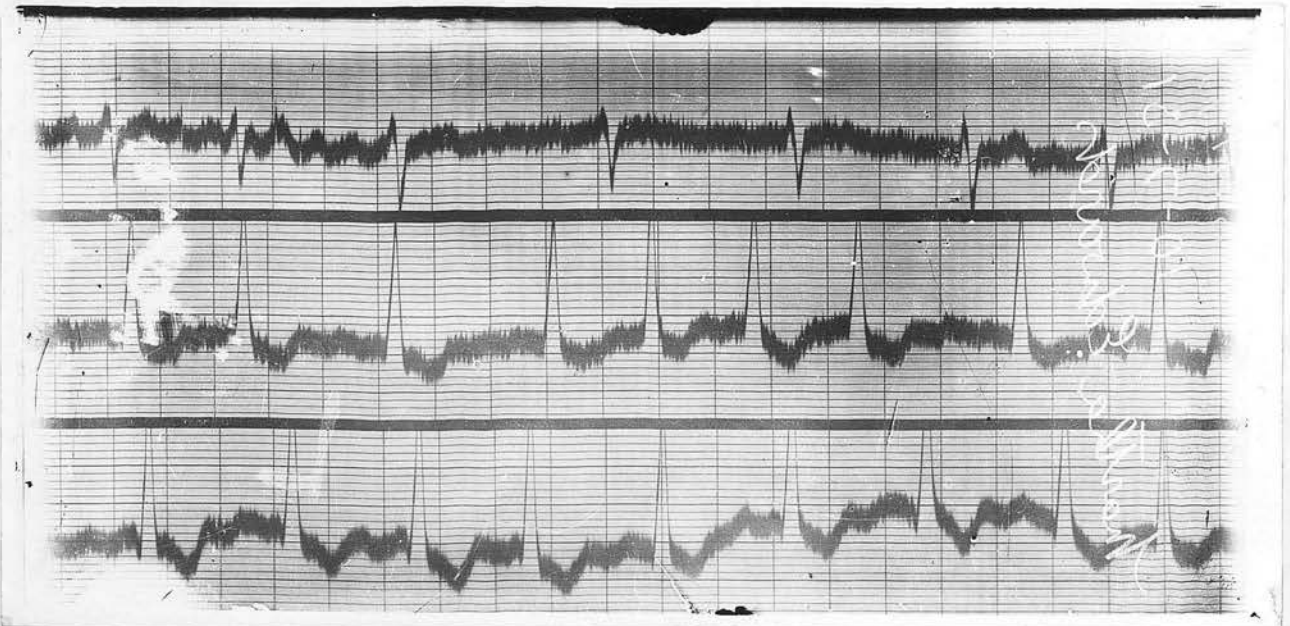
Case 4.



Previous History: Acute Rheumatism 1941.

Examination: Poor nutrition - pale with a slight icteric tinge - venous pulsation in neck.

ECG: 90 - regular - full voltage.



Case 5.

Age, 33.

Sex, Male.

Complaint: Flatulence - shortness of breath for one month - sleeplessness.

History: Out of sorts - one month.
Very easily exhausted and unable to go to work - was often very distressed after meals - had one or two severe attacks of giddiness.

Previous History: Acute Rheumatism in 1914.

Examination: Poor nutrition - pale with a slight icheric tinge - venous pulsation in neck. /t

Pulse: 90 - regular - full volume.

B.P.: 120/90.

Heart: Apex beat - 6th space - diffuse.

Sounds - pre-systolic at mitral area
double aortic - ? pericardial rub.

Liver: Not enlarged.

No Oedema.

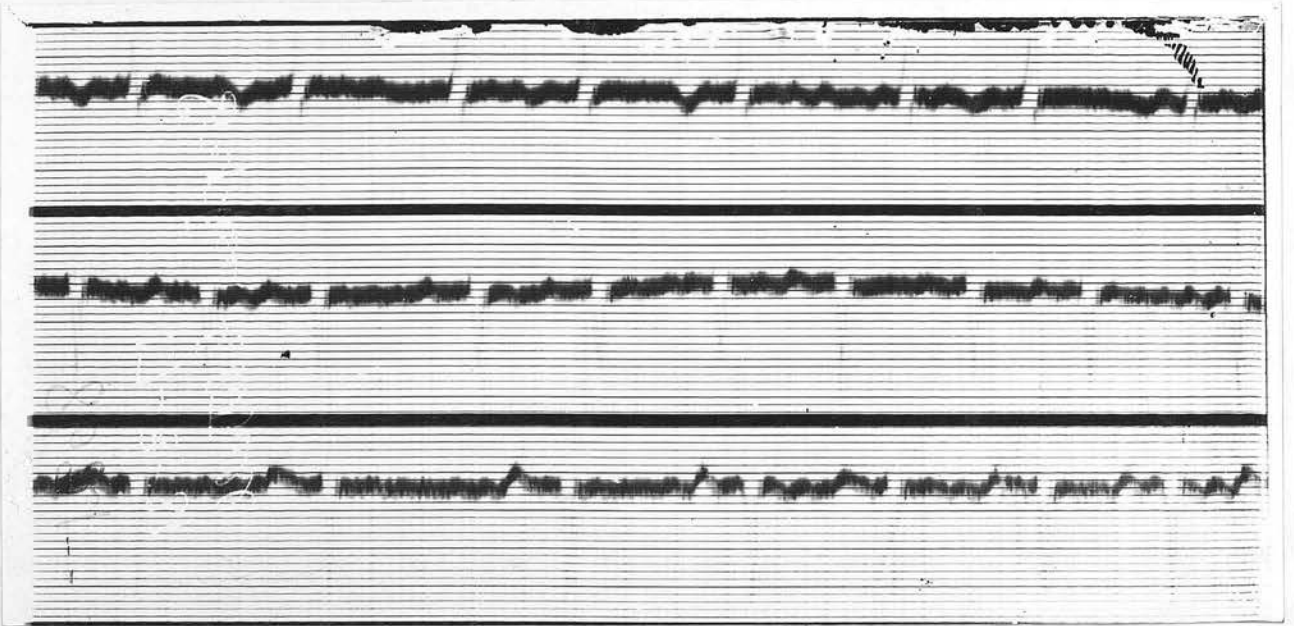
Wassermann negative.

Diagnosis: Rheumatic Carditis.

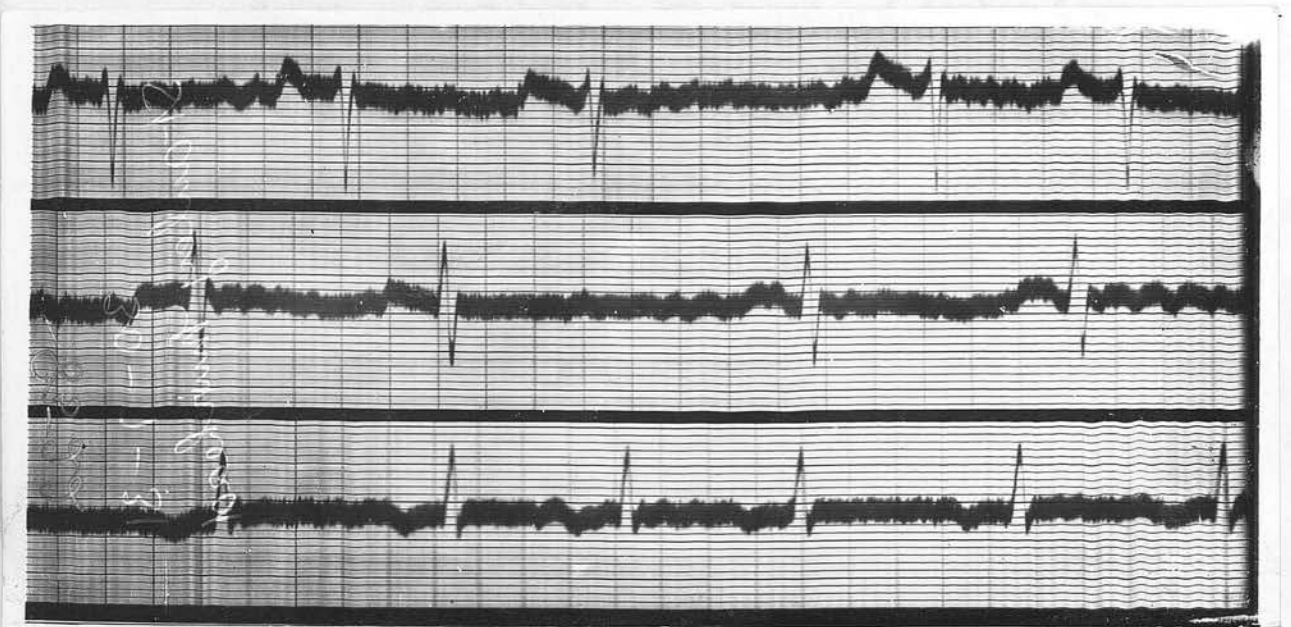
Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra + Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.507			.593	.545			
Haemoglobin %	78			80.3	79			
Refractive Index	134.85			135.02	134.58			
Blood Chloride in mgs. %	560			495	595			
Blood Urea in mgs. %								
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	39			48.3	43.3			
Blood Viscosity	7.6			8	7.5			
Venous Pressure in inches	8				7			
Weight in stones and lbs.	7-13½			8- 1¼ 7-13¼ 7-12 7- 9½	7-12 7-13½ 7-13½ 8- 4½			
Fluid Intake in ozs.	36 42			66 120 120 120	100 90 80 60			
Urine, 24 hrs., in ozs.	32½ 18½			76½ 108 91 99	30 28 30 38			
Urine Chloride in mgs. %	700			290 100	230 755 954			

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test
Depression of Freezing Point (Osmotic Pressure)			
Sp. Gravity			
Urea %			

Case 6.



Case 5



Case 6.

Age, 50.

Sex, Male.

Complaint: Shortness of breath - pain in left breast.

History: Has recently felt poor health and had to give up work - Has suffered from praecordial pain and palpitation - Dyspnoea on going up stairs - sleeps badly - some swelling of feet.

Previous History: Tonsillitis - Influenza and Chronic Rheumatism.

Examination: Acromegalic Facils.
Pulsation in neck.

Pulse: 120 - irregular - poor volume - vessel wall thickened.

B.P.: 190/85.

Heart: Apex beat - 5th space - 4 inches from middle line - diffuse.

Sounds: Mitral systolic.

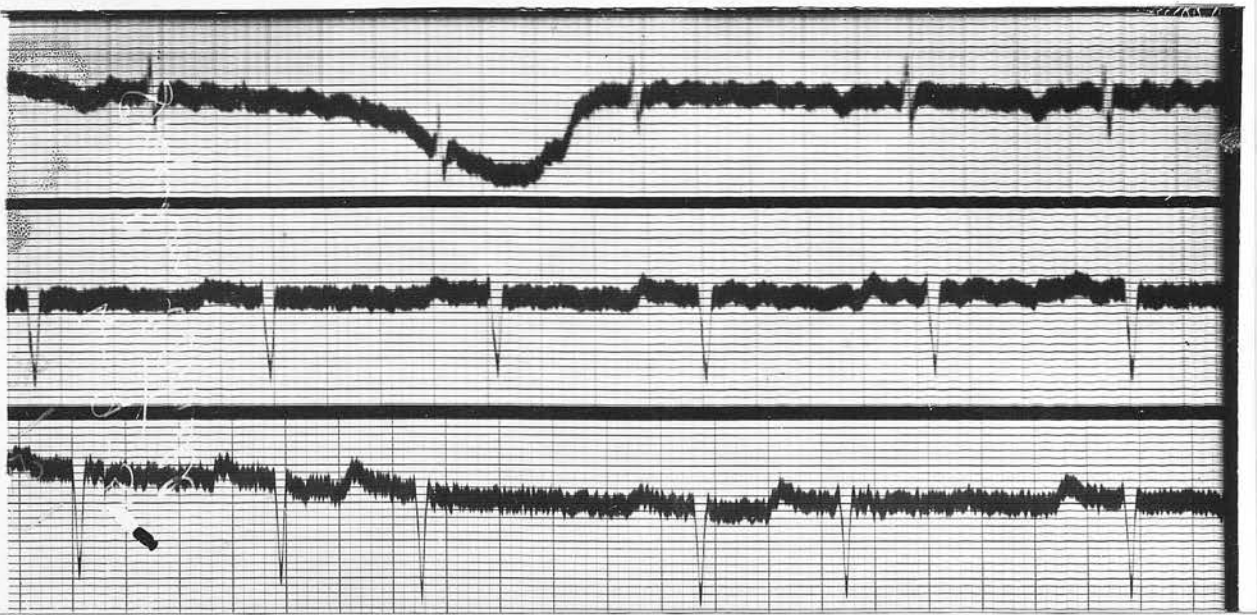
Wassermann + +

Diagnosis: Auricular Fibrillation.
Acromegaly.

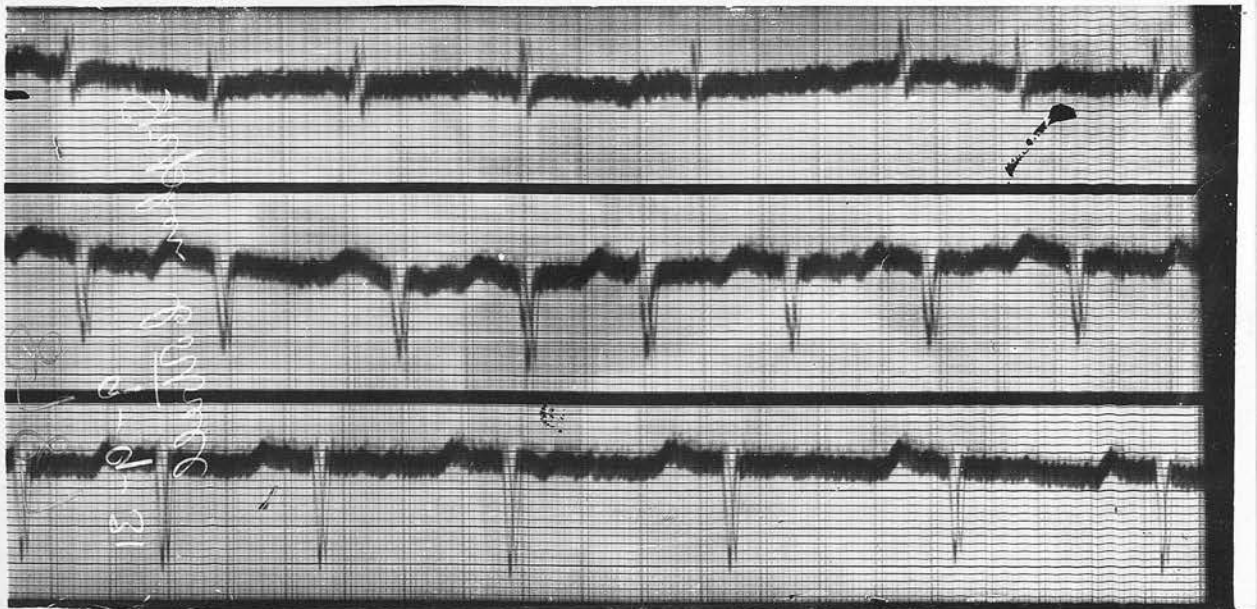
Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.583			.551	.568	.562		
Haemoglobin %	80			77	79			
Refractive Index	134.5			134.45	134.7	134.69		
Blood Chloride in mgs. %	500			485	495			
Blood Urea in mgs. %								
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	67.1			62.3	52.6			
Blood Viscosity	6.8			7	6.4			
Venous Pressure in inches	2½			None	2½			
Weight in stones and lbs.	11- 9 11- 7			11- 5½ 11- 2½ 10-13 10-12½ 10-12	10-10 10-11 10-10¼ 10-10¼ 10- 7½ 10- 8½			
Fluid Intake in ozs.	36 36			160 160 160 160 160	140 140 140 126 122 120			
Urine, 24 hrs., in ozs.	42			110 158	78 120 132 96			
Urine Chloride in mgs. %	875			930 100	750 730 550 600			

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test
Depression of Freezing Point (Osmotic Pressure)			
Sp. Gravity			
Urea %			

Case 6.



Diagnosis: 90% - regular - sinus - rhythm - sinus - tachycardia
1951



Case 7.

Age, 34.

Sex, Female.

Complaint: Choking sensation - quickly tired - swelling of feet.

History: Patient has recently become very dyspnoeic and soon gets exhausted - cannot do ordinary housework and frequently experiences choking sensation with palpitation. Epigastric pain especially after food.

Previous History: Tonsillitis, twice.
No Chorea, nor Rheumatic Fever.

Examination: Nutrition good - cyanosis - pulsation neck - anxious expression.

Pulse: 90 - regular - volume poor - vessels palpable.

B.P.: 122/84.

Heart: Apex beat - 6th space, 4" - diffuse.

Auscultation: Aortic diastolic - soft, mitral systolic.

Liver: Slightly enlarged - no ascites.

Oedema - feet and ankles.

Wassermann: --

Diagnosis: Myocarditis.

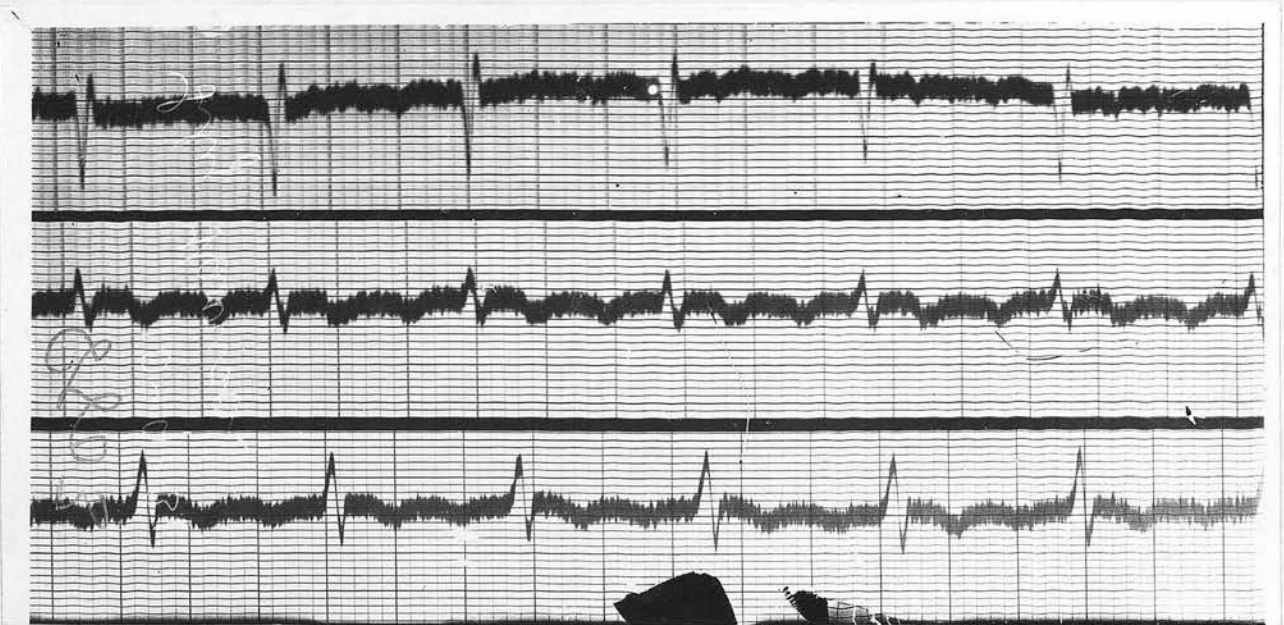
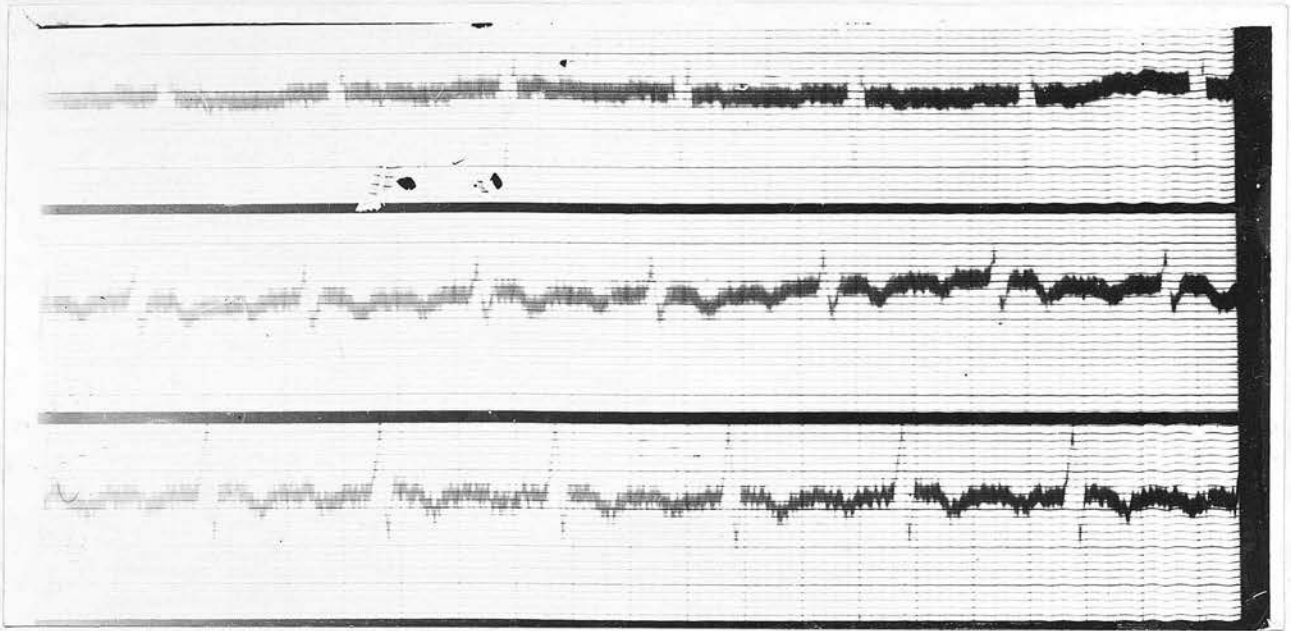
RESULTS

Case 7.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.551			.562	.592			
Haemoglobin %	82			80	85			
Refractive Index	134.7			134.95	134.69			
Blood Chloride in mgs. %	580			500	570			
Blood Urea in mgs. %								
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	47.7			42.9	47.7			
Blood Viscosity	7.6			8	8.2			
Venous Pressure in inches	8			14½	13			
Weight in stones and lbs.	14- 0			14- 1½ 13-12½ 13-12½ 13-12½ 13-11½	14- 4½ 14- 9			
Fluid Intake in ozs.	36			120 120 120 120 100	120 120 112 80 52			
Urine, 24 hrs., in ozs.	18			62 87½ 80 83 44	22 16 12 30 41			
Urine Chloride in mgs. %	675			150 105 775 65	55 800 775			

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test
Depression of Freezing Point (Osmotic Pressure)			
Sp. Gravity			
Urea %			

Case 7.



Case 8.

Age, 17.

Sex, Female.

Complaint: "Bad heart" for some years.

History: Health has been poor for many years. Has been in hospital several times on account of heart. Very breathless: unable to walk any distance even on level. Feet swell up. Had attacks of palpitation.

Previous History: Rheumatic Fever 12 years ago.
Recurrent attacks Tonsillitis.
Influenza and Measles.

Examination:

Pulse: 90-95 - irregular - poor volume - tension low.

B.P.: 100/60.

Heart: Apex beat - 6th space, $4\frac{1}{2}$ " - forcible thrust.

Liver: Enlarged - some ascites.

Oedema of feet and legs.

Lungs: Basal congestion.

Wassermann: --

Diagnosis: Auricular Fibrillation.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.563			.592	.587			
Haemoglobin %	77			81	77			
Refractive Index	134.4			134.9	134.7			
Blood Chloride in mgs. %	500			505	500			
Blood Urea in mgs. %								
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	52.6			57.4	57.4			
Blood Viscosity	7.2			7.6				
Venous Pressure in inches	5½			11½				
Weight in stones and lbs.	6- 1½			6-2½ 6-1¾ 6-2	6-7½ 6-8½ 6-7¼			
Fluid Intake in ozs.	24 24			140 140 140 150	120 120 30			
Urine, 24 hrs., in ozs.	24 41			143 120 100 85	24 8 14			
Urine Chloride in mgs. %	500			130	650 1195 700			

Renal Efficiency Tests

Dilution

Concentration

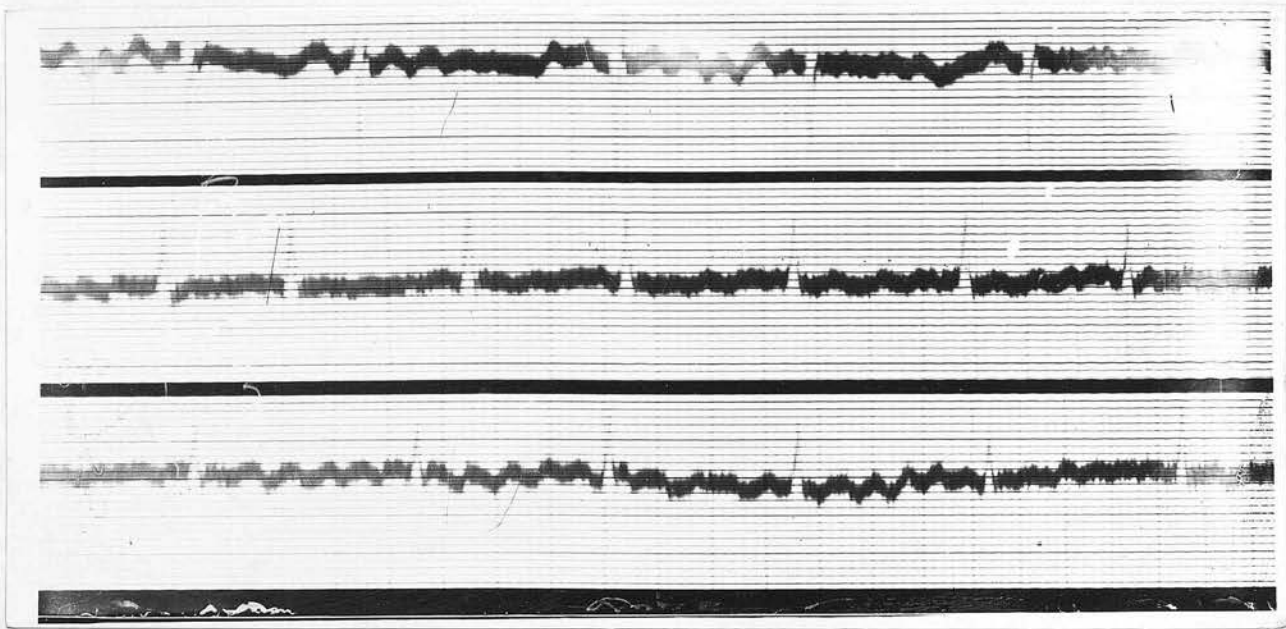
Urea % Excretion Test

Depression of Freezing Point (Osmotic Pressure)

Sp. Gravity

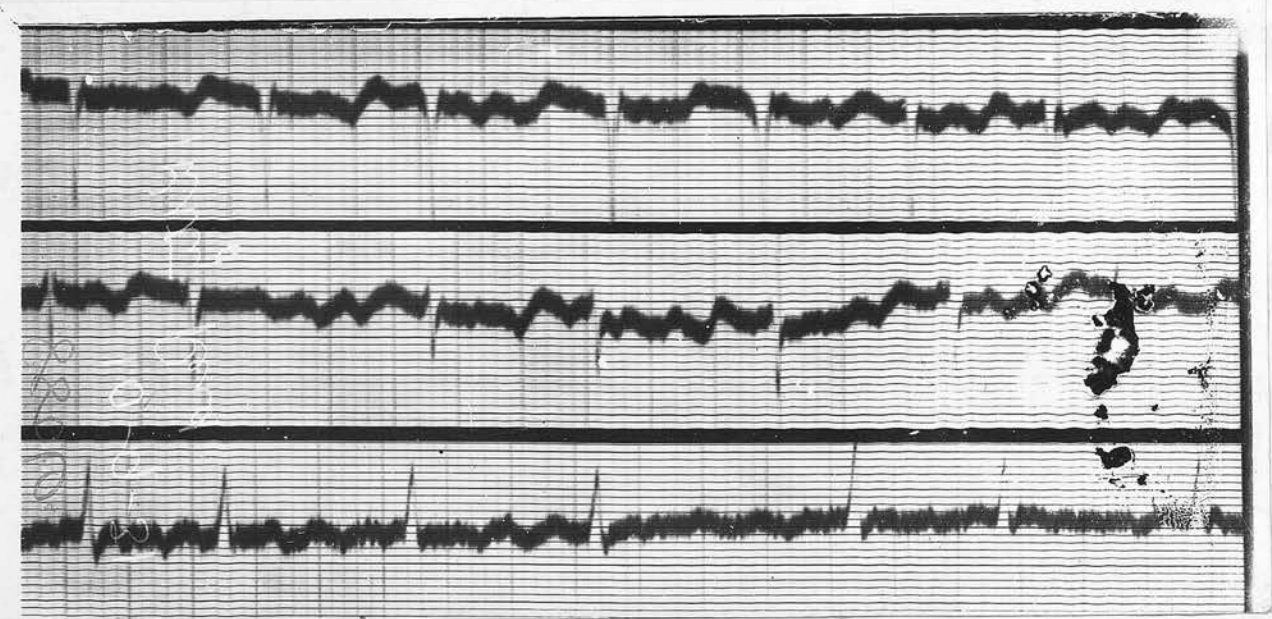
Urea %

Case 8



Examination: Pulse - irregularly irregular - bounding
Systolic in 100 - diastolic in 60

ECG: 100 - 60 - 100 - 60 - 100 - 60



Case 9.

Age, 43.

Sex, Male.

Complaint: Pain in chest going down left arm.

History: Anginal attacks occurring at night and causing vomiting - first began some years ago but now are much more frequent. Are not associated with exercise. Patient becomes conscious of heart beat and feels rate gets much quicker. Accompanied by marked dyspnoea.

Previous History: 1909 - Gonorrhoea and Syphilis.
1918 - Discharged Navy for Neurasthenia.
1924 - Acute Rheumatism.
Bronchitis frequently.

Examination: Pale - anxious expression - leaping pulsation in neck - capillary pulsation.

Pulse: 90 - regular - water hammer - vessels thickened.

B.P.: 130/730.

Heart: Apex beat - 6th space, $6\frac{1}{2}$ " - forcible - systolic thrill.

Auscultation: Double aortic murmur - systolic mitral.

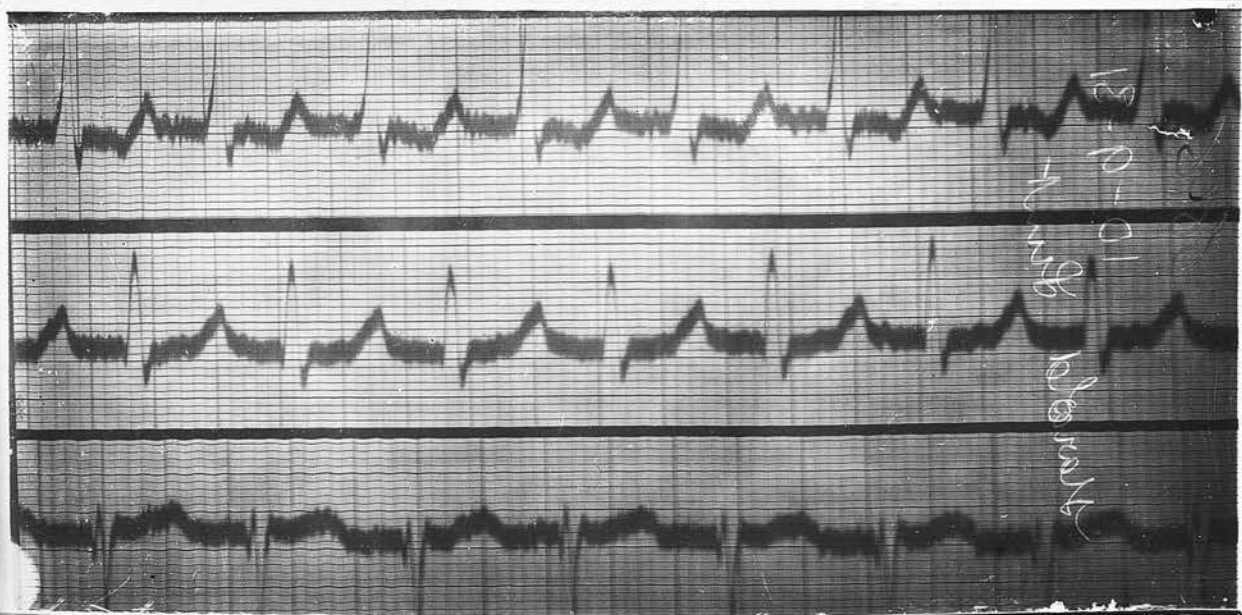
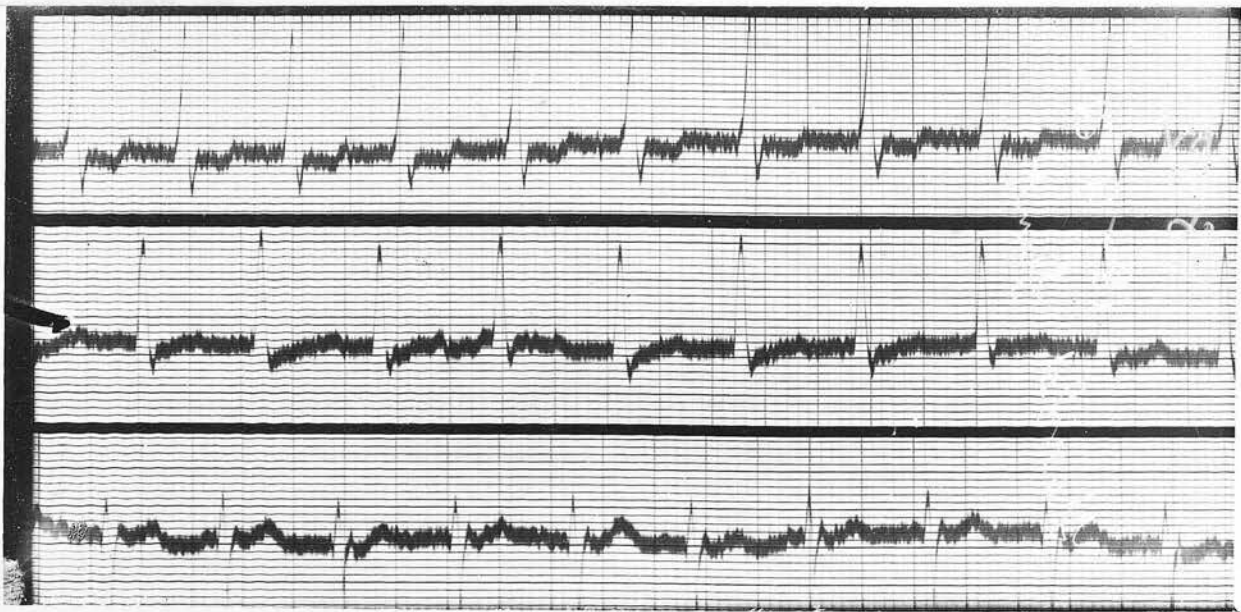
Liver: Not enlarged.

No Oedema.

Wassermann: + +

Diagnosis: Endocarditis and Aortitis.

Case 9.



Case 10.

Age, 46.

Sex, Male.

Complaint: Shortness of breath and weakness.

History: Five months ago had pneumonia. Since then health has been indifferent. Unable to return to work. Easily tired, breathless, and feet swell up. Occasional pain in chest and cough.

Previous History: Nil.

Examination: Nutrition poor - cyanosis - pulsation in neck.

Pulse: 94. Regular, poor volume.

Arteries: Very sclerosed.

B.P.: 188/135.

Heart: Apex beat - 5th space, 4" from M.S.L. - diffuse - marked dilatation right heart.

Sounds - 1st mitral - mid-sternal - soft aortic diastolic.

Lungs: Congestion both bases.

Liver: Enlarged - ascites -

Oedema of legs.

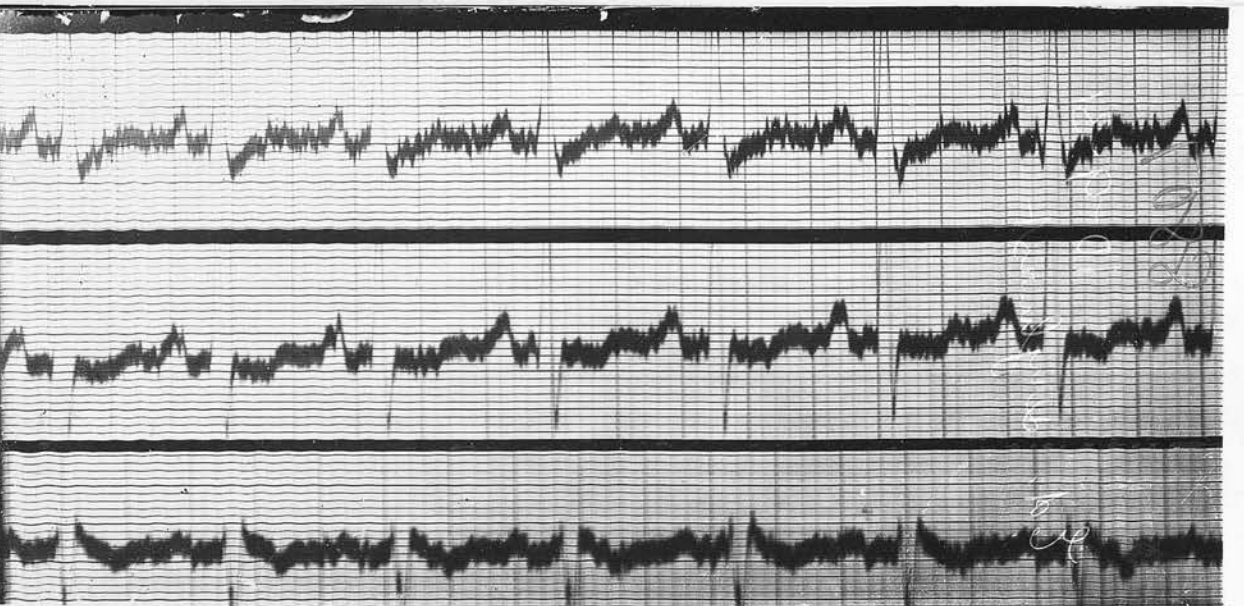
Wassermann + +

Diagnosis: Myocarditis.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.558			.541	.552	.645		
Haemoglobin %	78			79	80			
Refractive Index	134.99			134.8	134.49	134.82		
Blood Chloride in mgs. %	480			520	495	427.5		
Blood Urea in mgs. %								
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	71.9			52.6	71.9			
Blood Viscosity	7.6			7.6	7.4			
Venous Pressure in inches	11½			8½	-			
Weight in stones and lbs.	9- 1			9- 3 9- 2¼ 8-13	8-13 9- 3			
Fluid Intake in ozs.	16			63 44 46 76 60	110 100 56 39			
Urine, 24 hrs., in ozs.	12			10 50 44 50	24 33 20 10			
Urine Chloride in mgs. %				100	275 350			

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test
Depression of Freezing Point (Osmotic Pressure)			
Sp. Gravity			
Urea %			

Case 10



Case 11.

Age, 21.

Sex, Female.

Complaint: Swelling of legs, shortness of breath.

History: Four years ago had acute rheumatism for second time since when health has never been good - work impossible. After hospital treatment recovered somewhat for a month or two but then relapsed. Improvement and relapse have followed one another several times in past few years. Present is worst attack. Palpitation and praecordial pain sometimes. Cough and shortness of breath severe. Feet very swollen.

Previous History: Rheumatic fever 12 years ago.

Examination: Dyspnoea - cyanosis - pulsation in neck.
Nutrition poor.

Pulse: 140, irregular - poor volume, low tension.
walls soft.

B.P.: 120/70?

Heart: Apex beat - 6th space, $4\frac{1}{2}$ " from M.S.L. -
diffuse - retraction of interspaces.

Sounds: Harsh systolic at mitral -
diastolic.

Lungs: Congestion.

Liver: Enlarged, pulsating. Ascites.

Oedema of legs.

Wassermann: -

Diagnosis: Rheumatic Carditis.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.579		.543		.555		-	.496
Haemoglobin %	88.5		86		84		80%	
Refractive Index	134.74		134.6		135		134.7	133.8
Blood Chloride in mgs. %	415		460		420			390
Blood Urea in mgs. %	-		-		-			
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	52.6		57.8		67.2			52.8
Blood Viscosity	6.8							
Venous Pressure in inches			10		9½			
Weight in stones and lbs.	9- 5	9- 4½ 9- 4 9- 5½	9- 7 9- 6 9- 8 9- 8¾ 9- 7½		9- 7 9- 7 9- 7 9- 8¼ 9- 8			
Fluid Intake in ozs.	24 18	18 18 18	18 24 36 24 18		18 18 42 74 36			
Urine, 24 hrs., in ozs.	32 32	16 14 6 1030	15 1028 14 1030 11 1032		15½ 1030 14 - 24 1020 40 - 20 -			
Urine Chloride in mgs. %		150 - 90	- 100 100		300 - 75 425			

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test
Depression of Freezing Point (Osmotic Pressure)	.806	.846	
Sp. Gravity	-	-	1.2
Urea %			

Case 12.

Age, 69.

Sex, Female.

Complaint: Breathlessness and quickness of heart.

History: Health failing recently - unable to walk far - easily tired. Has had cough and lost some weight. Occasional giddiness.

Previous History: Nil.

Examination: Nutrition poor - cyanosis - carotid pulsation.

Pulse: 100, regular - volume good - tension high.

Arteries: Thick and hardened.

B.P.: 160/90.

Heart: Apex beat - 5th space, $6\frac{1}{2}$ ".

Sounds: Faint systolic at mitral area.
Accentuated pulmonary II.

Lungs: Emphysema. Rales and Rhonchi.

Liver: No enlargement.

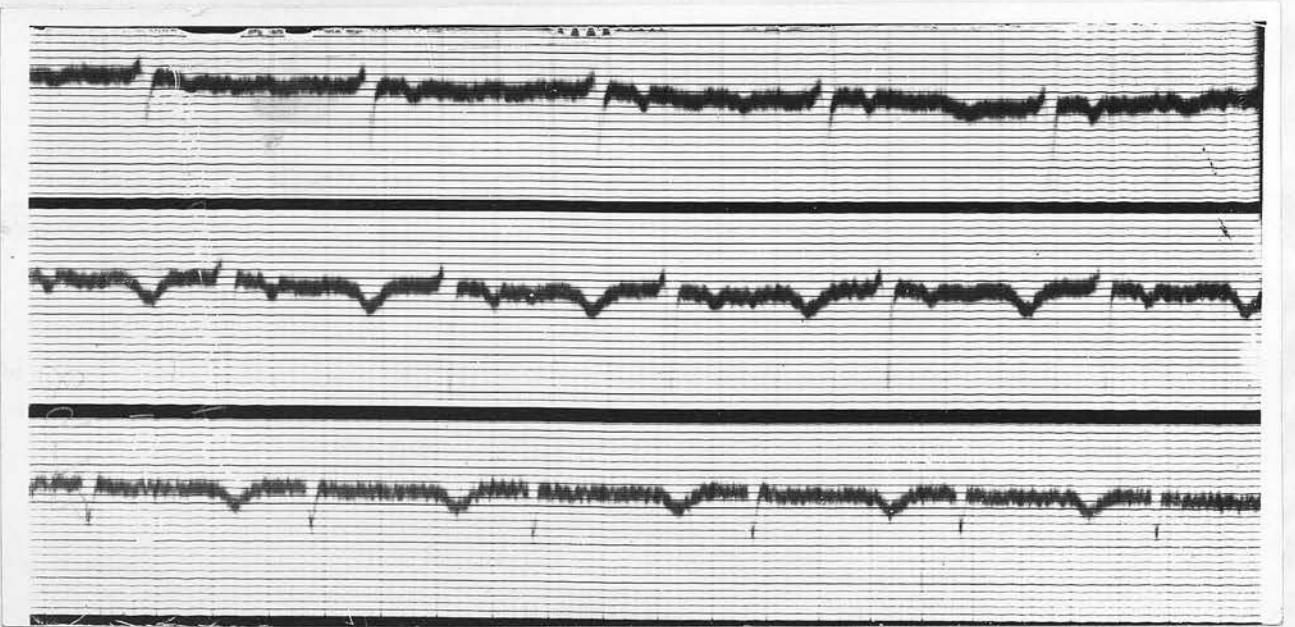
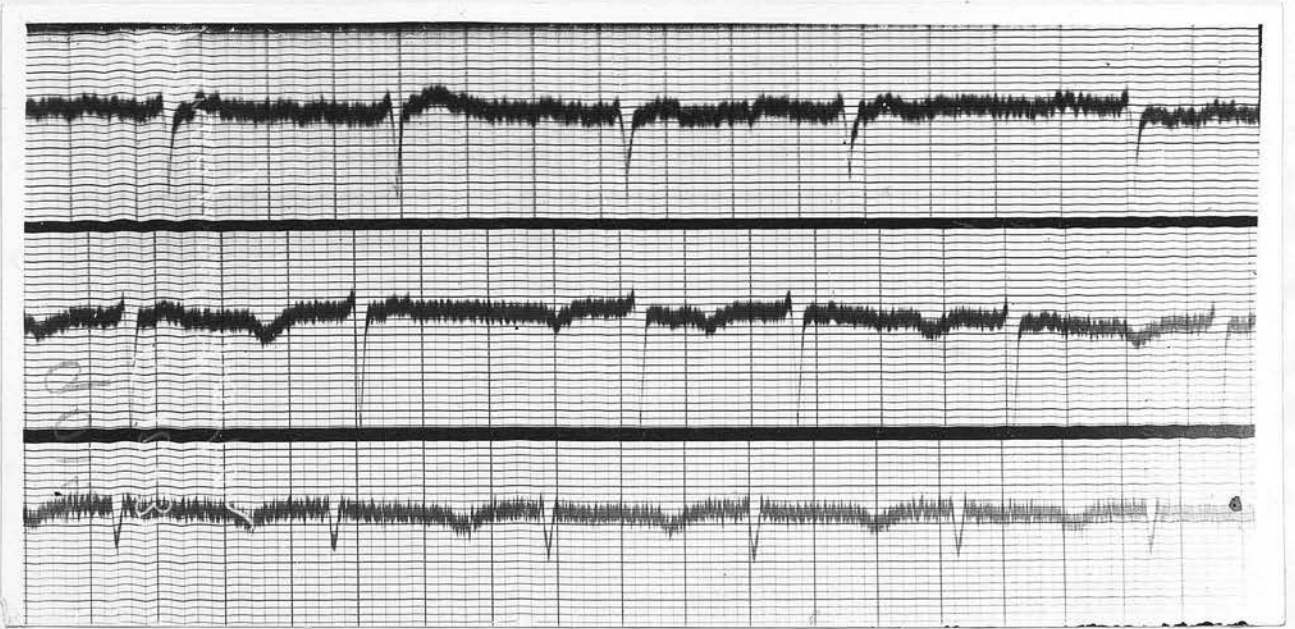
Oedema: Slight - disappears on resting.

Wassermann: --

Diagnosis: Myocarditis.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.530	.560	.545	.557	.546	.549		
Haemoglobin %	71	76	70	76	72	74		
Refractive Index	135	134.5	134.9	134.7	134.82			
Blood Chloride in mgs. %	450	502	500	500	392	450		
Blood Urea in mgs. %								
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	71.6	67.2	67.2	67.2	52.8	67.2		
Blood Viscosity								
Venous Pressure in inches	-	2	-	-	8	-		
Weight in stones and lbs.	- 7-9 7-8 $\frac{3}{4}$	7-8 $\frac{1}{4}$ 7-10 7-10	7-11 7-10 7-11 $\frac{1}{4}$	7-9 $\frac{1}{4}$ 7-8 $\frac{1}{2}$ 7-7	7-10 $\frac{1}{4}$ 7-10 7-9 $\frac{1}{2}$	7-9 7-9 7-8		
Fluid Intake in ozs.	6 30 18	20 36 44	122 64 64	18 18 18	120 36 4	40 24 30		
Urine, 24 hrs., in ozs.	48 - 22 $\frac{1}{2}$ - 14 1028	15 - 24 1028 23 -	76 - 59 $\frac{1}{2}$ - 71 -	21 1030 22 - 32 1032	91 1018 46 - 34 1020			
Urine Chloride in mgs. %	- - 550	- 250 -	350 - 850	- 850 -	800 - 585	- 175 425		
Renal Efficiency Tests		Dilution	Concentration	Urea % Excretion Test		Blood Urea		
Depression of Freezing Point (Osmotic Pressure)		.384 (1010, 1015 (1036	1.000			51 mgms. % (before) 102 " (after)		
Sp. Gravity		18 ozs. 34%	26 ozs.					
Urea %					2.4% urea			

Case 12



Case 13.

Age, 63.

Sex, Male.

Complaint: Pain in chest; swelling of feet.

History: For many years has considered he has had a bad heart on the advice of his doctor. Feels now condition is getting worse - more breathless, more easily tired, occasional giddiness, and some præcordial pain. Feet began to swell recently.

Previous History: Acute Rheumatic Fever 30 years ago. Chorea once. Tonsillitis frequently.

Examination: Ruddy complexion - good nutrition.

Pulse: 70, regular - volume good - high tension.

Arteries: Hard and thickened.

B.P.: 160/80.

Heart: Apex beat - 5th space, nipple line.

Sounds: Soft mitral systolic.

Lungs: Nil.

Liver: Slight enlargement.

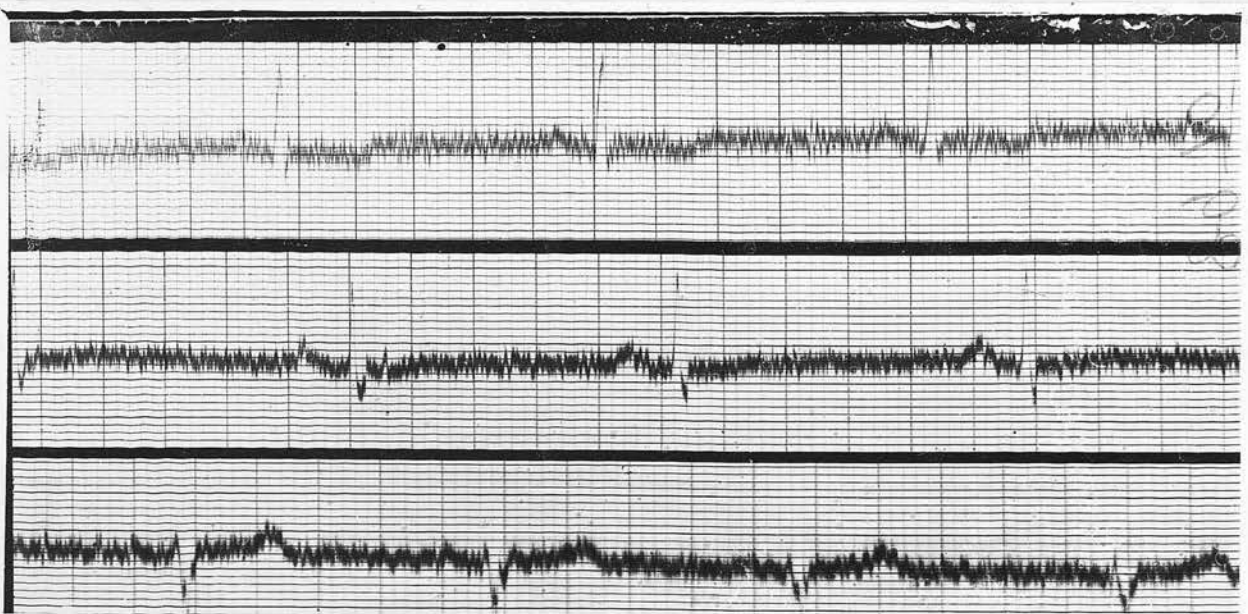
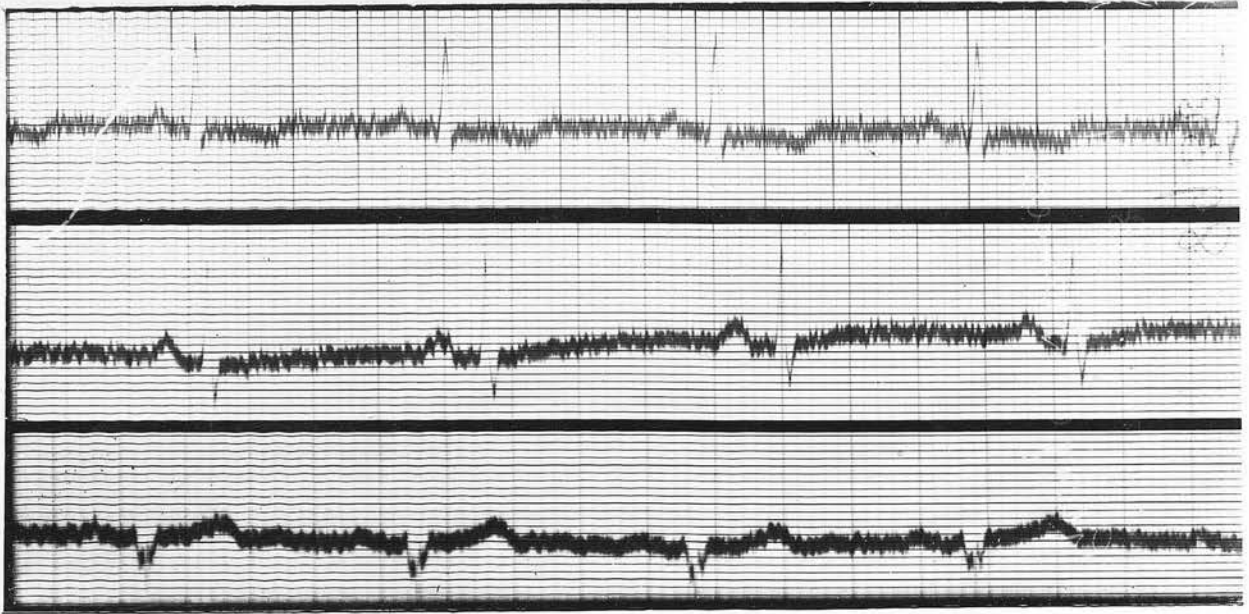
Slight Oedema feet.

Wassermann: --

Diagnosis: Myocarditis.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure		.567	.562	.575	.563	.582		
Haemoglobin %		84	91	85	88	88		
Refractive Index		-	134.5	135.	134.7	134.91		
Blood Chloride in mgs. %		400	420	390	450	450		
Blood Urea in mgs. %					65	65		
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂		52.8	52.8	-	52.8	67.2		
Blood Viscosity								
Venous Pressure in inches			15					
Weight in stones and lbs.		13- 5 $\frac{1}{2}$ 13- 5 $\frac{1}{2}$ 13- 5 $\frac{1}{2}$	13- 4 13- 4 $\frac{1}{2}$	13- 5 $\frac{1}{2}$ 13- 5 $\frac{1}{2}$ 13- 6 13- 5 $\frac{1}{4}$	13- 8 13-12 13-12 13-10 $\frac{1}{2}$ 13- 8 $\frac{1}{4}$	13- 5 13- 5 13- 6 $\frac{3}{4}$ 13- 7 13- 7 $\frac{1}{4}$		
Fluid Intake in ozs.	18	18 18 18	18 18	50 50 44 18	104 98 104 36 36	40 24 34 36 36		
Urine, 24 hrs., in ozs.	24	14 - 14 1030 14 $\frac{1}{2}$ 1030	26 - 18 1024	47 1034 54 - 46 1020 44 1020	30 - 59 1028 113 - 100 1012 44 -	47 - 21 1020 21 1030 20 1040 30 1032		
Urine Chloride in mgs. %		875 250	130 180	775 265 350 110	1250 900	680 - 575 -		
Renal Efficiency Tests		Dilution	Concentration	Urea % Excretion Test				
Depression of Freezing Point (Osmotic Pressure)		.441	1.285	2.1%				
Sp. Gravity								
Urea %		6 ozs. 5.66%						

Case 13



Case 14.

Age, 50.

Sex, Female.

Complaint: Pain in chest and feeling of sickness.

History: In indifferent health for about 6 months, and had much pain in praecordium which caused feeling of nausea. Easily tired and breathless. Sleeps badly.

Previous History: Pneumonia 14 years ago.
Acute Rheumatism, 20 years ago.
Frequent Tonsillitis.

Examination: Pale - worried-looking and ill. Poor nutrition. No cyanosis.

Pulse: 80/90, regular - volume good - low tension.

Arteries: Not thickened.

B.P.: 160/90.

Heart: Apex beat, 5th space, nipple line.

Sounds: No bruit.

Lungs: Nil.

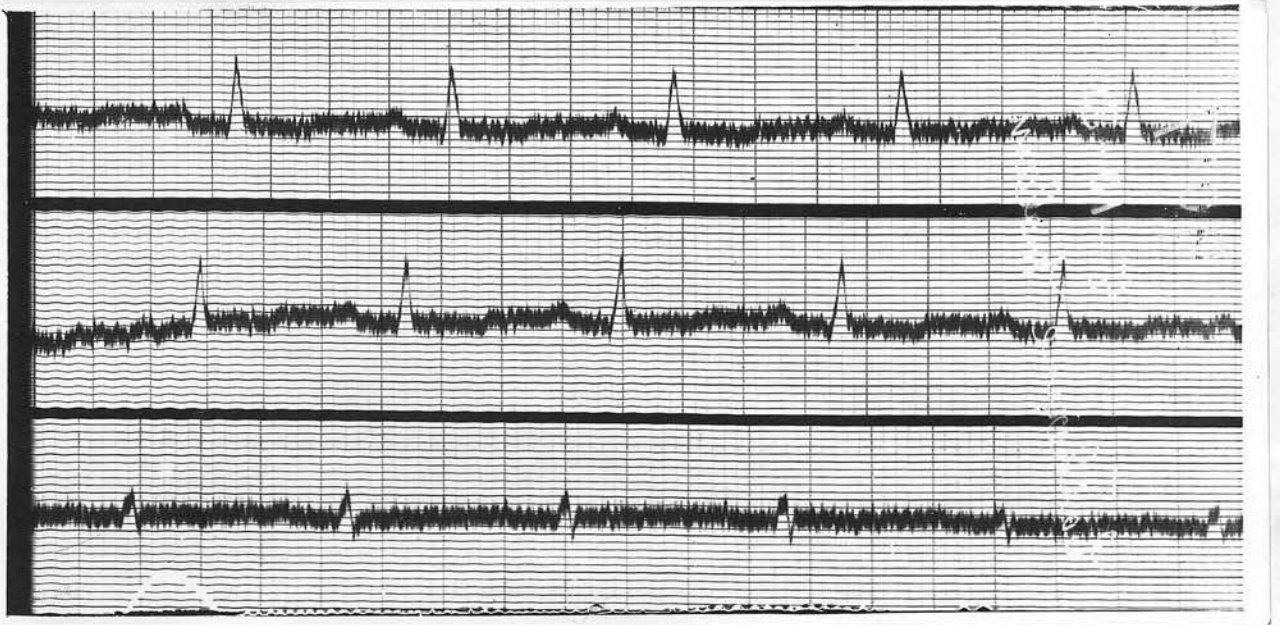
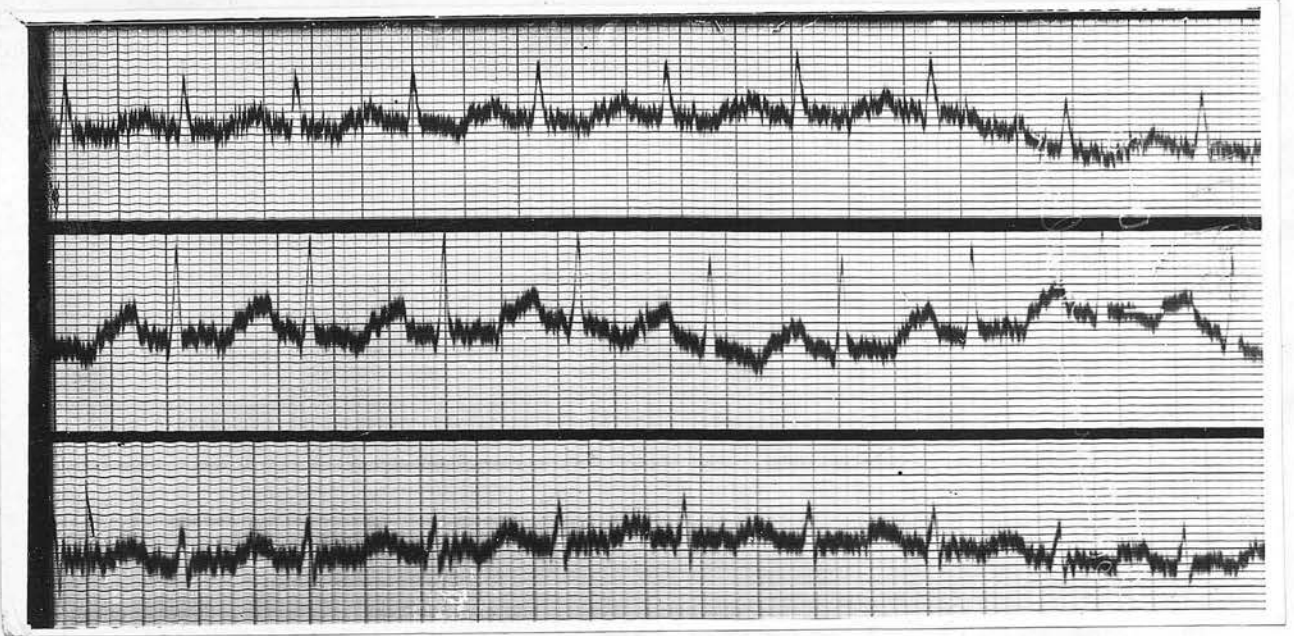
Liver: No enlargement.

No Oedema.

Wassermann: --

Diagnosis: Myocarditis.

Case 14



Case 15.

Age, 27.

Sex, Female.

Complaint: Pain in chest - shortness of breath - weakness.

History: Health has recently become gradually worse after Influenza attack 3 months ago, but previously had some trouble with heart about 3 years ago, when she had to remain in bed for some time. Feels pain in chest, has cough, some loss of weight. Amenorrhoea for 6 months.

Previous History: Acute Rheumatism 12 years ago.
Measles.

Examination: Nutrition poor - cyanosis - irregular pulsation.

Pulse: 110, irregular - poor volume.

B.P.: 130/70?

Heart: Apex beat, 6th space, 6½" from M.S.L.
Right border 2½" from sternum.

Sounds: Mitral systolic - loud and harsh.

Tricuspid systolic.
Soft Aortic diastolic.

Lungs: Congested.

Liver: Enlarged and pulsating. Ascites.

Oedema of legs.

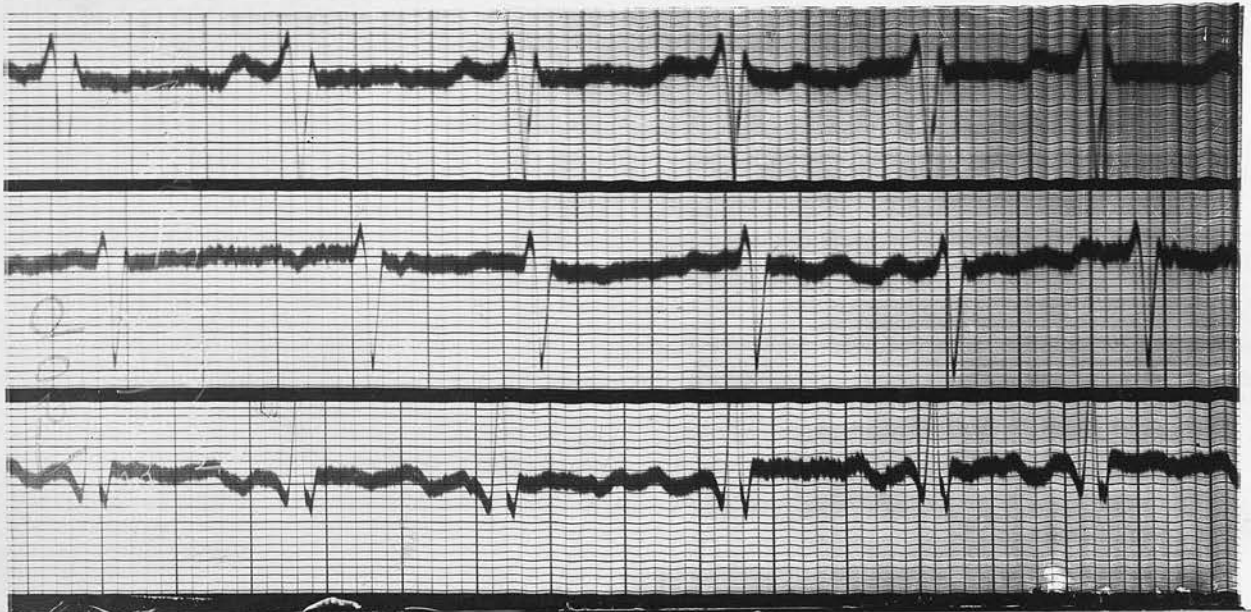
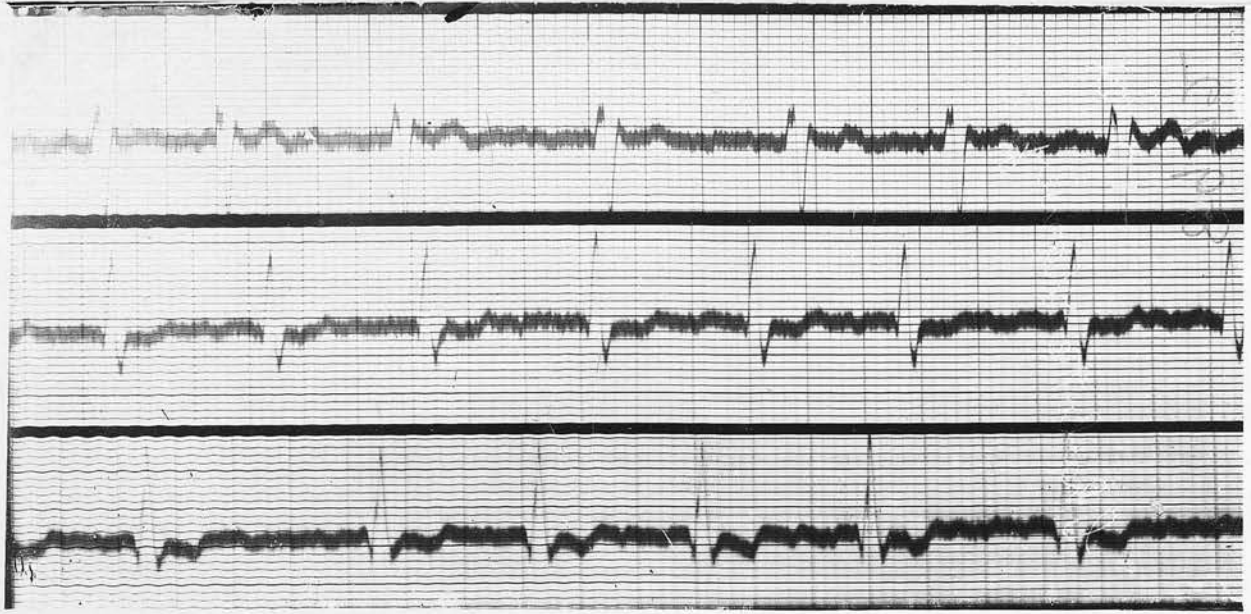
Wassermann: +

Diagnosis: Rheumatic Carditis.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.522	.579		.531	.533		.580	.539
Haemoglobin %	73.4	75		75	65			
Refractive Index	134.75	134.6		134.7	134.52		135	133.8
Blood Chloride in mgs. %	415	360		400	540		500	594
Blood Urea in mgs. %	-	-		65	57		49	31
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	22	38.2			43.3		43.3	38.2
Blood Viscosity								
Venous Pressure in inches	-	6			14			
Weight in stones and lbs.	9- 4 $\frac{3}{4}$	9- 4 9- 3 9- 3 $\frac{1}{4}$	9- 5 9- 4 $\frac{1}{4}$ 9- 3 $\frac{1}{4}$	9- 5 9- 5 9- 5 $\frac{1}{2}$	9- 6 $\frac{1}{2}$ 9- 6 9- 11	9- 11 $\frac{1}{2}$		
Fluid Intake in ozs.	6	18 18 24	18 18 18	30 24 24	100 100 30	40		
Urine, 24 hrs., in ozs.	6	6 - 12 - 15 1020	31 1020 16 1012 22 1015	8 1020 Retention 22 1020	24 - 16 1020 9 1020	9 1028 7 1028		
Urine Chloride in mgs. %		- 390 -	- 200 -	380 - 380	330 570 -	490 590		

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test
Depression of Freezing Point (Osmotic Pressure)	.989	1.312	1.8
Sp. Gravity			
Urea % Total Quantity	4 ozs. 7.56%		

Case 15



Case 16.

Age, 58.

Sex, Male.

Complaint: Swelling of legs.

History: Was in hospital 3 months ago for same complaint and recovered completely after a rest of some weeks. Has also severe cough and occasional pain in chest not radiating.

Previous History: Nil.

Examination: Cyanosis - nutrition good - slight dyspnoea, jugular pulsating.

Pulse: 80, regular - good volume - high tension.

B.P.: 220/125?

Heart: Apex beat, 5th space, 4½" from M.S.L.

Lungs: Hydrothorax.

Liver: Enlarged - pulsation - ascites.

Oedema of legs.

Wassermann: +

Diagnosis: Myocardial Failure following Hyperpiesia.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.562	-	.566	.575	.583			
Haemoglobin %	86	-	92	91	90			
Refractive Index	134.95	-	135	134.7	134.8			
Blood Chloride in mgs. %	400		390	395	480			
Blood Urea in mgs. %	-	-	102	-	78			
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	57.2	-	52.8	67.2	52.8			
Blood Viscosity								
Venous Pressure in inches	8	-	9	14½				
Weight in stones and lbs.	15- 0½	14-11½ 14- 7 14- 8½	14- 9 14- 4½ 14- 2	14- 8 14- 8 14-10	14- 4¾ 14- 8 -			
Fluid Intake in ozs.	8	18 18 18	18 18 18	70 76 60	120 104 42			
Urine, 24 hrs., in ozs.	-	50 1018 31 1030	30 1028 34 1020	20 1030 28 1032	24 1022 14 1032 12 1035			
Urine Chloride in mgs. %	-	- 515 530	- 730 240	- 450 420	- 500 450			

Renal Efficiency Tests

Dilution

Concentration

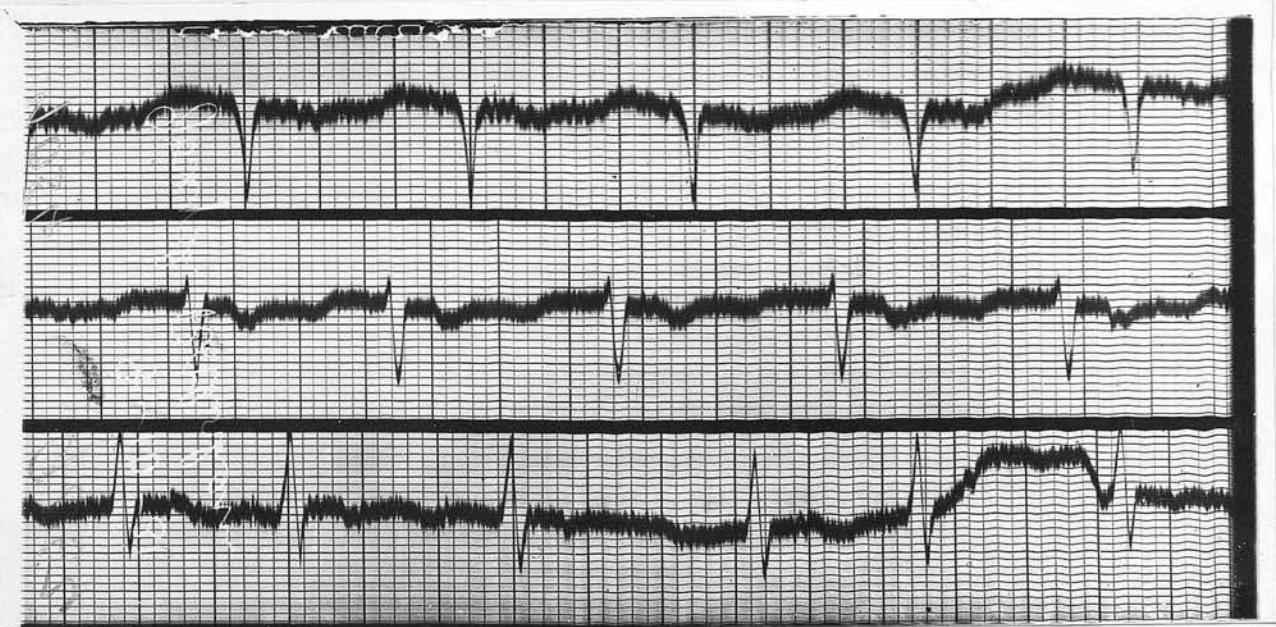
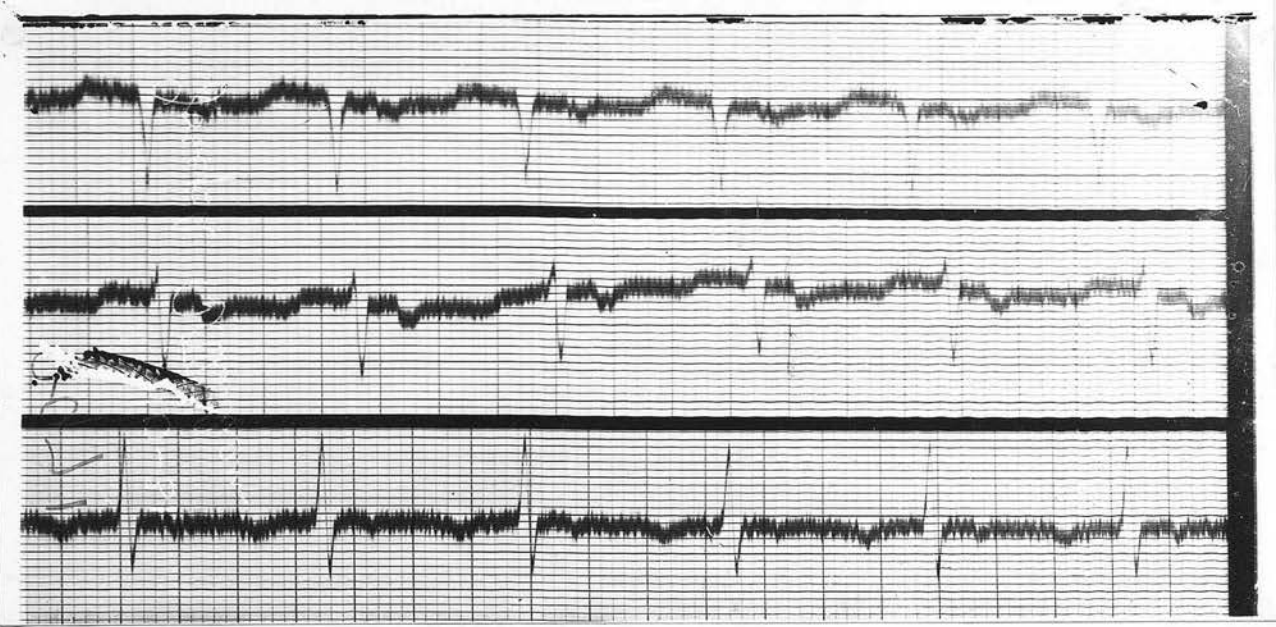
Urea % Excretion Test

Depression of Freezing Point (Osmotic Pressure)

Sp. Gravity

Urea %

Case 16



Case 17.

Age, 17.

Sex, Male.

Complaint: Pain in stomach - swelling of face.

History: 14 weeks ago began to feel ill and noticed swelling of face, then of legs and scrotum. Had to discontinue work and was sent to hospital. Recovered but symptoms returned in a few weeks.

Previous History: Nil.

Examination: Pale, swollen face. No dyspnoea.

Pulse: 80, regular - good volume - tension normal.

B.P.: 104/58.

Heart: Apex beat, 5th space, 3½" from M.S.L.

Sounds: No bruit.

Lungs: Nil. Slight Ascites.

Oedema of legs.

Urine: Gross Albuminuria.

Blood showed lipaemia.

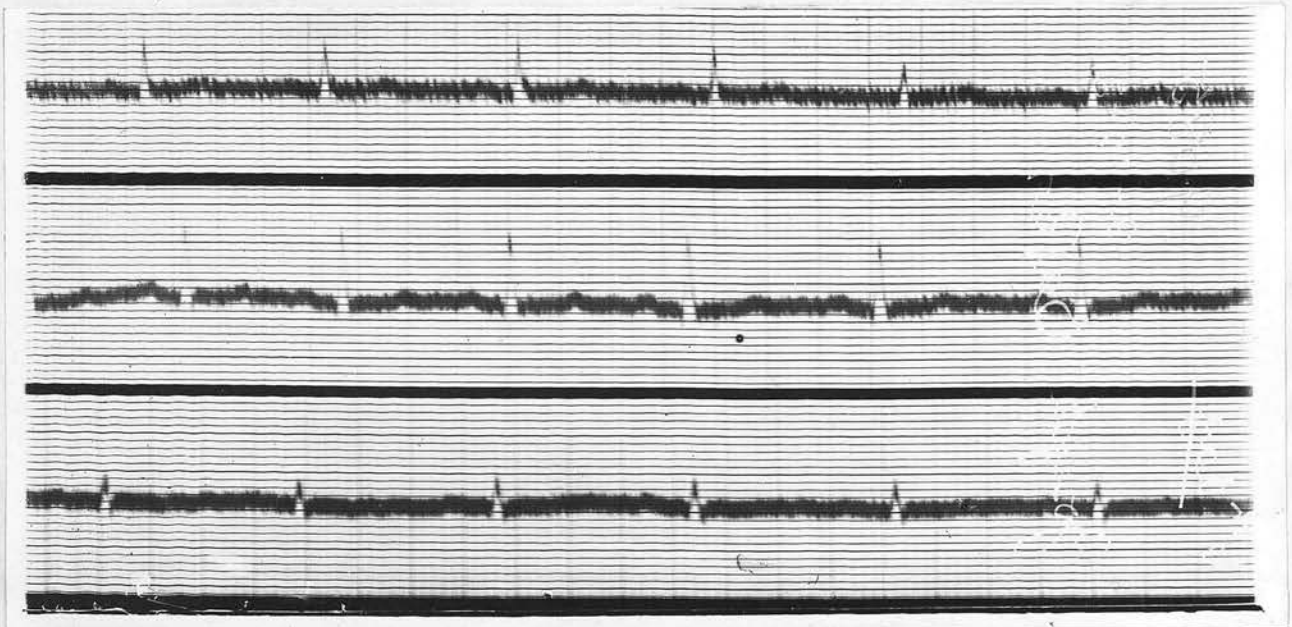
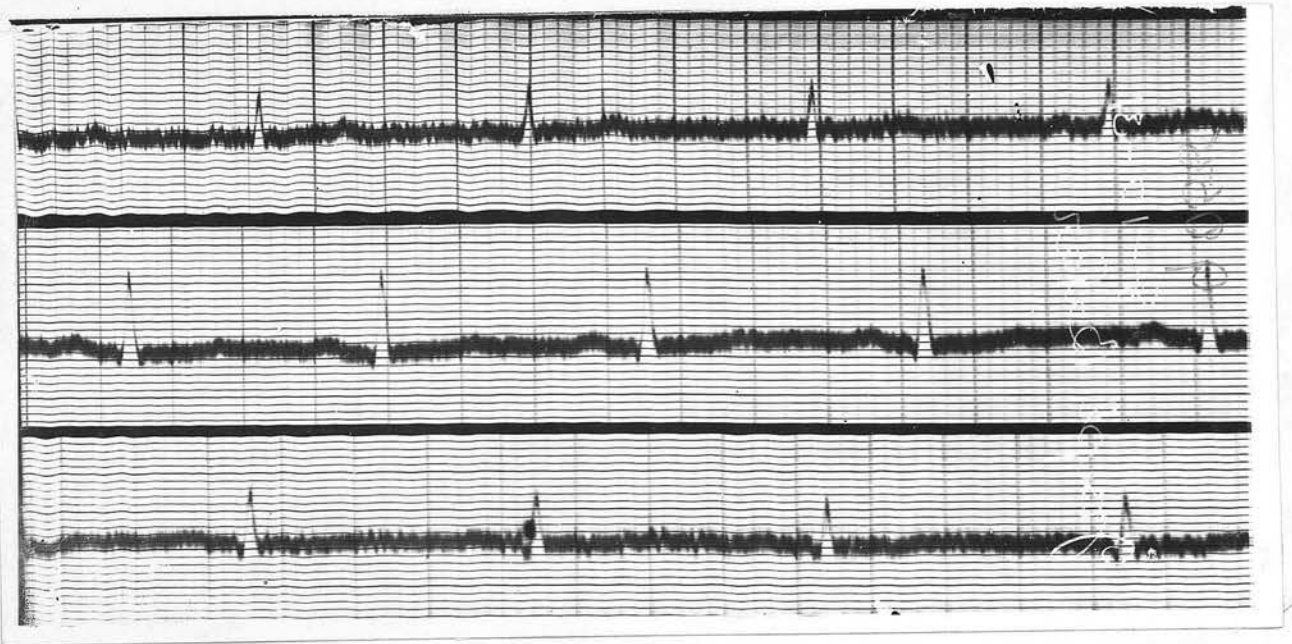
Wassermann: --

Diagnosis: Nephrosis.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.577	.567	.558	.569	.588	.553		
Haemoglobin %	92	92	88	88	86	90		
Refractive Index	134.6	134.5	134.54	134.7	134.58	135.0		
Blood Chloride in mgs. %	390	474	345	350	435	390		
Blood Urea in mgs. %	68	73	102	85	90	78		
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	57	43	52.8	45	38.5	43.3		
Blood Viscosity								
Venous Pressure in inches	2	3	10½	2		4½		
Weight in stones and lbs.	11-12	11-12 11-12½ 11-12¾	12- 5½ 12- 5 12- 7	12- 1 12- 3½ 12- 5¼	12- 8 12-12½ 12-13	12-13½ 13- 1½ 13- 1½		
Fluid Intake in ozs.	42	18 18 18	18 18 18	60 60 42	64 60 55	42 36 40		
Urine, 24 hrs., in ozs.	44 1020	49 1026 28 1030 14 1044	16 1030 36 1024 20 1028	12 1046 12 1040 12 1040	28 1020 28 1030 24 1030	24 1032 58 1024 22 1028		
Urine Chloride in mgs. %	300	256 300 400	50 150 10	80 100 absent	absent 20 10	absent 75 125		

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test	Blood Urea
Depression of Freezing Point (Osmotic Pressure)	.956	1.688	1.200	78 (after)
Sp. Gravity	1028	1040	1030	68 (before)
Urea %	0.70	1.9	1.7	

Case 17



Case 18.

Age, 47.

Sex, Male.

Complaint: Swelling of face and legs. Pain in stomach.

History: Four weeks ago noticed swelling of face, especially in the morning on rising. There was also a little swelling of feet. Occasional pains in stomach, not definitely localised.

Previous History: Rheumatic Fever 14 years ago and ? Typhoid.

Examination: Swollen face.

Pulse: 84, regular - volume good.

B.P.: 155/105.

Heart: Apex beat, 5" space, inside nipple line. No murmurs.

Liver: Not enlarged. Swelling of feet.

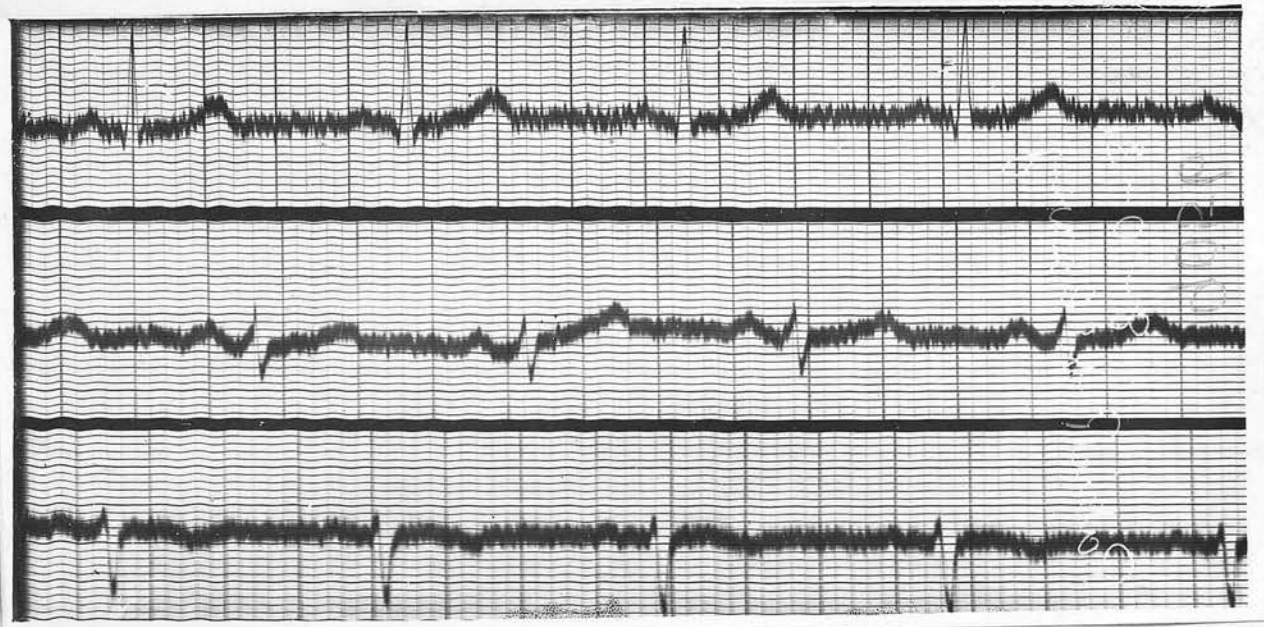
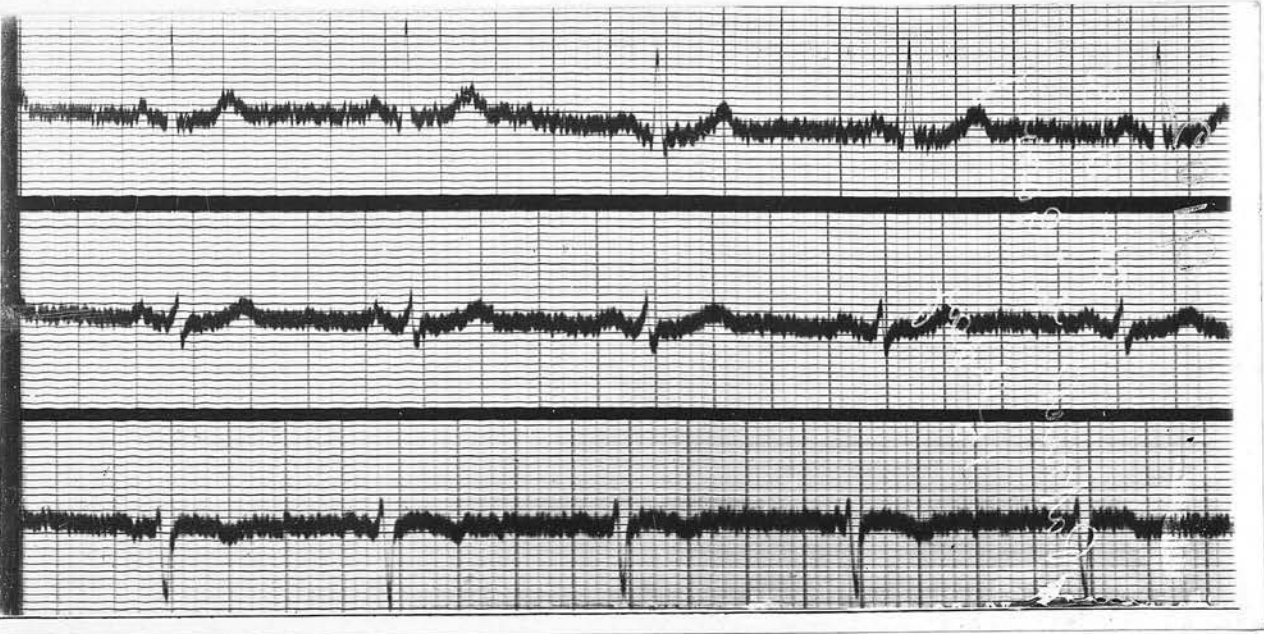
Urine: Albumin + +
Casts + +

Wassermann: --

Diagnosis: Parenchymatous Nephritis.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.596	.552	.565	.598	.587	.559		
Haemoglobin %	88	90	88	86	82	88		
Refractive Index	134.42	134.52	134.42	134.42	134.32	134.52		
Blood Chloride in mgs. %	420	425	430	450	465	450		
Blood Urea in mgs. %	44	51	49	45	41.5	24		
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	48	45	57.2	38.5	38.5	48		
Blood Viscosity								
Venous Pressure in inches	$\frac{1}{2}$	$\frac{1}{2}$	-	$2\frac{1}{2}$		5		
Weight in stones and lbs.	12- $1\frac{1}{4}$	12- $1\frac{1}{2}$ 12- $2\frac{1}{2}$ 12- 1	12- 1 11- $13\frac{3}{4}$ 12- 0	12- 1 12- $0\frac{3}{4}$ 12- $3\frac{3}{4}$	12- $0\frac{3}{4}$ 12- $4\frac{1}{4}$ 12- 8	12- 8 12- 8 12- $7\frac{1}{2}$		
Fluid Intake in ozs.	24	18 18 18	18 18 18	52 60 36	62 60 55	20 24 40		
Urine, 24 hrs., in ozs.	24 1024	11 1030 14 1028 20 1028	16 1024 18 1030 16 1032	12 1040 26 1030 44 1020	12 1038 14 1030 10 1040	12 1040 18 1038 18 1040		
Urine Chloride in mgs. %	250	400 300 350	10 90 absent	500 180 80	150 250 675	450 950 650		
Renal Efficiency Tests		Dilution	Concentration	Urea % Excretion Test		Blood Urea		
Depression of Freezing Point (Osmotic Pressure)		1.593	1.953	1.672		65 (after) 44 (before)		
Sp. Gravity		1030	1040	1038				
Urea %		.95	1.4	1.1				

Case 18.



Case 19.

Age, 71.

Sex, Male.

Complaint: Giddiness - occasionally felt heart beating quickly.

History: Been conscious of failing health for some time. Attacks of dizziness and palpitation. Easily tired and incapable of much exertion.

Previous History: Gout for 10 years. Bronchitis for about 6 or 7 years. Glaucoma 3 years ago.

Examination: Nutrition good - no cyanosis - pulsation in neck.

Pulse: 80/90, irregular - volume poor - vessels palpable and hard.

B.P.: 190/90?

Heart: Apex beat, 6th space, 7½" from mid-line - diffuse - forcible.

Sounds: Systolic and mitral area.

Liver: Not enlarged - no ascites.

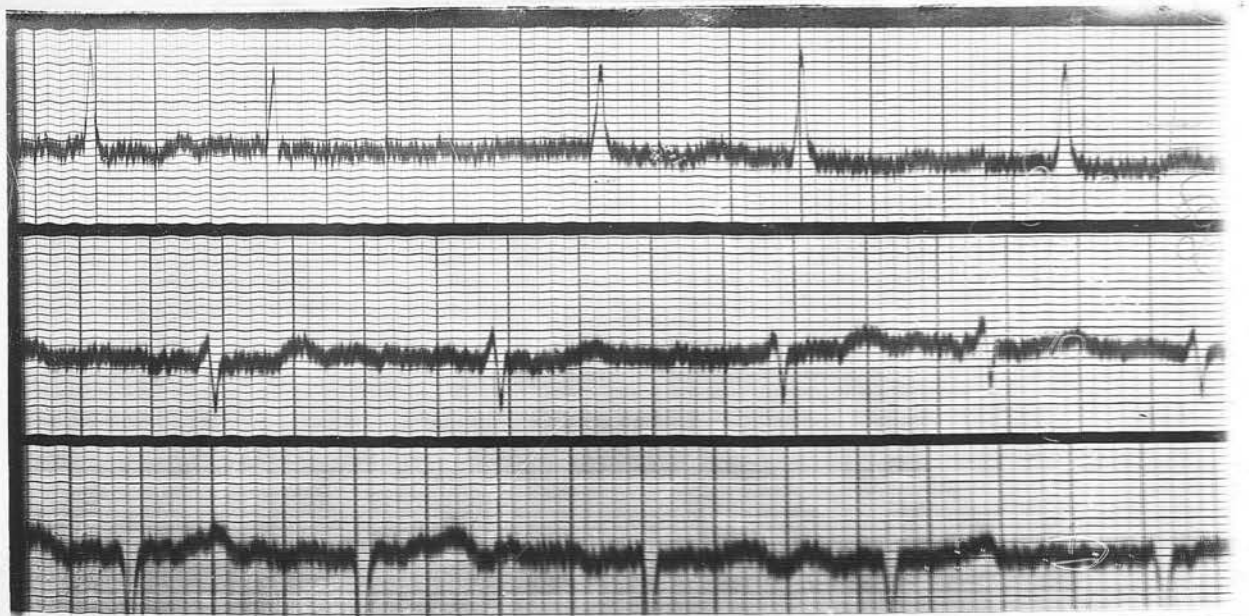
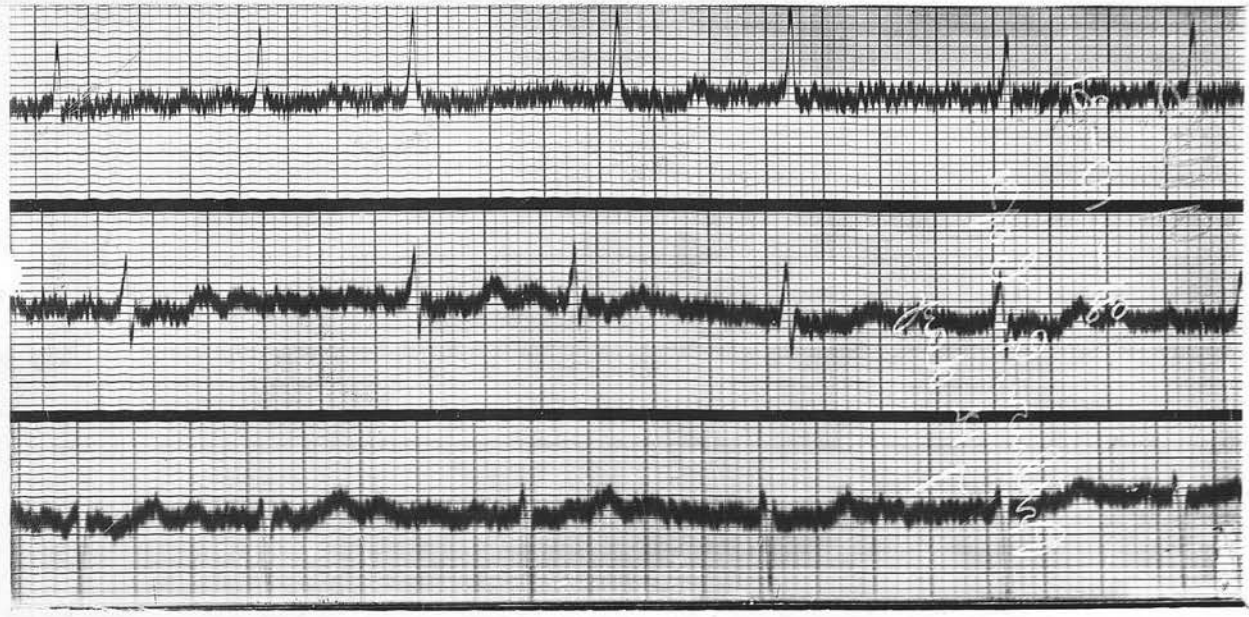
No Oedema feet.

Wassermann: --

Diagnosis: Auricular fibrillation.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.565	.590	.585	.566	.564	.572		
Haemoglobin %	91	88	93	95	91	92		
Refractive Index	134.7	134.62	134.80	134.72	134.78	134.70		
Blood Chloride in mgs. %	510	540	450	390	420	480		
Blood Urea in mgs. %	44	37	27	41	37	44		
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	52.8	52.8	52.8	52.8	33.8	52.8		
Blood Viscosity								
Venous Pressure in inches	3			6	9			
Weight in stones and lbs.	10- 1	10- 1½ 10- 1 10- 1	9-13½ 9-13½ 10- 0	10- 3 10- 1½ 10- 1½	10- 3½ 10- 4 10- 5½	10- 4 10- 5 10- 3½		
Fluid Intake in ozs.	24	18 18 18	18 18 18	64 90 66	120 90 100	36 36 40		
Urine, 24 hrs., in ozs.	16 1028	22 1034 24 1040 20 1040	53 1020 28 1020 16 1030	16 1040 51½ 1015 28 1020	30 1028 42 1030 90 1022	100 1020 30 1032 44 1030		
Urine Chloride in mgs. %	500	420 500 940	10 25 250	775 40 85	absent 550 850	890 1005 425		
Renal Efficiency Tests		Dilution	Concentration	Urea % Excretion Test		Blood Urea		
Depression of Freezing Point (Osmotic Pressure)		.253	1.396	1.298		85 (before) 113 (after)		
Sp. Gravity		1004	1024	1024				
Urea %		.18	2%	1.7				
Amount		28	2 ozs.	4 ozs.				

Case 19



Case 20.

Age, 48.

Sex, Female.

Complaint: "Neuritis" - swelling of feet in evening.

History: Pain in left arm for 5 weeks - dyspnoea on exertion and swelling of feet in evenings. Occasional cough, especially after exercise, and some indigestion.

Previous History: Acute Rheumatism ? 4 years ago.
Scarlet Fever 36 years ago.

Examination: Nutrition good - malar flush - no pulsation in neck.

Pulse: 80/90, irregular - volume poor - tension low.

Arteries: Thickened and palpable.

B.P.: 170/90.

Heart: Apex beat, 5th space, 3½".

Sounds: Mitral systolic.

Liver: Not enlarged - no ascites.

Slight oedema.

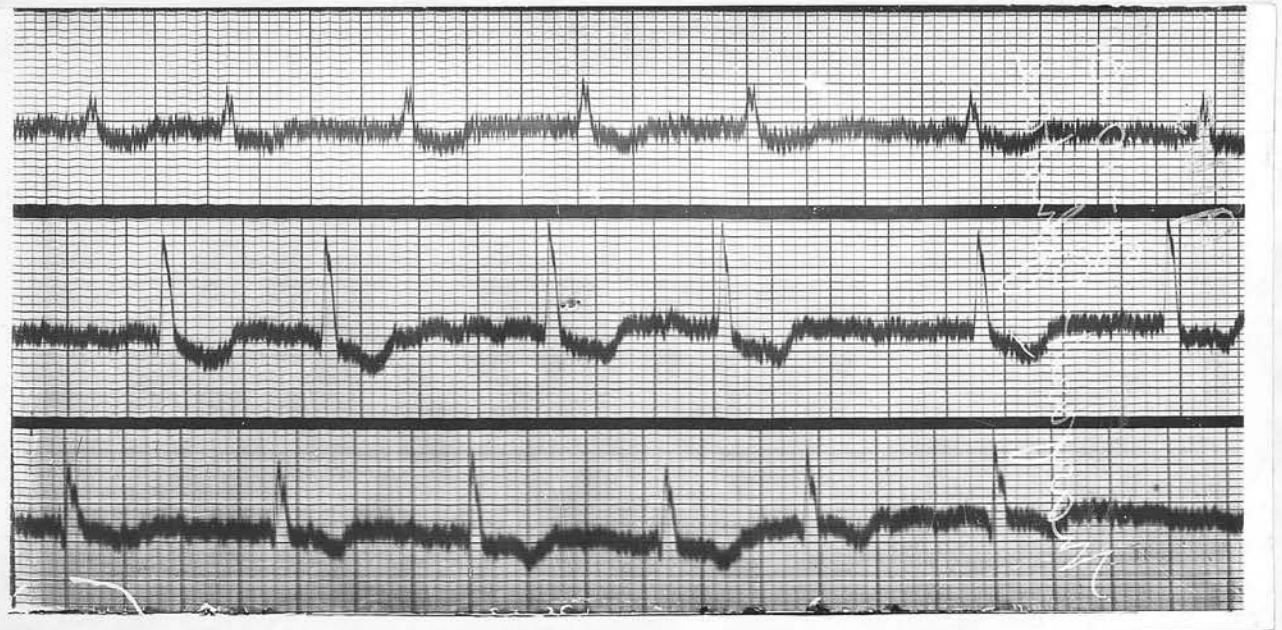
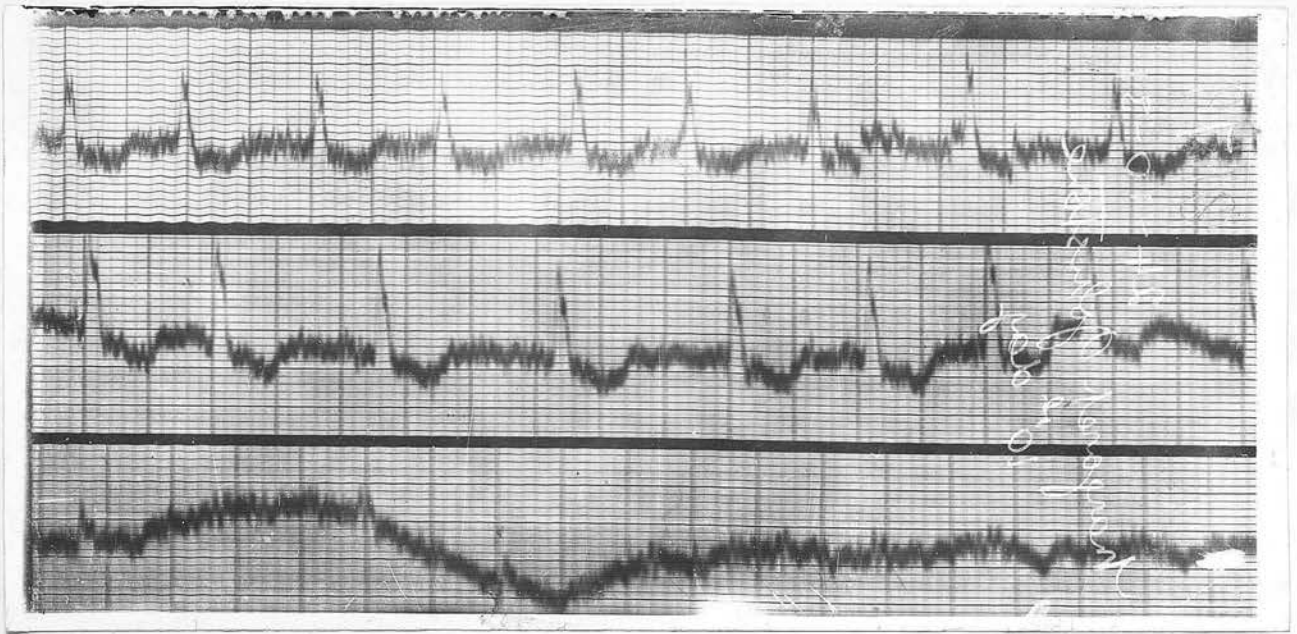
Wassermann: --

Diagnosis: Auricular Fibrillation.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.561	.563	.585	.543	.569	.551		
Hemoglobin %	83	85	86	88	80	83		
Refractive Index	134.9	135.0	135.2	135.2	134.82	134.9		
Blood Chloride in mgs. %	420	450	485	400	405	430		
Blood Urea in mgs. %	58	49	37	35	49	41		
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	52.8	52.8	43.3	48.1	52.8	52.8		
Blood Viscosity								
Venous Pressure in inches	11	-	8	8	8			
Weight in stones and lbs.	7-11 $\frac{1}{4}$	7-12 $\frac{1}{2}$ 7-12 $\frac{3}{4}$ 7-12	7-12 $\frac{1}{2}$ 7-13 7-12	7-12 $\frac{1}{2}$ 7-12 $\frac{1}{2}$ 7-12 $\frac{1}{2}$	8-2 8-3 $\frac{3}{4}$ 8-3	8-1 $\frac{1}{4}$ 8-1 $\frac{1}{4}$ 8-0 $\frac{1}{2}$		
Fluid Intake in ozs.	30	18 18 18	18 18 18	26 80 58	100 100 106	36 36 40		
Urine, 24 hrs., in ozs.	30 1030	18 1034 26 1030 16 1030	75 1020 8 1030 20 1022	16 1038 16 1028 50 1015	10 1030 49 1020 80 1020	52 1020 33 1020 39 $\frac{1}{2}$ 1020		
Urine Chloride in mgs. %	430	500 600 825	absent " 25	1225 430 85	75 650 925	970 500 825		

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test	Blood Urea
Depression of Freezing Point (Osmotic Pressure)	.372	1.365	1.034	46 (before) 73 (after)
Sp. Gravity	1004	1022	1016	
Urea %	.14%	1.8%	1.5%	
Amount	22 $\frac{1}{2}$	4 ozs.	9 ozs.	

Case 20



Case 21.

Age, 66.

Sex, Male.

Complaint: Pain in left knee.

History: Patient went to doctor for advice on painful knee and after examination was told heart was not normal. No symptoms referable to heart other than slight breathlessness.

Previous History: Nil.

Examination: Nutrition good - no cyanosis.
Pulsation in neck +

Pulse: 90, regular - vessels, marked thickening.

B.P.: 212/100.

Heart: Apex beat, 6th space, 5" - forcible.

Sounds: Mitral systolic.
Aortic 2, accentuated.

Liver: Not enlarged. No ascites.

Slight swelling feet.

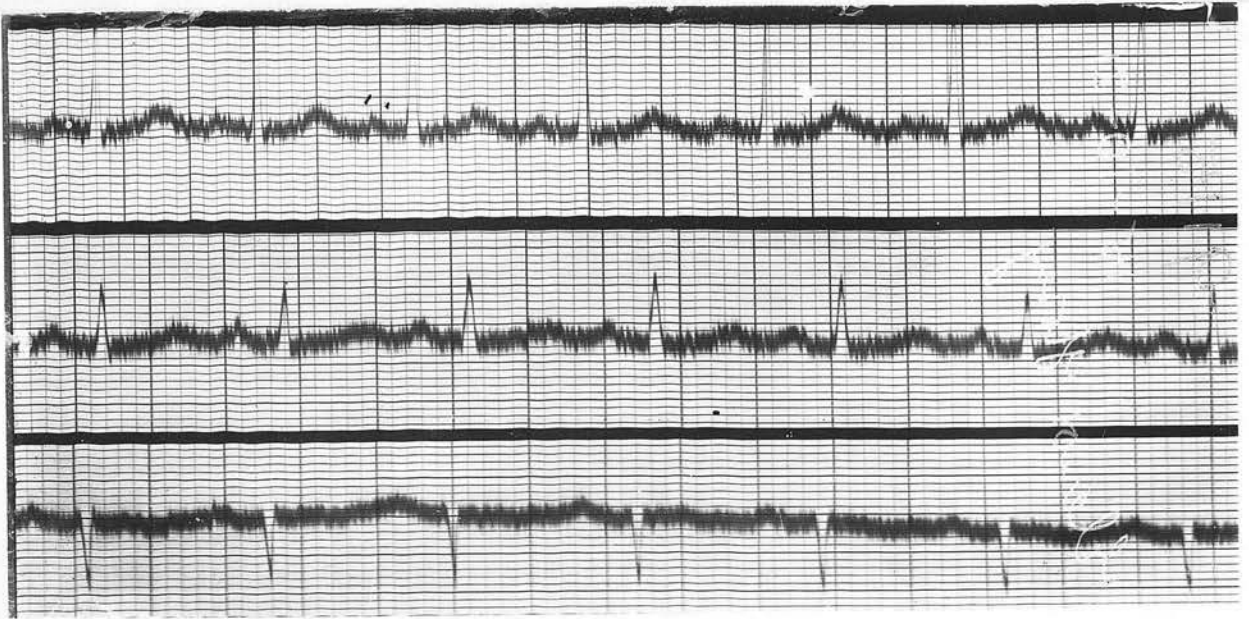
Wassermann: --

Diagnosis: Hyperpiesia.

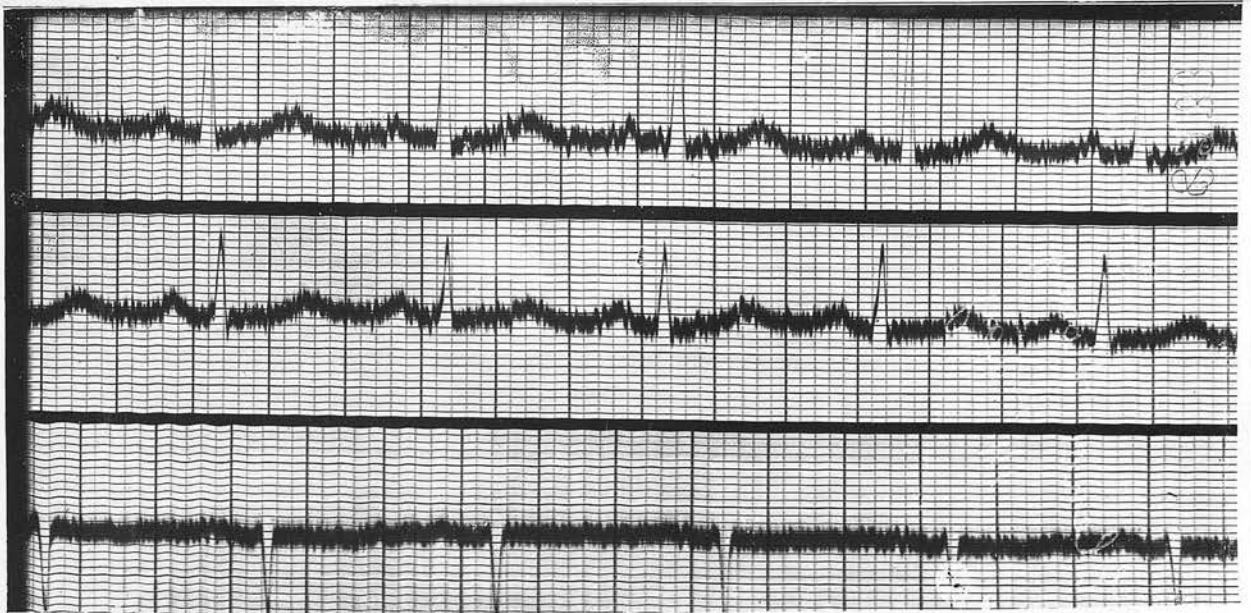
Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.576	.595	.550	.548	.597	.551		
Haemoglobin %	88	90	92	94	89	92		
Refractive Index	134.62	134.7	134.6	134.6	134.68	1.3442		
Blood Chloride in mgs. %	435	555	500	414	510	555		
Blood Urea in mgs. %	65	35	42	54	36	38		
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	57.6	43.3	38.5	43.3	33.8	52.8		
Blood Viscosity								
Venous Pressure in inches	7			6 $\frac{1}{4}$				
Weight in stones and lbs.	9- 7 $\frac{1}{2}$	9- 6 $\frac{3}{4}$ 9- 6 $\frac{1}{2}$ 9- 7	9- 1 $\frac{1}{2}$ 9- 0 8-13 $\frac{1}{2}$	9- 6 $\frac{1}{2}$ 9- 6 9- 3	9- 1 9- 4 $\frac{1}{2}$ 9- 2	9- 3 9- 4 $\frac{1}{2}$ 9- 3 $\frac{1}{2}$		
Fluid Intake in ozs.	24	18 18 18	18 18 18	80 80 100	86 86 24	24 36 46		
Urine, 24 hrs., in ozs.	18 1026	37 1024 14 1030 18 1028	90 1012 28 1020 43 1020	22 1030 82 1010 110 1010	33 1030 20 1040 20 1040	16 1032 18 1030 59 1018		
Urine Chloride in mgs. %		250	100 400 500	500 75 50	800 1010 700	250 400 670		

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test	Blood Urea
Depression of Freezing Point (Osmotic Pressure)	.280	1.506	1.273	68 (before) 78 (after)
Sp. Gravity	1004	1024	1012	
Urea %	1%	.98%	1.7%	

Case 21



ECG - irregular - voltage poor
sinus tachycardia



Case 22.

Age, 35.

Sex, Female.

Complaint: Shortness of breath and swelling of feet.

History: Childbirth 6 months ago.
Health indifferent since then.
Has recently suffered from dyspnoea,
palpitation and feet have begun to swell.

Previous History: Chorea 23 years ago.

Examination: Malar flush - cyanosis - pulsation in neck.

Pulse: 100, irregular - volume poor.

Arteries not thickened.

B.P.: 120/75.

Heart: Apex beat, 6th space, 4½".

Sounds: Mitral systolic - tricuspid systolic.

Lungs: Congested at the bases.

Liver: Enlarged. Ascites.

Marked Oedema of feet and legs.

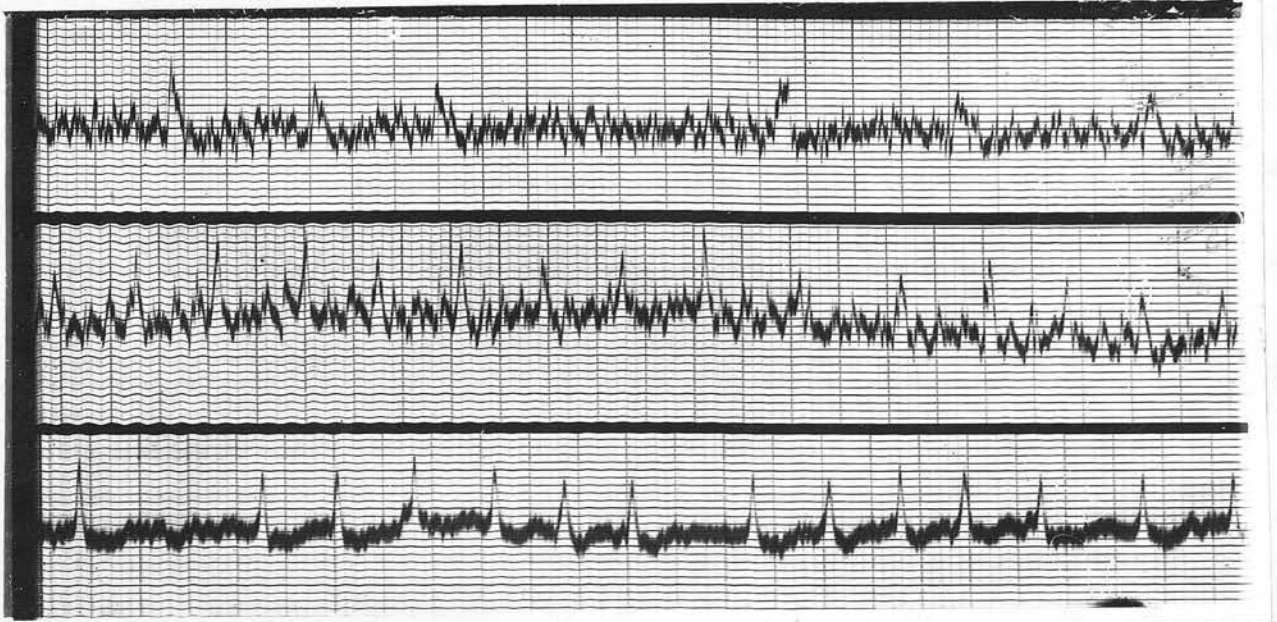
Wassermann: --

Diagnosis: Rheumatic Carditis.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.549	.564		.550				
Haemoglobin %	80	77		70				
Refractive Index	1.3482	1.3500		1.3481				
Blood Chloride in mgs. %	550	630		490				
Blood Urea in mgs. %	55	33		38				
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	38.5	37.1		24.2				
Blood Viscosity								
Venous Pressure in inches	7½			17½				
Weight in stones and lbs.	10- 1¾	10- 1½ 10- 3 10- 2½		10- 6 10- 6 10- 8				
Fluid Intake in ozs.	24	18 18 18		100 80 100				
Urine, 24 hrs., in ozs.		10 1032 10 1026 12 1030		13 1030 11 1020 8 1028				
Urine Chloride in mgs. %		165 150 110		90 25 50				

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test
Depression of Freezing Point (Osmotic Pressure)			
Sp. Gravity			
Urea %			

Case 22



Arteries: soft.

B.P.: 120/70.

Heart: apex beat, 5th space, 5th rib.

Lungs: normal, systolic and diastolic.

Liver: not enlarged.

Stomach: normal.

Veins: normal.

Diagnosis: Atrial fibrillation.

Case 23.

Age, 36.

Sex, Female.

Complaint: Pain in chest and left shoulder.

History: Health has recently been poor - easily tired on exertion - attacks of giddiness, especially when bending. Praecordial pain, radiating to left shoulder and left arm, not noticeably brought on by exercise.

Previous History: Tonsillitis in 1919. Three years ago attacks of palpitation and feet swelled up, for which she was treated in hospital for 3 months.

Examination: Pale - nutrition poor.

Pulse: 80, irregular - volume poor - tension low.

Arteries: Soft.

B.P.: 120/70.

Heart: Apex beat, 5th space, 5" - diffuse.

Sounds: Mitral systolic and diastolic.

Liver: Not enlarged.

Slight Oedema.

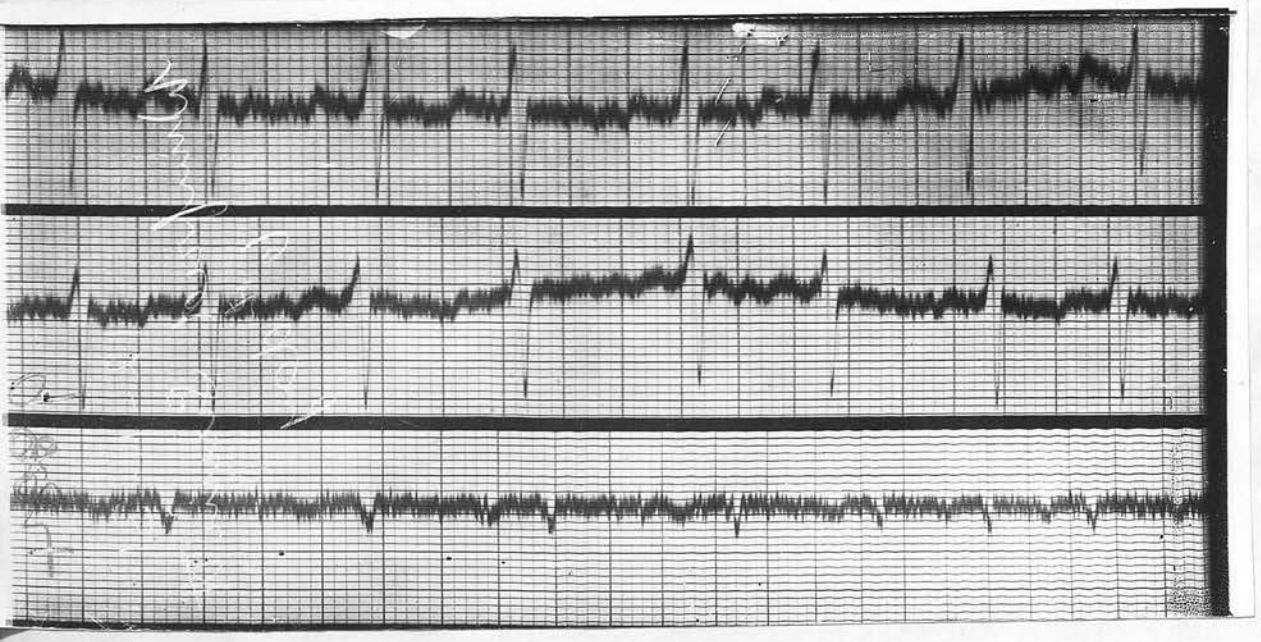
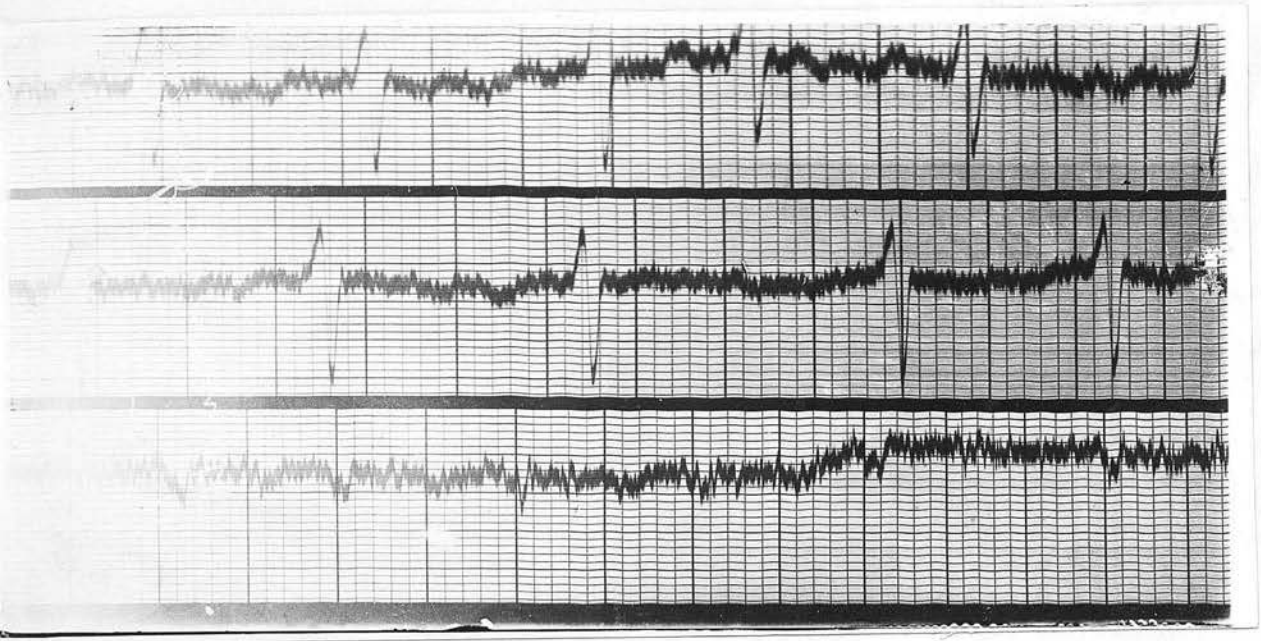
Wassermann: --

Diagnosis: Auricular Fibrillation.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.567	.565	.557	.556	.585	.564		
Hæmoglobin %	95	94	96	93	88	94		
Refractive Index	1.3510	1.3575	1.3481	1.3480	1.3480			
Blood Chloride in mgs. %	395	385	360	372.5	405	390		
Blood Urea in mgs. %	45	42	47	36	32	36		
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	52.8	43.3	48.1	45.3	43.3	48.1		
Blood Viscosity								
Venous Pressure in inches		2½						
Weight in stones and lbs.	8- 2	8- 1¾ 8- 1¼ 8- 1	8- 1½ 8- 1 8- 1	8- 2 8- 1½ 8- 1¼	8- 4½ 8- 8½ 8- 5	8- 4½ 8- 2		
Fluid Intake in ozs.	24	18 18 18	18 18 18	100 100 100	80 100 100	36 36		
Urine, 24 hrs., in ozs.	44	43 1030 26 1015 15 1030	44 1010 12 1034 14 1030	80 1010 18 1022 64 1010	- 21 1030 68 1020	122 1020 38		
Urine Chloride in mgs. %								

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test
Depression of Freezing Point (Osmotic Pressure)			
Sp. Gravity			
Urea %			2.8% (2 hrs.)

Case 23



Case 24.

Age, 62.

Sex, Male.

Complaint: Shortness of breath - pain in chest.

History: Collapsed 12 months ago at work. Has since had attacks of praecordial pain radiating into left arm, lasting a few minutes; sometimes pain after food.

Previous History: Pneumonia.

Examination: Red face - full blooded - nutrition good. Slight carotid pulsation.

Pulse: 90, regular - full volume, high tension.

Arteries: Hard and thickened.

B.P.: 190/100.

Heart: Apex beat, 5th space - M.S.L.

Sounds: No bruit.

Lungs: Emphysema.

Wassermann: --

Liver: Not enlarged.

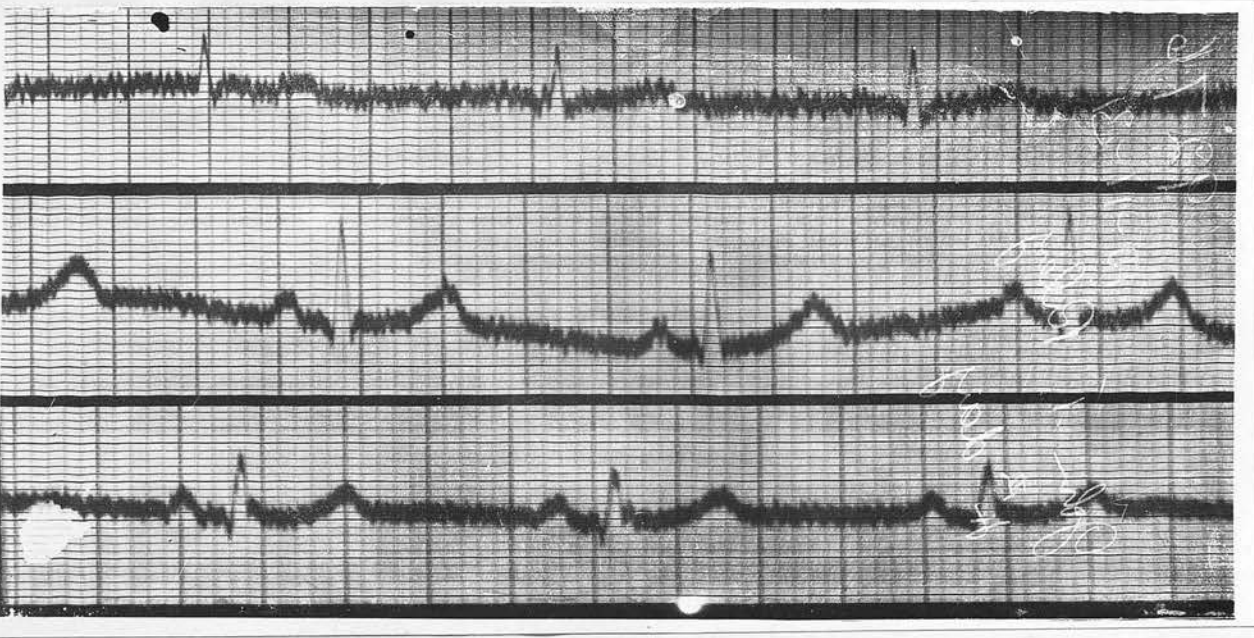
No Oedema.

Diagnosis: High Blood Pressure.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.573	.572	.541	.551	.590	.560		
Haemoglobin %	91	92	92	93	92	94		
Refractive Index	1.3479	1.3441	1.3478	1.3490	1.3450			
Blood Chloride in mgs. %	459	420	487.5	457.5	497	450		
Blood Urea in mgs. %	52	68	54	63	51	60		
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	48.1	38.5	43.3	48.1	48.1	52.8		
Blood Viscosity								
Venous Pressure in inches		3						
Weight in stones and lbs.	9-13 $\frac{1}{2}$	10- 0 9-12 $\frac{1}{2}$ 10- 0	9-12 $\frac{1}{2}$ 9-12 9-12 $\frac{1}{4}$	10- 1 10- 0 $\frac{1}{2}$ 9-13 $\frac{1}{2}$	10- 2 10- 6 10- 6 $\frac{1}{2}$	10- 4 $\frac{1}{2}$ 10- 2 $\frac{1}{2}$		
Fluid Intake in ozs.	24	18 24 18	18 18 18	70 106 100	90 106 86	36 36		
Urine, 24 hrs., in ozs.								
Urine Chloride in mgs. %								

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test
Depression of Freezing Point (Osmotic Pressure)			
Sp. Gravity			
Urea %			

Case 24



Case 25.

Age, 28.

Sex, Female.

Complaint: Pains in legs - swelling of feet -
shortness of breath.

History: Rheumatism 10 weeks ago. Still complains
of pain in legs - finds that she gets
breathless on exertion and pain in chest.

Previous History: Diphtheria and Measles.

Examination: Nervous - flushed - carotid pulsation
in neck - pulsation in the thyroid -
slight tremor of hands.

Pulse: 90, regular - poor volume - low tension.

B.P.: 95/50.

Heart: Apex beat, 5th space, $3\frac{1}{2}$ ".

Sounds: Mitral systolic - soft.

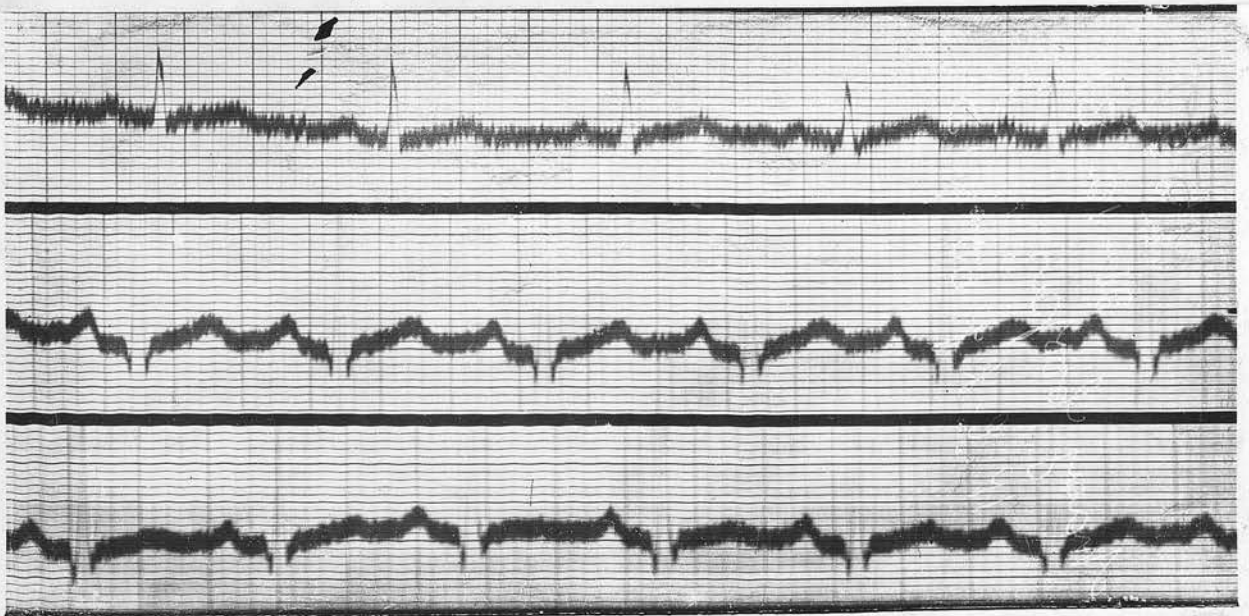
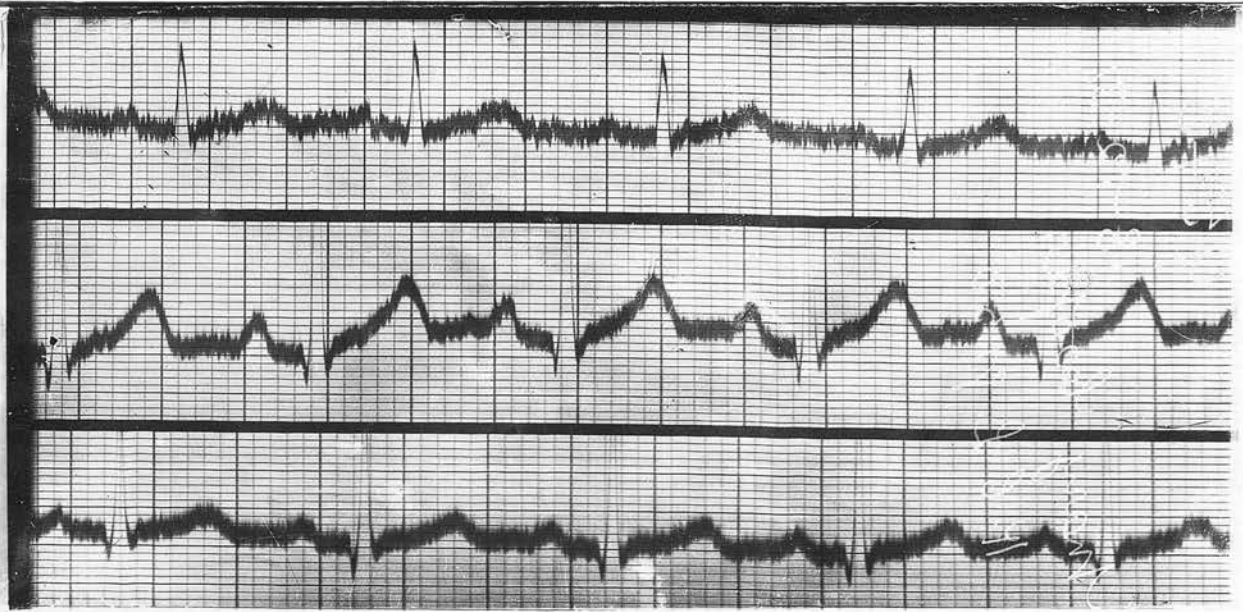
No Oedema.

Wassermann: --

Diagnosis: Rheumatic Carditis.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.556			.561	.564			
Haemoglobin %	93			94	96			
Refractive Index	1.3500			1.3490	1.3452			
Blood Chloride in mgs. %	510			520	525			
Blood Urea in mgs. %	38			36	37			
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	52.8			52.8	52.8			
Blood Viscosity	5.9			6.4	6			
Venous Pressure in inches								
Weight in stones and lbs.	6-10 $\frac{3}{4}$ 6-10 $\frac{1}{2}$			6-11 6-10 $\frac{1}{4}$ 6-10 $\frac{1}{4}$ 6-10 $\frac{1}{2}$ 6-10 $\frac{1}{4}$	7- 1 $\frac{1}{2}$ 7- 3 $\frac{1}{4}$ 7- 3 $\frac{1}{4}$ 7- 3 $\frac{1}{2}$			
Fluid Intake in ozs.	30 27			94 80 80 80 80	120 120 120 120			
Urine, 24 hrs., in ozs.				90 1008 86 1010 71 1010 72 1010	80 1010 86 1020 92 1020 110 $\frac{1}{2}$ 1020 96 1015			
Urine Chloride in mgs. %				absent 20 15 25 absent	320 450 370 500			
Renal Efficiency Tests		Dilution	Concentration	Urea % Excretion Test				
Depression of Freezing Point (Osmotic Pressure)		.190	1.313			.314		
Sp. Gravity								
Urea %								

Case 25



Case 26.

Age, 57.

Sex, Male.

Complaint: Swelling of legs - shortness of breath - pain in chest.

History: Pneumonia 12 months ago. Health since then indifferent - 9 weeks ago legs began to swell - attacks of pain on exertion in praecordium - passing off quickly.

Previous History: Malaria 1917 and 1920.
Pneumonia 1930.

Examination: Nutrition good - slight pulsation in neck.

Pulse: 100, regular - good volume - high tension.

B.P.: 180/100.

Heart: Apex beat, 6th space, 5" forcible.

Sounds: Systolic - at the mitral area - re-duplication 1st mitral.

Lungs: Emphysema.

Liver: Slightly enlarged.

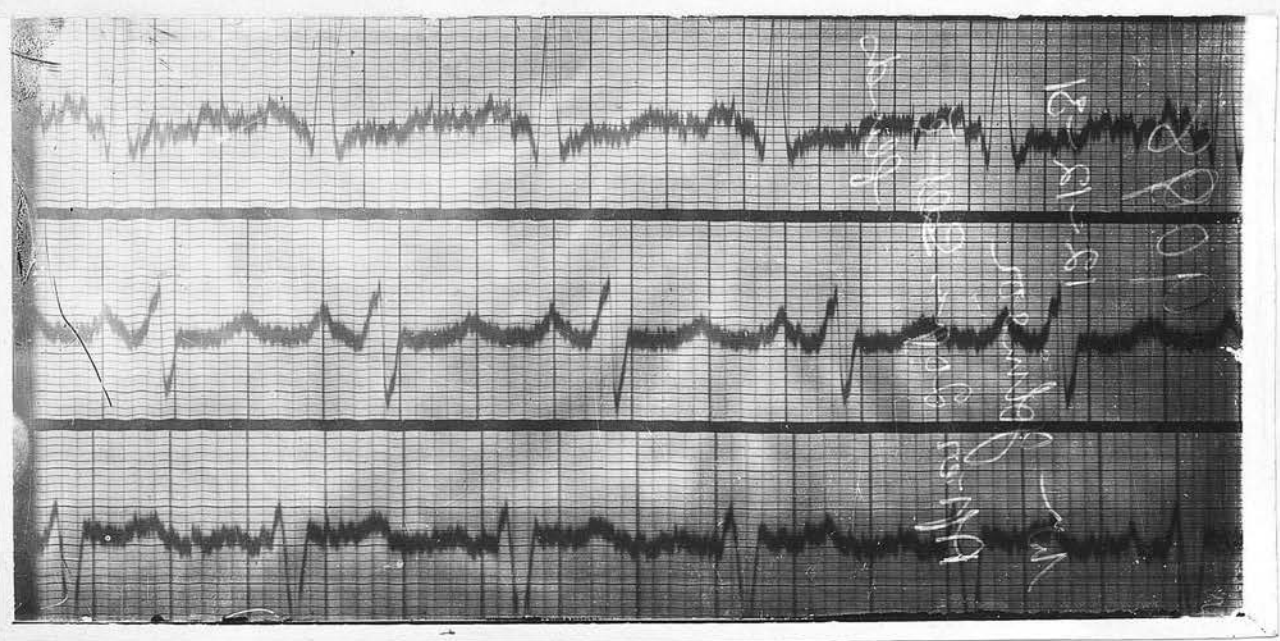
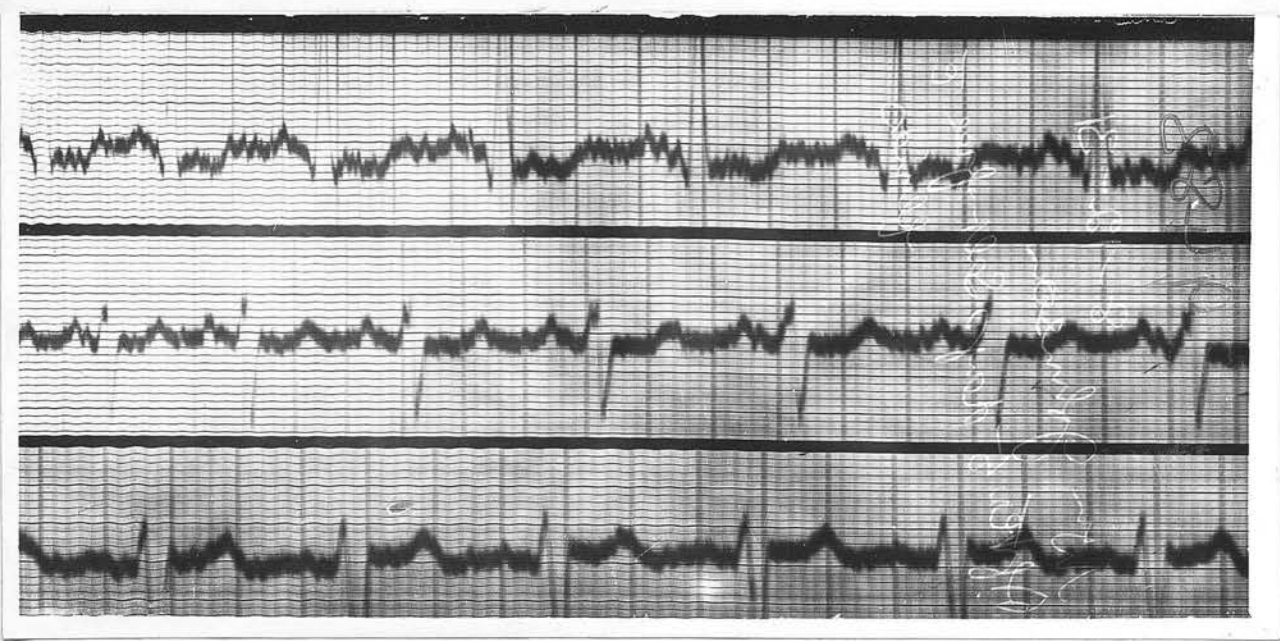
Oedema of ankles.

Diagnosis: High Blood Pressure.

Myocarditis.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.563			.571	.574			
Haemoglobin %	97			97	95			
Refractive Index	1.3488			1.3470	1.3480			
Blood Chloride in mgs. %	520			510	525			
Blood Urea in mgs. %	49			41	46			
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	48.1			52.8	52.8			
Blood Viscosity	6.4			7	6.6			
Venous Pressure in inches								
Weight in stones and lbs.	11-10 $\frac{1}{2}$			11-13 $\frac{1}{2}$ 11-13 11-10 $\frac{1}{4}$ 11-6 11-4 $\frac{1}{2}$	11-3 $\frac{1}{2}$ 11-6 11-12 12-2			
Fluid Intake in ozs.	18			120 100 100 100 120	120 120 120 126			
Urine, 24 hrs., in ozs.				64 1016 120 1010 125 1010 120 1010	120 1010 80 1015 70 1015 49 1022 50 1020			
Urine Chloride in mgs. %				10 15 25 absent	absent 430 450 450 400			
Renal Efficiency Tests		Dilution	Concentration	Urea % Excretion Test				
Depression of Freezing Point (Osmotic Pressure)		.720	.943			.987		
Sp. Gravity								
Urea %								

Case 26,



Case 27.

Age, 42.

Sex, Male.

Complaint: Shortness of breath - pains in chest.

History: Ten weeks ago, attack of Bronchitis - has since been very run down and short of breath. Pain around left nipple, intermittent and not affected by exercise - loss of weight.

Previous History: Diphtheria 15 years ago.

Examination: Nutrition poor - pale - no cyanosis.

Pulse: 90, regular - good volume - normal tension.

Heart: Apex beat, 5th space.

B.P. 190/115.

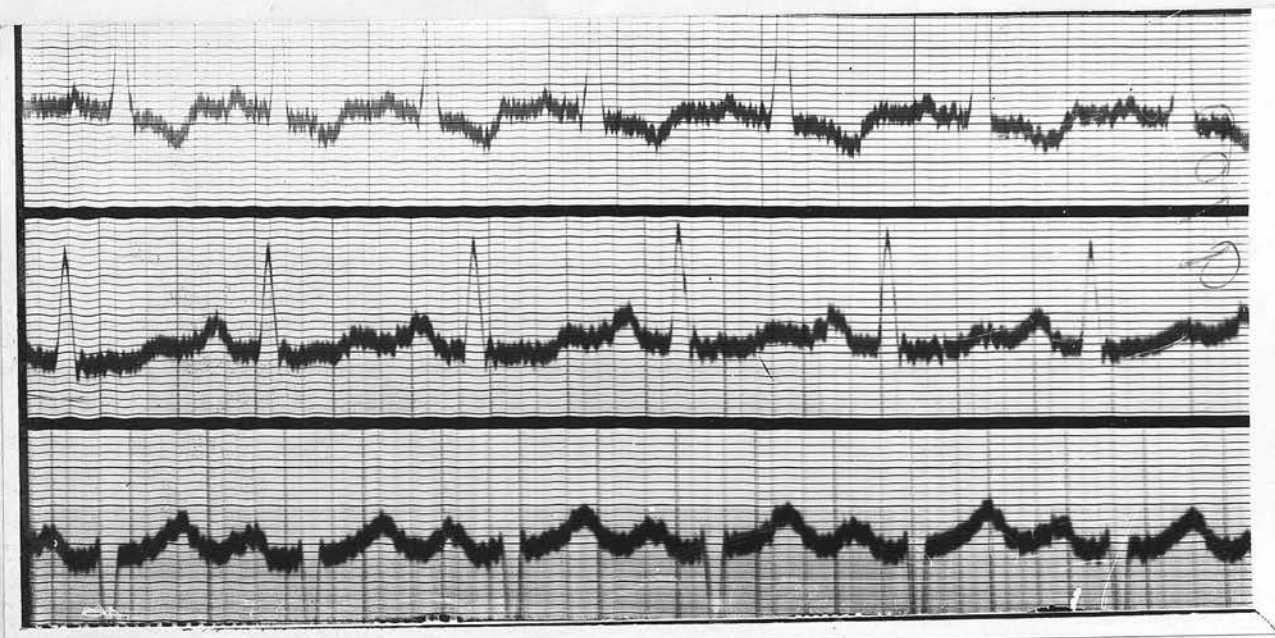
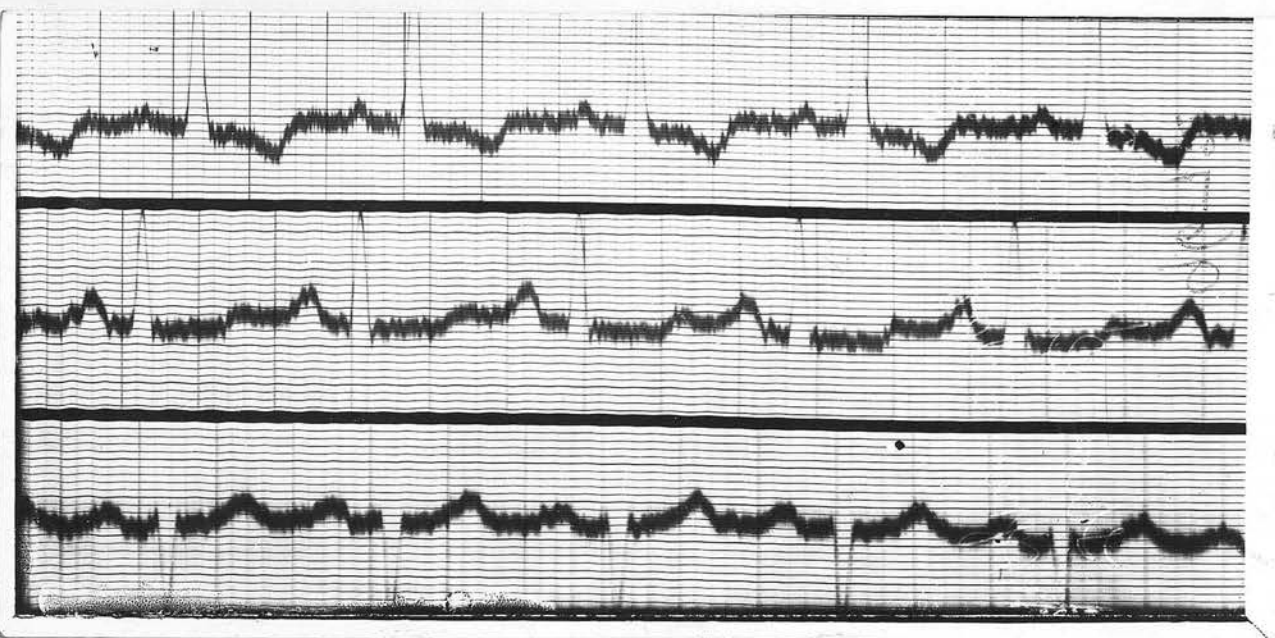
Liver: Not enlarged.

No Oedema.

Wassermann: --

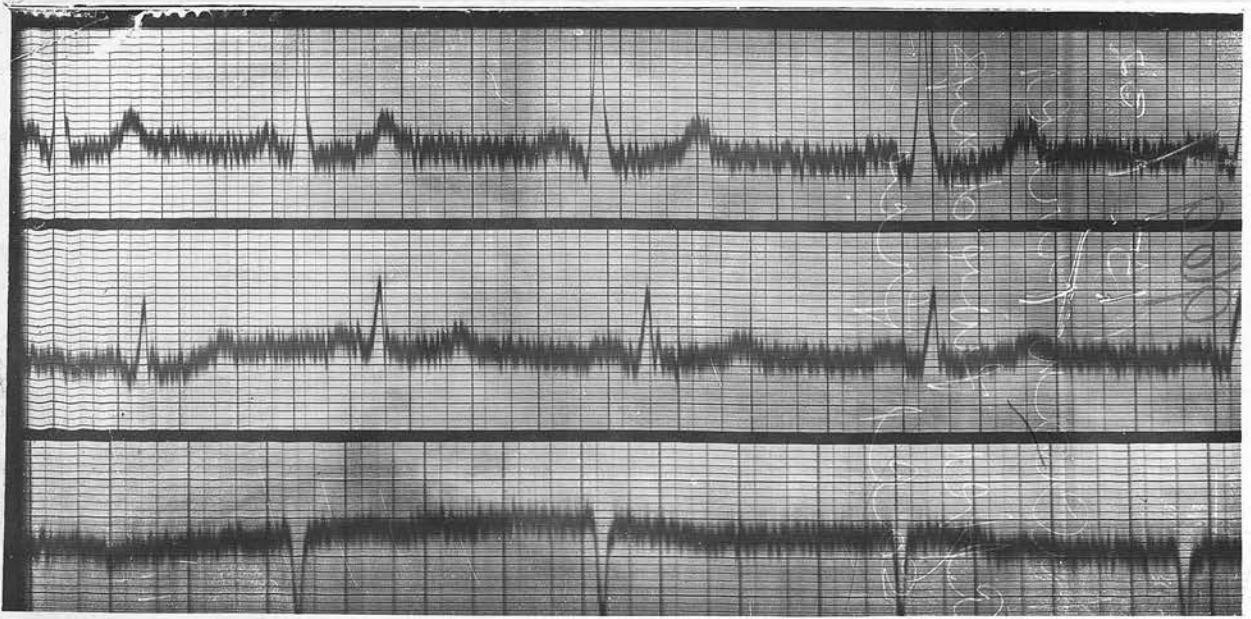
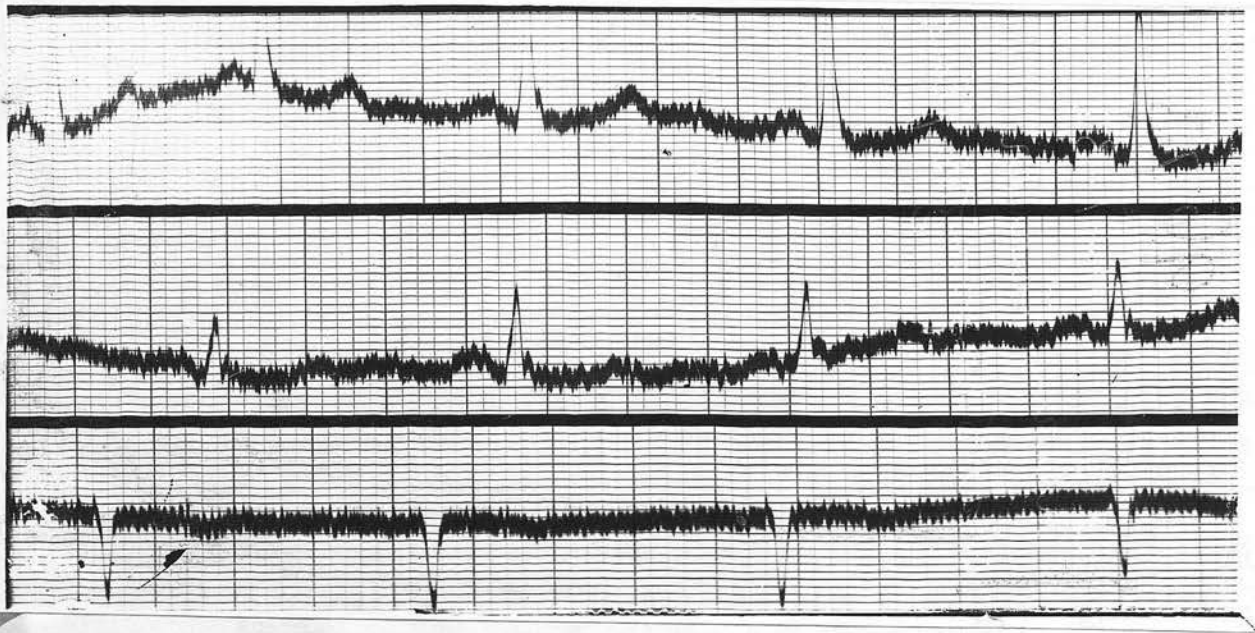
Diagnosis: Myocarditis and
High Blood Pressure.

Case 27



Investigation	Normal Condition	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.578	.584	.584					
Haemoglobin %	87	89	90					
Refractive Index	1.3478	1.3478	1.3500					
Blood Chloride in mgs. %	570	535	505					
Blood Urea in mgs. %	58	63	61					
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	43.3	39.2	43.3					
Blood Viscosity								
Venous Pressure in inches								
Weight in stones and lbs.		10- 1 $\frac{1}{4}$ 12- 1 12- 1 11-12 $\frac{1}{4}$	11-13 $\frac{1}{2}$ 11-13 11-13 $\frac{3}{4}$ 11-13 $\frac{1}{2}$ 11-13 $\frac{1}{4}$					
Fluid Intake in ozs.	36	18 18 18 18 18	18 18 18 18 18					
Urine, 24 hrs., in ozs.		32 1040 23 1030 21 1040 28 1030 22 1040	34 $\frac{1}{2}$ 1034 14 1042 22 1042 11 1030 18 1040					
Urine Chloride in mgs. %		650 480 735 725 750	450 450 300 200 240					
Renal Efficiency Tests		Dilution	Concentration	Urea % Excretion Test				
Depression of Freezing Point (Osmotic Pressure)		1.011	1.499					
Sp. Gravity								
Urea %				32%				

Case 28



Case 29.

Age, 20.

Sex, Female.

Complaint: "Bad heart."

History: Ten years ago had Acute Rheumatic Fever and since her mode of life has been restricted on medical advice, e.g., not allowed to play games. Work tried once or twice but had to be given up. Easily tired and cough and dyspnoea on exertion. Sleeps badly and suffers from flatulence. Sometimes pain in chest after exercise.

Previous History: Nil.

Examination: Malar flush - good nutrition - slight cyanosis - no pulsation in neck.

Pulse: 84, irregular - variable volume.

Heart: Apex beat, 5th space, 5" from M.S.L.

Sounds: Harsh systolic at mitral - early diastolic - aortic and pulmonary - Mitral bruit audible.

Lungs: Nil.

Liver: Enlarged. No ascites.

Slight Oedema.

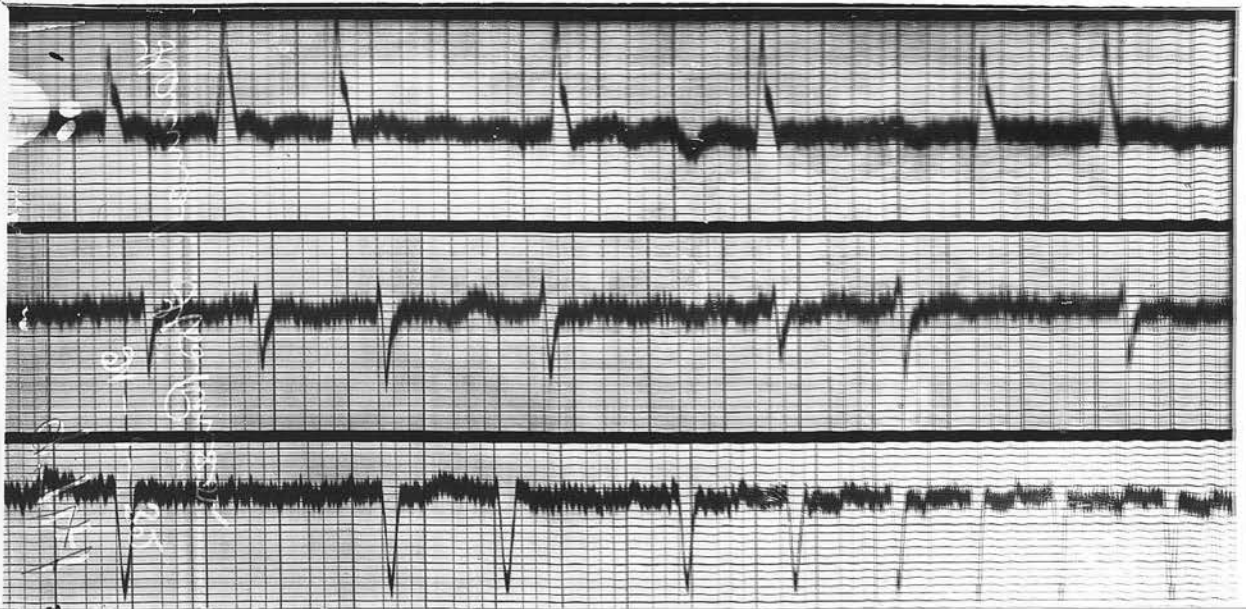
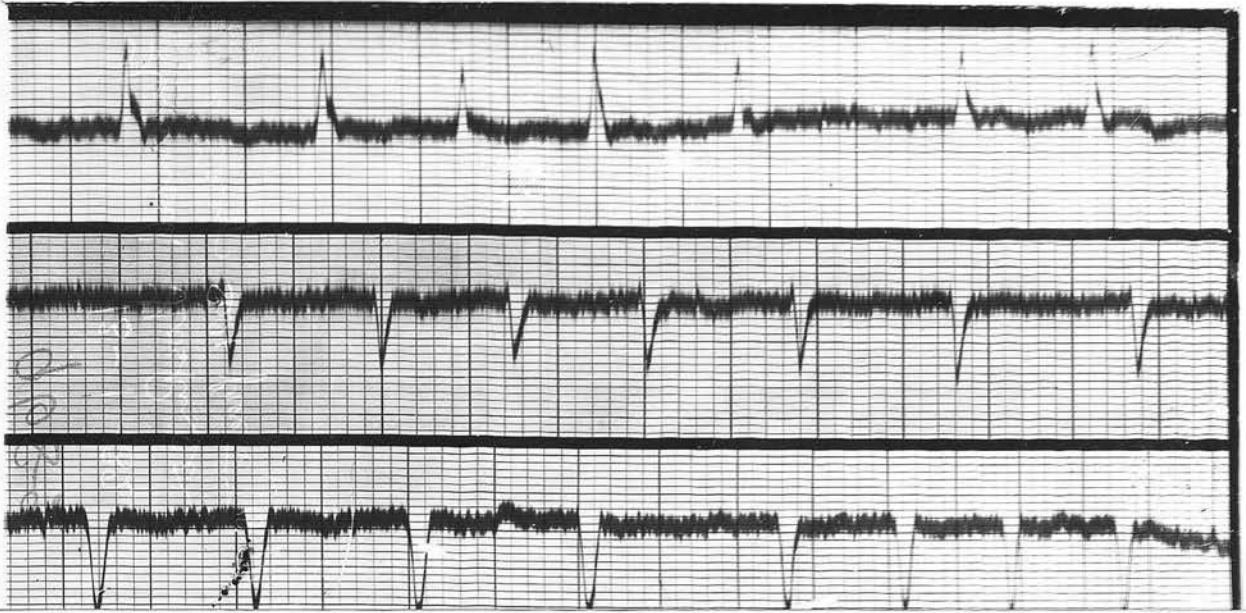
Wassermann: --

Diagnosis: Rheumatic Carditis and
Mitral Stenosis.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.562	.573	.564					
Haemoglobin %	86	83	75					
Refractive Index	1.346	1.3458	1.3478					
Blood Chloride in mgs. %	500	545	500					
Blood Urea in mgs. %	51	70	73					
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	-	-	47.9					
Blood Viscosity								
Venous Pressure in inches								
Weight in stones and lbs.		8- 4 $\frac{3}{4}$ 8- 4 $\frac{1}{2}$ 8- 5 $\frac{1}{4}$ 8- 6 $\frac{1}{2}$	8- 6 $\frac{1}{4}$ 8- 6 $\frac{1}{2}$ 8- 6 $\frac{1}{2}$ 8- 6 8- 6					
Fluid Intake in ozs.	30	18 18 18 18 18	18 18 18 18 18					
Urine, 24 hrs., in ozs.		16 1042 15 1030 15 1030 16 1030 18 1030	16 1032 14 1030 17 1032 16 $\frac{1}{2}$ 1030 16 $\frac{1}{2}$ 1022					
Urine Chloride in mgs. %		480 420 560 460 490	430 430 370 390 300					
Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test					
Depression of Freezing Point (Osmotic Pressure)	1.290	1.507						
Sp. Gravity								
Urea %					1.1%			

Investigation	Normal Condition	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.554	.546	.575					
Haemoglobin %	88	88	83					
Refractive Index	1.3472	1.3490	1.3490					
Blood Chloride in mgs. %	535	555	570					
Blood Urea in mgs. %	36	48	48					
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	52.8	-	48.1					
Blood Viscosity								
Venous Pressure in inches	7							
Weight in stones and lbs.	11-10 $\frac{1}{2}$	11-11 11-10 $\frac{1}{2}$ 11- 9 11- 9 $\frac{1}{2}$ 11- 8 $\frac{3}{4}$	11- 7 $\frac{1}{2}$ 11- 5 11- 5 $\frac{1}{4}$ 11- 5 $\frac{1}{2}$ 11-1 $\frac{1}{4}$					
Fluid Intake in ozs.	42 36	18 18 18 18 18	18 18 18 18 18					
Urine, 24 hrs., in ozs.		32 1030 21 1030 22 1030 16 $\frac{1}{2}$ 1032 26 1032	19 1034 8 1040 17 1040 21 1040					
Urine Chloride in mgs. %		460 425 500 685 395	550 500 275 535					
Renal Efficiency Tests		Dilution	Concentration	Urea % Excretion Test				
Depression of Freezing Point (Osmotic Pressure)		1.468	1.663					
Sp. Gravity				2.6				
Urea %								

Case 30



Case 31.

Age, 33.

Sex, Male.

Complaint: Shortness of breath - swelling of legs.

History: During past 4 years health has become increasingly worse and work impossible. Very breathless and incapable of prolonged exertion. Pain in the chest over praecordium - intermittent and worse after exercise. Severe cough and once or twice blood came up. Feet have begun to swell recently.

Previous History: Rheumatic Fever 5 years ago.
Gonorrhoea 16 years ago.

Examination: Anxious expression - cyanosis - pulsation in neck.

Pulse: 80, regular - volume below normal - tension low.

B.P.: 150/95.

Heart: Apex beat, 5th space, 5" - diffuse.

Sounds: Perceptible at mitral and systolic. Systolic bruit at base.

Liver: Enlarged. Ascites.

Oedema legs.

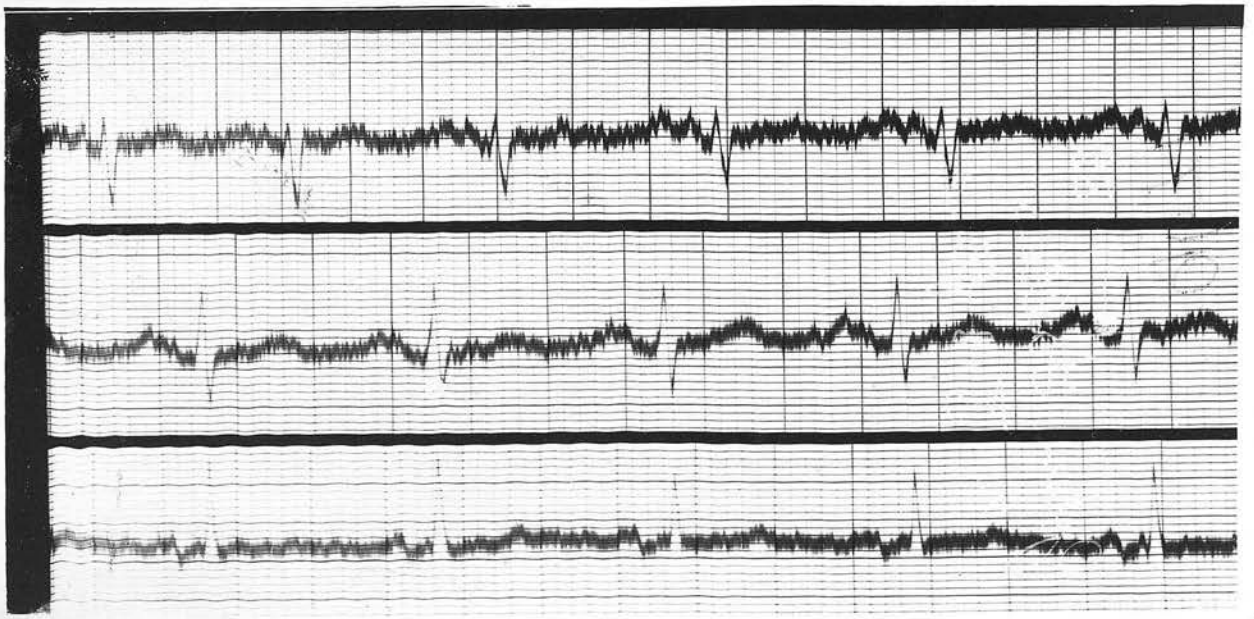
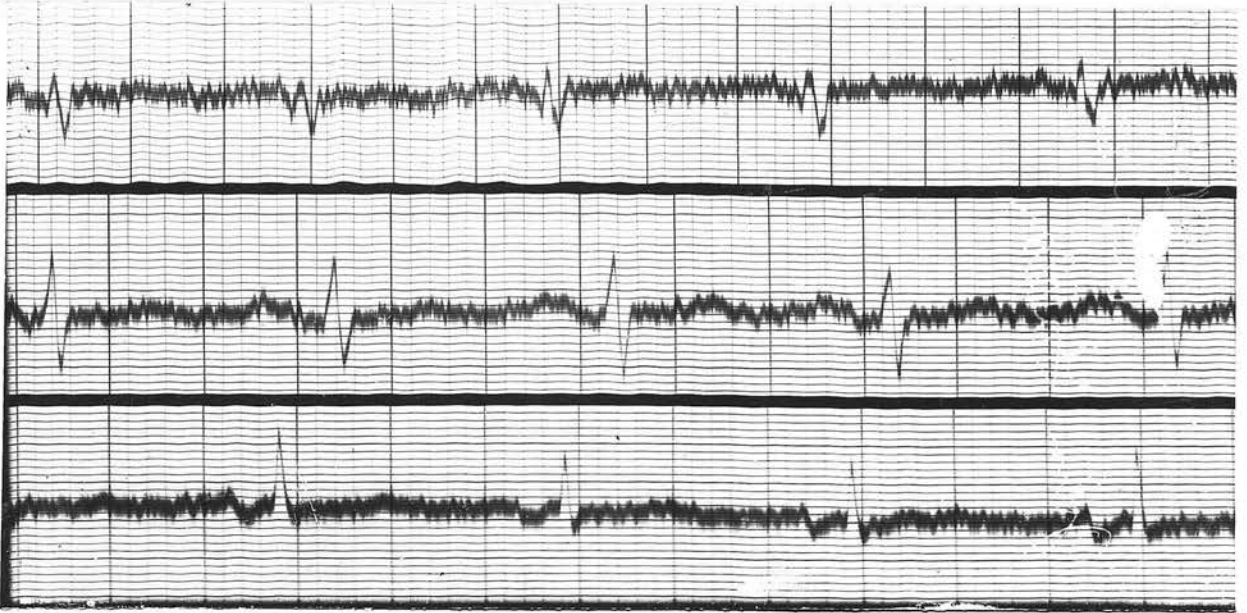
Wassermann: --

Diagnosis: Rheumatic Carditis.

Mitral Stenosis.

Investigation	Normal Condition	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.587	.569	.558					
Haemoglobin %	98	103	101.5					
Refractive Index	1.3480	1.3510	1.3515					
Blood Chloride in mgs. %	510	615	495					
Blood Urea in mgs. %	68	65	69					
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	52.8	38.1	43.3					
Blood Viscosity								
Venous Pressure in inches	11							
Weight in stones and lbs.	10- 1 $\frac{1}{4}$	10- 1 $\frac{1}{4}$ 10- 1 $\frac{1}{4}$ 10- 1 9-13 $\frac{1}{2}$ 10	10- 0 9- 13 $\frac{3}{4}$ 9-13 $\frac{1}{2}$ 9-12 $\frac{3}{4}$ 9-10 $\frac{1}{2}$ 9- 8 $\frac{1}{2}$					
Fluid Intake in ozs.	6 18	18 18 18 18 18	18 18 18 18 18					
Urine, 24 hrs., in ozs.		16 1040 6 1030 12 1040 19 1036 10 1040	19 1030 14 1040 13 1043 18 1030 10 1038					
Urine Chloride in mgs. %		740 630 825 570 350	425 365 420 200 170					
Renal Efficiency Tests		Dilution	Concentration	Urea % Excretion Test				
Depression of Freezing Point (Osmotic Pressure)		.371	1.452					
Sp. Gravity				1.8%				
Urea %								

Case 31



Case 32.

Age, 57.

Sex, Female.

Complaint: Feels tired - sleeps badly.

History: Past few months - indifferent health -
appetite poor - pain in chest - not radiat-
ing - easily tired and occasionally feels
faint and giddy.

Previous History: Nil.

Examination: Nutrition good - pale.

Pulse: 90, regular - good volume.

B.P.: 160/70.

Heart: Apex beat, 5th space - nipple line.

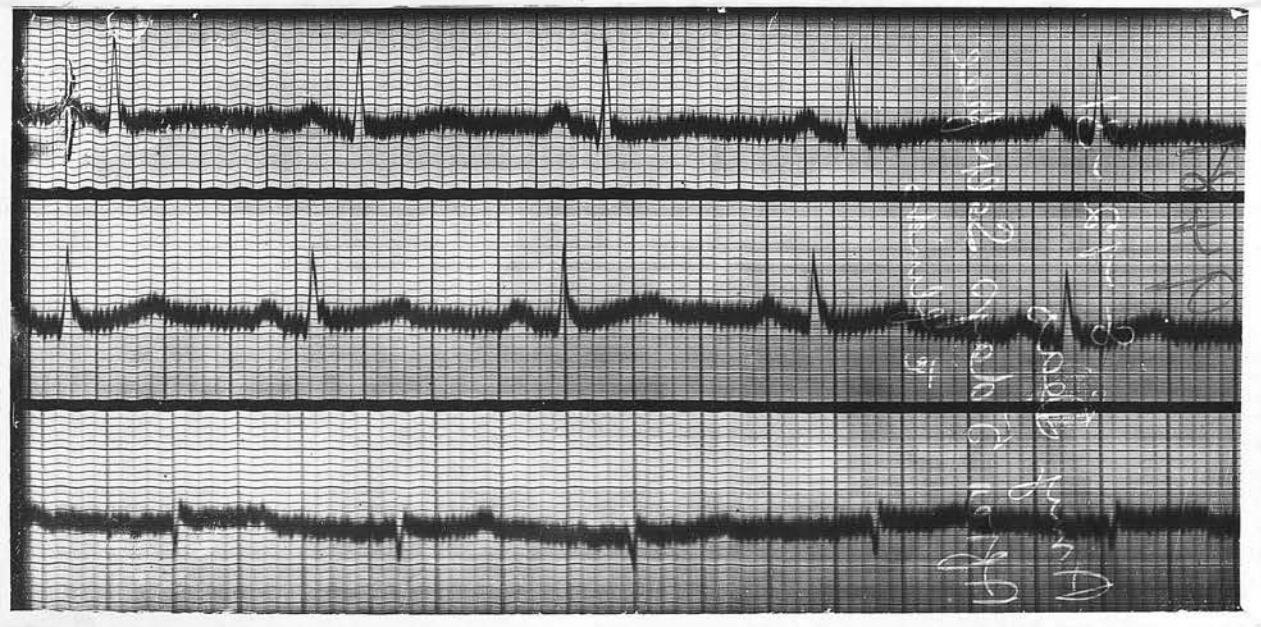
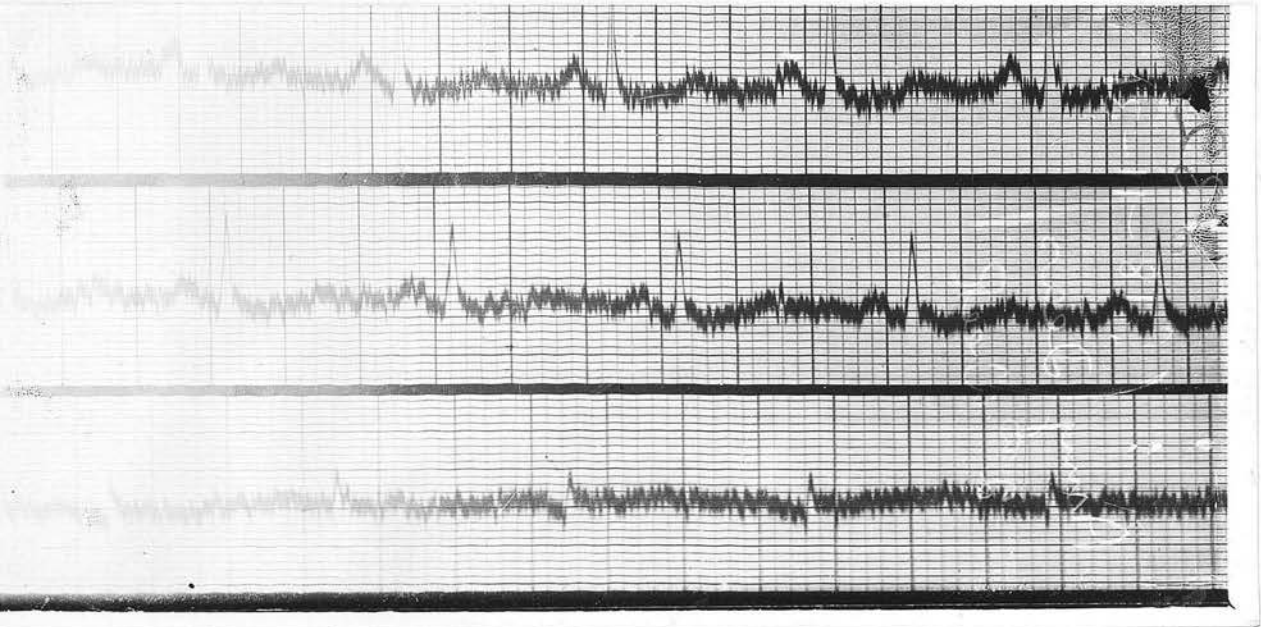
Sounds: No bruit.

Wassermann: --

Diagnosis: Myocarditis.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.564			.574	.558			
Haemoglobin %	81			87	73			
Refractive Index								
Blood Chloride in mgs. %	525			520	535			
Blood Urea in mgs. %	51			41	41			
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	52.8			43.3	43.3			
Blood Viscosity	6.8							
Venous Pressure in inches								
Weight in stones and lbs.	10- 7½			10- 9 10-10 10-10 10- 9½ 10- 8	10-12½ 10-11½ 10-13½ 10-12 10- 8			
Fluid Intake in ozs.	24			120 80 80 80 80	120 120 120 120 40			
Urine, 24 hrs., in ozs.				111 1012 76½ 1010 71½ 1010 56 1010 56 1010	90 1020 140 1015 107 1015 104¾ 1010			
Urine Chloride in mgs. %				75 85 absent 25 absent	320 500 800 450			
Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test					
Depression of Freezing Point (Osmotic Pressure)	.127	1.093			.462			
Sp. Gravity								
Urea %	.9%	2.1%			1.8			

Case 37



Case 33.

Age, 30.

Sex, Male.

Complaint: Breathlessness and palpitation.

History: Past 5 weeks, severe indigestion - pain in chest - breathless - palpitation - pain localised praecordium - indigestion related to food - much flatulence - occasional fits of fainting.

Previous History: Nil.

Examination: Cyanosed - nutrition fair - carotid and venous pulsation in neck.

Pulse 90, irregular - poor volume - low tension - vessels not thickened.

B.P.: 100/75.

Heart: Apex beat, 6th space, 7".

Sounds: Mitral systolic and diastolic - Aortic systolic and diastolic.

Lungs: Congested - both bases.

Liver: Enlarged.

Oedema of legs.

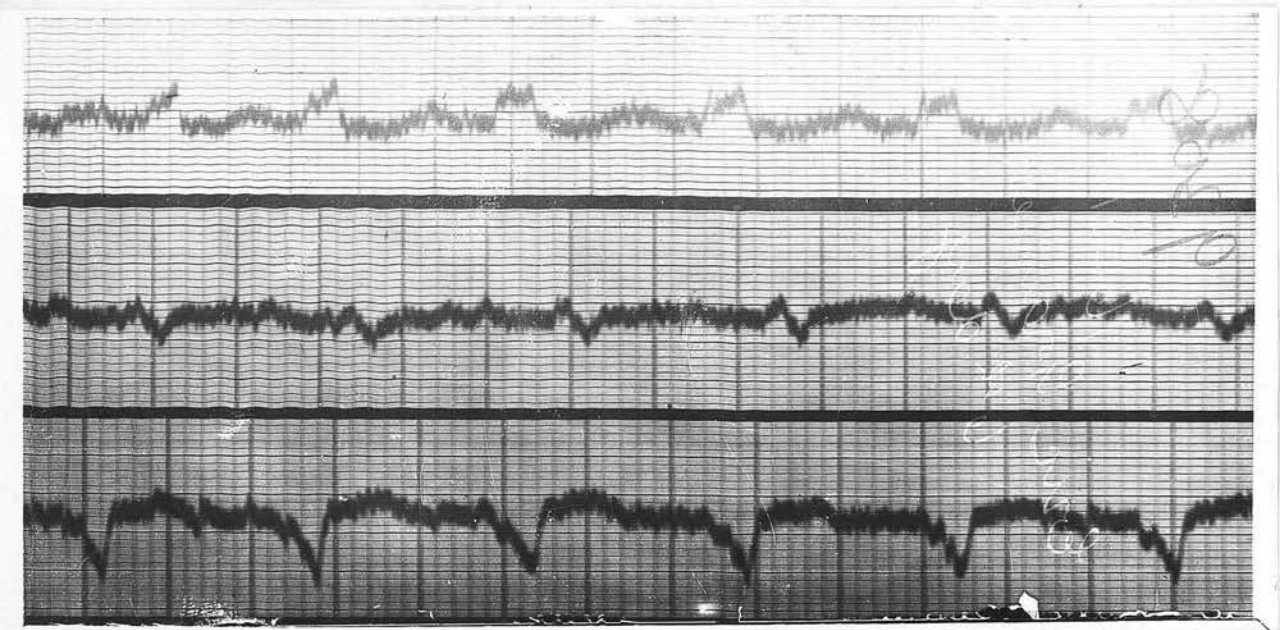
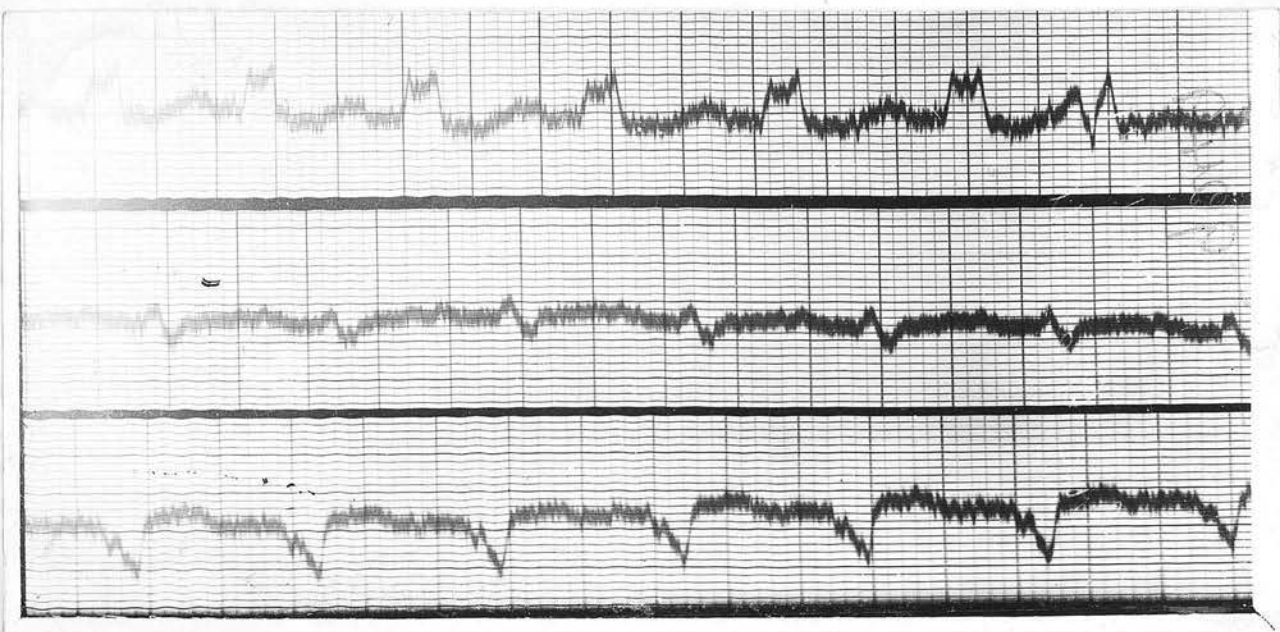
Wassermann: + +

Diagnosis: Syphilitic Myocarditis.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.541	.568		.573				.631
Haemoglobin %	91	92		90				
Refractive Index	1.3480	1.3450		1.3470				1.3390
Blood Chloride in mgs. %	405	452.5		430				
Blood Urea in mgs. %	49	44		39				27
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	481	57.6		43.3				615
Blood Viscosity								
Venous Pressure in inches								
Weight in stones and lbs.	9- 2 $\frac{3}{4}$	9- 4 $\frac{1}{2}$ 9- 2 $\frac{1}{2}$ 9- 3 $\frac{1}{2}$	9- 3 $\frac{1}{2}$	9- 5 $\frac{1}{4}$ 9- 4 $\frac{1}{4}$ 9- 4 $\frac{1}{2}$				
Fluid Intake in ozs.	62	18 18 30		86 90 70				
Urine, 24 hrs., in ozs.								
Urine Chloride in mgs. %								

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test
Depression of Freezing Point (Osmotic Pressure)			
Sp. Gravity			
Urea %			

Case 32,



Case 34.

Age, 16.

Sex, Female.

Complaint: Cough, weakness and swelling of leg.

History: Rheumatic Fever for a second time 6 months ago - was treated in hospital, being discharged at the end of two months. For two months health remained fairly good, but recently suffered pain in chest, attacks of giddiness - palpitation.

Previous History: Rheumatic Fever 3 years ago.
Measles and Influenza.

Examination: Pale and thin - looks ill.
Marked dyspnoea.
Cyanosis.
Pulsation in the neck.

Pulse: 120, irregular - poor volume - low tension - vessels soft.

Heart: Apex beat, 6th space, 6" middle line - diffuse beat.

Lungs: Slight congestion.

Liver: Enlarged.

Abdomen: Distended and ascites.

Oedema legs and ankles.

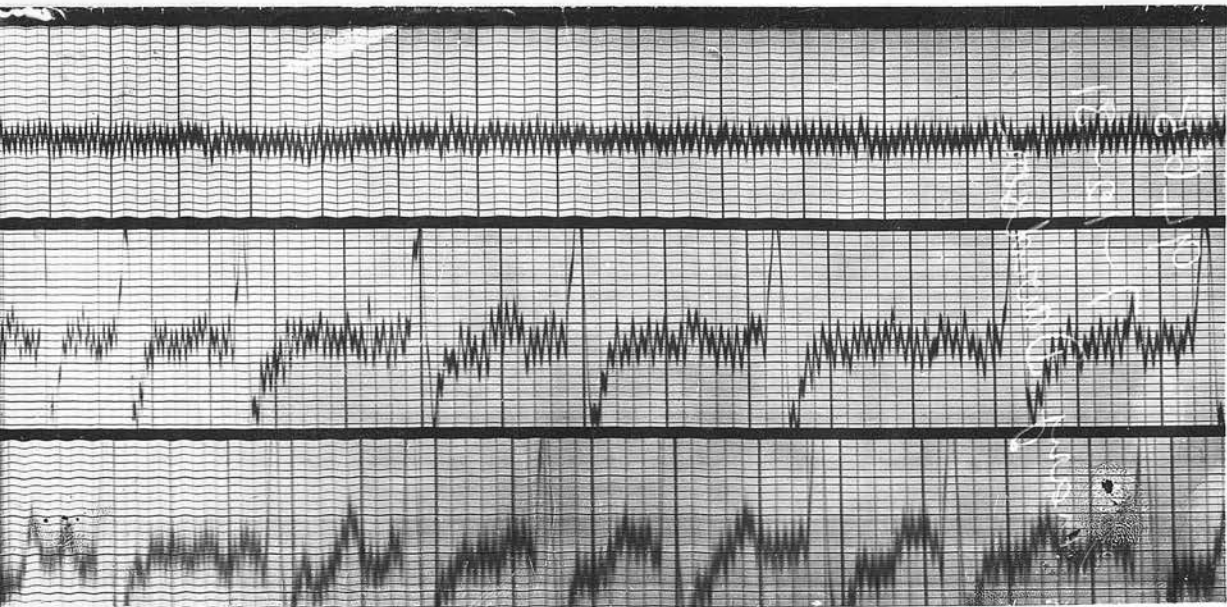
Wassermann: --

Diagnosis: Rheumatic Carditis with Fibrillation.

Investigation	Normal Condition	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.576			.566	.588	.587		(Before death) .538
Haemoglobin %	81			82	73			
Refractive Index	1.3450			1.346	1.349			1.3390
Blood Chloride in mgs. %	410			390	430			310
Blood Urea in mgs. %	60			49	53			27
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂								
Blood Viscosity	7.2			7.9	7.4			
Venous Pressure in inches								
Weight in stones and lbs.	6- 1½			6- 2 6- 2¼ 6- 2 6- 1 6- 1½ 6- 1½	6- 1½ 6- 1½ 6- 2½			
Fluid Intake in ozs.	6			80 24 32 40 36 40	32 64 66			
Urine, 24 hrs., in ozs.				4 1024 16 1010 14 1020 14 1020	10 1020 12 1020			
Urine Chloride in mgs. %				20 15 absent 25	10 15			

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test
Depression of Freezing Point (Osmotic Pressure)	1.167		
Sp. Gravity			
Urea %			

Case 34



P.P.: 12/73

Heart: Apex beat, with heave, 4F - somewhat diffuse.

Lungs: No crackles - faint

Liver: Nil.

Spleen: No enlargement. In abdomen.

No oedema.

Examination: ---

Diagnosis: Myocarditis.

Case 35.

Age, 57.

Sex, Male.

Complaint: Pain in chest.

History: Pain over sternum intermittently for past 6 months - not radiating. Brought on by work. May last for two hours. Sometimes marked dyspnoea during attack and has to stop work. Recently swelling of ankles.

Previous History: Influenza and Bronchitis.

Examination: Plethoric - cyanosis - no pulsation in neck.

Pulse: 86, regular - good volume - tension normal.

B.P.: 125/75.

Heart: Apex beat, 6th space, 4½" - somewhat diffuse.

Sounds: No bruit - faint.

Lungs: Nil.

Liver: No enlargement. No ascites.

No Oedema.

Wassermann: --

Diagnosis: Myocarditis.

Case 36



Case 37.

Comparisons of Blood and Transudate

Investigation	Normal Conditions		On Salt Free Diet		On Salt Free Diet	
	Blood	Transudate	Blood	Transudate	Blood	Transudate
Osmotic Pressure	.557	.498	.558	.507	.559	.512
Haemoglobin %	67		76		70	
Refractive Index	1.3470	1.3380	1.3460		1.3489	1.3390
Chloride in mgs. %	399	427.5	430	418	330	360
Urea in mgs. %	61	25	67	23	77	27
Viscosity	-	-	-	-	-	-
Venous Pressure in inches	-					
Alkali Reserve as vols. of O ₂	48.1	52.8	38.1	33.1	43.3	-

Case 38.

Age, 52.

Sex, Male.

Complaint: Pain in stomach - shortness of breath -
Loss of weight.

History: Health satisfactory until one year ago -
had operation - since then suffered pain,
loss of weight, severe cough, feet and
legs began to swell.

Previous History: Nil.

Examination: Poor nutrition - anxious expression -
marked dyspnoea - cyanosed.

Pulse: 105, regular - volume good - tension
good.

Arteries: Slight sclerosis.

B.P.: 150/105.

Heart: Apex beat, 5th space, 4" from M.S.L.

Sounds: Mitral systolic and re-
duplicating 2nd.

Lungs: Hydrothorax.

Liver: Greatly enlarged.

Ascites and oedema of legs.

Wassermann: --

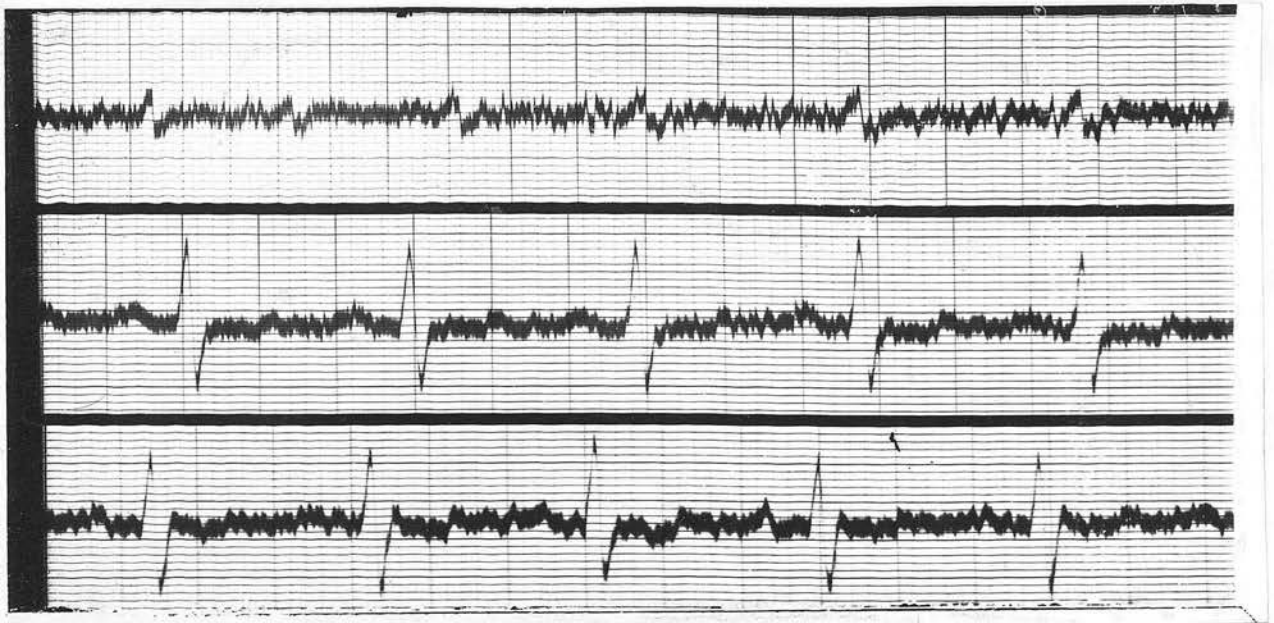
Diagnosis: Myocarditis.

Case 38.

Comparison of Blood and Transudate

Investigation	Normal Conditions		
	Blood	Transudate Pleura	Transudate Legs
Osmotic Pressure	.551	.562	
Haemoglobin %	96		
Refractive Index	1.3500	1.3390	1.3360
Blood Chloride in mgs. %	-	495	
Blood Urea in mgs. %	34	28	
Blood Sugar in mgs. %	-	-	
Alkali Reserve as vols. of O ₂	43.3	52.8	29.1

Case 38,



Arteries normal.

Heart: Apex beat, 5th space, left

Sound: Presystolic murmur
Low systolic

Lungs: Congested.

Liver: Enlarged. No spleen

No edema at feet.

Examination: --

Diagnosis: Mitral Stenosis.

Rheumatic Carditis.

Case 40.

Age, 30.

Sex, Female.

Complaint: Fainting and spitting blood.

History: Eight years ago developed severe cough and haemoptysis. Was treated in hospital for heart disease and improved. Cough, loss of weight and haemoptysis recurred and is now breathless. Faints occasionally and gets pain in chest. Feet sometimes swell at night.

Previous History: Chorea - Tonsillitis.

Examination: Malar flush - pale, thin.

Pulse: 80, regular - small volume - normal tension.

Arteries normal.

Heart: Apex beat, 5th space, $3\frac{1}{2}$ ".

Sounds: Presystolic at mitral.
Loud systolic.

Lungs: Congested.

Liver: Enlarged. No ascites.

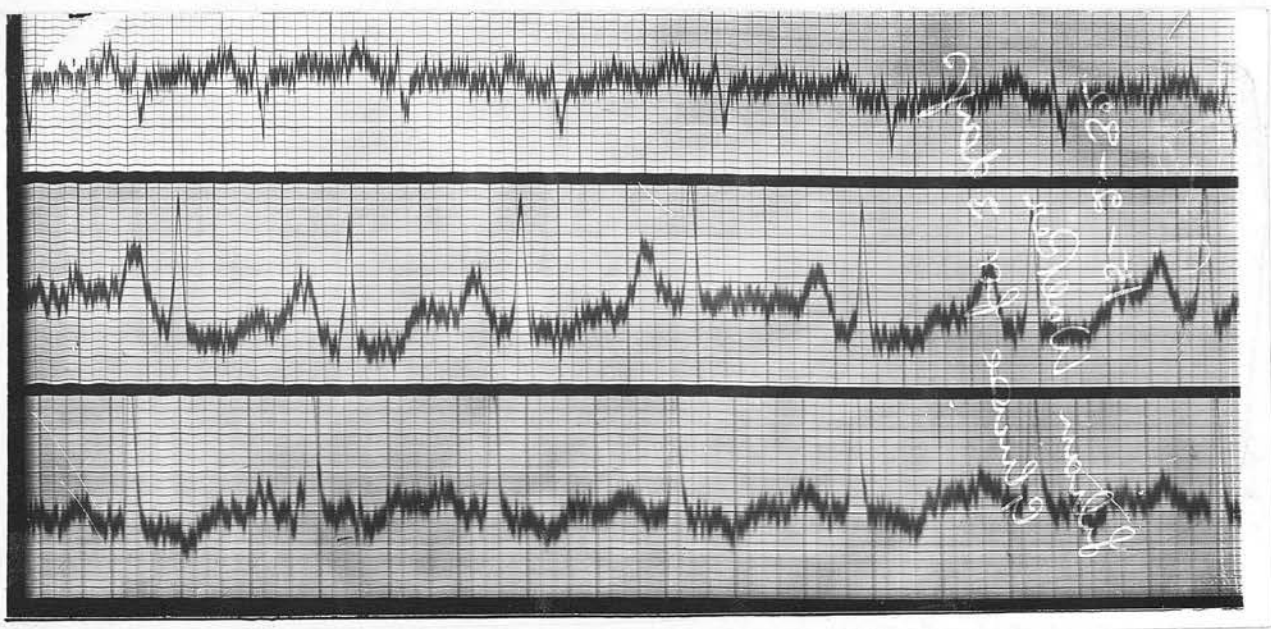
No Oedema at rest.

Wassermann: --

Diagnosis: Mitral Stenosis.

Rheumatic Carditis.

Case 40



Diagnosis: [Faint text]

Case 41.

Age, 34.

Sex, Female.

Complaint: Fainting attacks.

History: Nine months attacks of fainting commenced and have become gradually more frequent. Sleeps badly and is losing weight. Very easily tired and short of breath.

Previous History: Nil.

Examination: Nutrition good - dyspnoea - some cyanosis.

Pulse: 90/100 - dropped beats. Rhythm variable - volume normal - tension normal.

Arteries: Slightly thickened.

B.P.: 135/75.

Heart: Apex beat, 5th space, $3\frac{1}{2}$ ".

Sounds: Bruit de galop occasionally.

Lungs: Nil.

Liver: Nil. No ascites.

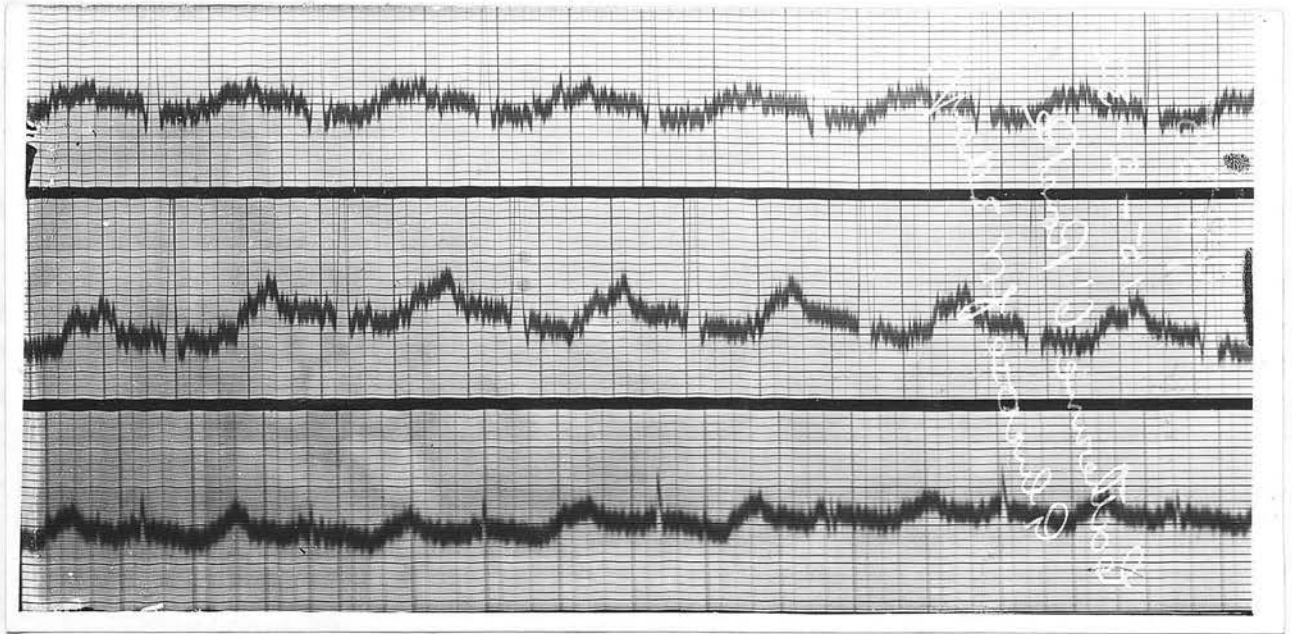
No Oedema.

Wassermann: + +

Diagnosis: Syphilitic Myocarditis.

Investigation	Normal Condition	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose + 6 Pints Fluid	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.556				.564	.559		
Haemoglobin %	76				68	78		
Refractive Index	1.3498				1.3500	1.3570		
Blood Chloride in mgs. %	562				585	510		
Blood Urea in mgs. %	33				31	30		
Blood Sugar in mgs. %	-				105	182		
Alkali Reserve as Vols. of O ₂	48.1				38.5	38.5		
Blood Viscosity								
Venous Pressure in inches								
Weight in stones and lbs.	7-12 $\frac{1}{4}$				7-11 $\frac{3}{4}$ 7-12 $\frac{1}{2}$ 7-11 $\frac{1}{2}$	7-11 $\frac{1}{4}$ 7-10 $\frac{1}{2}$ 7-11 $\frac{1}{4}$		
Fluid Intake in ozs.	48				160 120 124 42	100 100 100		
Urine, 24 hrs., in ozs.					36 $\frac{1}{2}$ 1030 57 1015 68 1020 40 1022	70 1015 78 1018 72 $\frac{1}{2}$ 1012		
Urine Chloride in mgs. %					350 500 100 100	200 800 500		
Renal Efficiency Tests		Dilution	Concentration	Urea % Excretion Test				
Depression of Freezing Point (Osmotic Pressure)								
Sp. Gravity								
Urea %								

Case 41



Diagnosis: Acute myocardial infarction

Case 42.

Age, 34.

Sex, Female.

Complaint: Pain in stomach.

History: Pain in epigastrium for 4 months - in no way related to food. Sometimes last 2 or 3 days. Pain in lumbar region occasionally. Palpitation after exercise. No swelling of feet.

Previous History: Nil.

Examination: Good nutrition - no cyanosis - no pulsation in neck.

Pulse: 86, regular - volume normal - tension normal.

B.P.: 140/70.

Heart: Apex beat, 5th space, 3" M.S.L.

Sounds: Soft systolic mitral.

Lungs: Nil.

Liver: Not enlarged. No ascites or oedema.

Wassermann: --

Diagnosis: No organic disease.

Investigation	Normal Condition	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Comparison of Blood and Transudate			
					Extra Salt Extra Fluid	After Glucose + 6 Pints Fluid	Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.565				.571	.574		
Haemoglobin %	65				63	65		
Refractive Index	1.3491				1.3490	1.3490		
Blood Chloride in mgs. %	-				550	510		
Blood Urea in mgs. %	29				30	33		
Blood Sugar in mgs. %	-				102	91		
Alkali Reserve as Vols. of O ₂	33				33	38		
Blood Viscosity								
Venous Pressure in inches								
Weight in stones and lbs.	8- 8				8-10 $\frac{1}{4}$ 8-10 $\frac{1}{4}$ 8-10 $\frac{1}{4}$ 8-10 $\frac{1}{2}$	8- 8 $\frac{3}{4}$ 8-13 8-10 $\frac{3}{4}$ 8-10 8-10 $\frac{3}{4}$		
Fluid Intake in ozs.					120 120 120 120	120 120 120 120		
Urine, 24 hrs., in ozs.					68 1010 105 1010 114 $\frac{1}{2}$ 1010 92 1014	74 1010 92 1010 80 1014 89 1010		
Urine Chloride in mgs. %					250 200 230 250	200 250 200 200		

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test
Depression of Freezing Point (Osmotic Pressure)			
Sp. Gravity			
Urea %			

Case 43.

Age, 35.

Sex, Male.

Complaint: Breathlessness and Palpitation.

History: Suffered from breathlessness for some time and recently had palpitation with occasional praecordial pain not radiating. Cramp in calf of legs after exercise causes patient to stop walking from time to time.
During War was marked C.3.

Previous History: Severe Influenza 1918.

Examination: Stout - pale - no cyanosis - no pulsation in neck.

Pulse: 90, irregular - good volume - good tension.

Arteries: Not thickened.

B.P.: 130/85.

Heart: Apex beat, 5th space, 4" - diffuse.

Sounds: No bruit. Irregular, with runs of regular rhythm. Impure Flutter.

Liver: Not enlarged.

No Oedema.

Wassermann: --

Diagnosis: Impure Flutter.

Case 44.

Age, 53.

Sex, Male.

Complaint: Indigestion and tightness on chest.

History: Suffered from flatulence and dyspepsia sometimes and occasionally gets feeling of constriction across chest after food. This lasted about one hour. Also had dizziness and tingling in tips of fingers. Gets severe headaches. Works with lead.

Previous History: Gonorrhoea 23 years ago.
? Rheumatism 20 years ago.

Examination: Plethoric - good nutrition - no cyanosis.

Pulse: 74, regular - good volume - high tension.

Vessels: Tortuous and hard.

Heart: Apex beat, invisible and impalpable.

Sounds: Systolic bruit at mitral.

B.P.: 240/110.

Liver: No enlargement.

No Oedema.

Wassermann: --

Diagnosis: Hyperpiesia.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose + 6 Pints Fluid	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.574					.581		
Haemoglobin %	73					94		
Refractive Index	1.3500					1.3485		
Blood Chloride in mgs. %	520					510		
Blood Urea in mgs. %	44					38		
Blood Sugar in mgs. %	110					105		
Alkali Reserve as Vols. of O ₂	43					38		
Blood Viscosity								
Venous Pressure in inches								
Weight in stones and lbs.	10- 5½					10- 8½ 10- 8¾ 10- 8 10- 8		
Fluid Intake in ozs.	36					120 120 120 120		
Urine, 24 hrs., in ozs.						80 1018 74 1012 56 1012 78 1010		
Urine Chloride in mgs. %						400 390 290 450		

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test
Depression of Freezing Point (Osmotic Pressure)			
Sp. Gravity			
Urea %			

Case 44,



No. 10000

March 1932

Diagnosis

Case 45.

Age, 50.

Sex, Male.

Complaint: Dizziness.

History: Complained of dizziness and light-headedness for 4 years and 2 years ago had to stop work on this account. Sleeps badly.

Examination: Well nourished - rather ruddy complexion - carotid pulsation.

Pulse: 86, regular - good volume - high tension.

Vessels: Very sclerosed.

B.P.: 230/120.

Heart: Apex beat, 5th space, $3\frac{1}{2}$ ".

Sounds: Accentuated aortic II.

Lungs: Nil.

Liver: Not enlarged.

No Oedema.

Wassermann: +

Diagnosis: Myocarditis Hyperpiesia.

Case 46.

Age, 16

Sex, Female.

Complaint: Swelling of both ankles and legs.
Breathlessness.

History: Swelling of ankles and both legs, coming on intermittently for some time. Has been treated in hospital for same thing before. Swelling has been coming on for some time. Occasional attacks of light-headedness.

Previous History: Growing pains and Tonsillitis and Influenza.

Examination: Pale - well nourished - no cyanosis.

Pulse: 80, regular - good volume and tension.

Vessels: Soft.

B.P.: 135/70.

Heart: Apex beat, 6th space, 4" M.S.L.

Sounds: Mitral systolic murmurs.

Lungs: Nil.

Liver: Not enlarged. No ascites.

Slight Oedema.

Wassermann: --

Diagnosis: Rheumatic Endocarditis.

Case 47.

Age, 39.

Sex, Female.

Complaint: "Palpitations."

History: Operation 12 months ago - health poor since then - very nervous - hot flushes and cold sweats. Noticed swelling in neck recently after Tonsillitis. Also noticed tender swellings in other parts of body. Easily tired and short of breath.

Previous History: Rheumatic Fever 30 years ago.
Chorea 4 years ago.
Scarlet Fever and Diphtheria.

Examination: Very stout - face flushed - no cyanosis - carotid pulsation.

Pulse: 80, regular - small volume - tension normal.

B.P.: 135/80.

Heart: Apex beat, not visible, circa 3" M.S.L.

Sounds: Faint - no bruit.

Lungs: Nil.

Liver: Not enlarged. No ascites or oedema.

Wassermann: --

Diagnosis: Menopausal obesity.

Case 48.

Age, 18.

Sex, Female.

Complaint: Swelling of ankles.

History: Left ankle began to swell recently and was worse at night, also attacks of praecordial pain and breathlessness - pains sometimes radiating to left shoulder.

Previous History: Rheumatic Fever 1925.
Recurrent Tonsillitis.

Examination: Pale - no cyanosis.
No pulsation in neck.

Pulse: 76, regular - normal tension and volume.

Arteries: Soft.

B.P.: 130/60.

Heart: Apex beat, 5th space, 4" to the left
R.B. in R.B.S.

Sounds: Pre-systolic and systolic.

Lungs: Nil.

Liver: Not enlarged. No ascites.

Slight Oedema.

Wassermann: --

Diagnosis: Rheumatic Endocarditis.

Investigation	Normal Condition	Standard Diet + 18 ozs. Fluid	Salt Free Diet + 18 ozs. Fluid		Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
			Blood	Transudate			Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.570		.576	.584				
Haemoglobin %	77		78	76				
Refractive Index	1.3490		1.3490	1.3499				
Blood Chloride in mgs. %	570		565	500				
Blood Urea in mgs. %	38		34	38				
Blood Sugar in mgs. %								
Alkali Reserve as Vols. of O ₂	43		42	38				
Blood Viscosity								
Venous Pressure in inches								
Weight in stones and lbs.	10- 3½		10- 1½ 10- 1 10- 1½ 10- 1½	10- 0½ 10- 1 10- 1½ 10- 1				
Fluid Intake in ozs.			18 18 18 18	120 120 120 120				
Urine, 24 hrs., in ozs.			18 1036 26 1030 25 1032	76 1010 68 1010 60 1014 80 1010				
Urine Chloride in mgs. %			520 480 450	230 140 130 130				

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test
Depression of Freezing Point (Osmotic Pressure)			
Sp. Gravity			
Urea %			

Case 49.

Age, 17.

Sex, Female.

Complaint: Pain in the back and legs.

History: Has recently had what appeared to be an attack of Acute Rheumatism. After a month in bed patient got up. Suffered from palpitation and giddiness and breathlessness - pain in the knees returned, also severe headaches.

Previous History: Rheumatic Fever 3 years ago.

Examination: Pale - ill nourished -

Pulse: 80, irregular - volume poor - tension low.

Vessels: Soft.

B.P.: 130/70.

Heart: Apex beat, 6th space - diffuse.

Sounds: Soft mitral systolic murmur.

Lungs: Nil.

Liver: Not enlarged.

No Oedema.

Wassermann: --

Diagnosis: Rheumatic Carditis.

Case 50.

Age, 19.

Sex, Female.

Complaint: Palpitation.

History: Three years ago Doctor informed patient that she had V.D.H. Has been very careful but recently ankles began to swell. Noticed she was breathless and easily tired. Occasional praecordial pain.

Previous History: Rheumatic Fever 4 years ago.

Examination: Pale - thin - no cyanosis.

Pulse: 90, regular - volume good - tension good.

B.P.: 110/70.

Heart: Apex beat, behind 6th rib, 4" M.S.L. - forcible.

Sounds: Long blowing systolic bruit. *at mitral.*
Soft basal systolic.

Lungs: Nil.

Liver: Not enlarged.

No Oedema.

Wassermann: +

Diagnosis: Myocarditis, Rheumatic.

Investigation	Normal Conditions	Standard Diet + 18 ozs. Fluid + 20 grammes Salt	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.571	.581						
Haemoglobin %	80	83						
Refractive Index	1.3470	1.3570						
Blood Chloride in mgs. %	580	530						
Blood Urea in mgs. %	31	30						
Blood Sugar in mgs. %		82						
Alkali Reserve as Vols. of O ₂	38	33						
Blood Viscosity								
Venous Pressure in inches								
Weight in stones and lbs.		7- 1½ 7- 2 7- 2						
Fluid Intake in ozs.	36	18 18 18						
Urine, 24 hrs., in ozs.		22 1018 28 1010 20 1010						
Urine Chloride in mgs. %		300 - 100						

Renal Efficiency Tests	Dilution	Concentration	Urea % Excretion Test
Depression of Freezing Point (Osmotic Pressure)			
Sp. Gravity			
Urea %			

Case 51.

Age, 68.

Sex, Male.

Complaint: Cough, headache and breathlessness.

History: Cough, dry, hacking, commenced 8 weeks ago, also was very short of breath. Praecordial pain on exertion and occasional blurring of vision.

Previous History: Rheumatic pains some years ago while in the Army - Syphilis 40 years.

Examination: Sallow complexion - nutrition fair - some dyspnoea - carotid pulsation.

Pulse: 90, regular - fair volume - high tension.

Arteries: Sclerosed.

B.P.: 230/130

Heart: Apex beat, 6th space, 5" M.S.L. - heaving - forcible.

Sounds: Double mitral, double aortic.

Lungs: Some congestion at both bases.

Liver: Enlarged.

Oedema of legs.

Wassermann: + +

Diagnosis: Syphilitis Carditis.

Investigation	Normal Condition	Standard Diet + 18 ozs. Fluid + 20 Grammes Salt	Salt Free Diet + 18 ozs. Fluid	Salt Free Diet + Extra Fluid	Extra Salt + Extra Fluid	After Glucose	Comparison of Blood and Transudate	
							Blood	Transudate
Depression of Freezing Point Osmotic Pressure	.569	.578						
Haemoglobin %	82	80						
Refractive Index	1.3460	1.3500						
Blood Chloride in mgs. %	585	510						
Blood Urea in mgs. %	38	49						
Blood Sugar in mgs. %	-	105						
Alkali Reserve as Vols. of O ₂	38	34						
Blood Viscosity								
Venous Pressure in inches								
Weight in stones and lbs.		10- 2 10- 2 9-13 ³ / ₄						
Fluid Intake in ozs.	24	18 18 18						
Urine, 24 hrs., in ozs.		15 1046 12 - 13 1042						
Urine Chloride in mgs. %		400 475 550						
Renal Efficiency Tests		Dilution	Concentration	Urea % Excretion Test				
Depression of Freezing Point (Osmotic Pressure)								
Sp. Gravity								
Urea %								