

great dietary staples: maize, wheat, and rice. A low-energy diet is likely to be one also low in protein. The two are inseparable in human requirements and to debunk protein seems to me to be courting disaster. This does not detract from the criticism that perhaps the protein-enriched food programme has been overemphasised or proved impractical. However, it is only with research and by trial and error that we can find possible solutions to the very real world malnutrition problem.

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FOLLOW-UP OF PATIENT WITH PORTACAVAL SHUNT FOR THE TREATMENT OF HYPERLIPIDÆMIA

SIR,—The case was reported previously of a 12-year-old girl with type-IIa hyperlipoproteinæmia who underwent end-to-side portacaval shunt in an attempt to lower cholesterol levels.¹ The patient had had a myocardial infarction prior to surgery and was bedridden owing to angina pectoris. In the 6-month postoperative period her cholesterol levels fell markedly and the chest pain disappeared. The purposes of this supplementary report are first, to provide a longer follow-up which now is 17 months, and, second, to present documentation of the disappearance of cardiovascular lesions in the human following the lowering of cholesterol and low-density-lipoprotein (L.D.L.) levels.

The preoperative angina pectoris has not recurred. The patient has been an honours student in school over the past

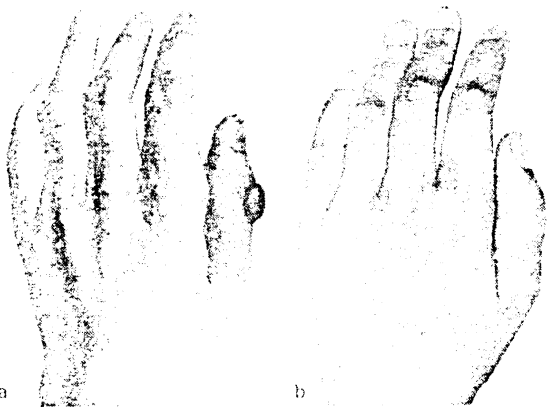


Fig. 1—Patient's left hand (a) two weeks before and (b) 16 months after portacaval shunt.

year, has walked the 4 blocks to and from school, ridden her bike daily, and led a normal life for an adolescent girl. Her height has increased 8 cm., and her weight 8.4 kg. over the 17 postoperative months. The electrocardiogram remains abnormal with evidence of the previous myocardial infarction. She continues to receive digitalis, and twice during acute respiratory infections has had physical and X-ray evidence of fluid in the lungs due to congestive heart-failure. The previously raised yellow xanthomas over the ankles, heels, knees, knuckles, elbows, and eyelids have continued to disappear (fig. 1) and in some areas there remains only a slight discoloration of the skin, which is no longer yellow or tuberous. Restrictions of protein intake have not been imposed at any time. She has not had any evidence of encephalopathy.

The serum-cholesterol levels, determined by the method of

1. Starzl, T. E., Chase, H. P., Putnam, C. W., Porter, K. A. *Lancet*, 1973, ii, 940.

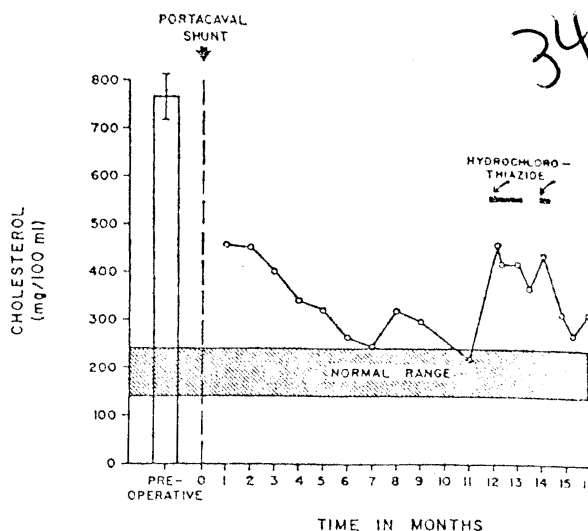


Fig. 2—Serum-cholesterol concentrations before and for 16 months after portal diversion.

The preoperative value represents the mean of 9 determinations \pm one standard deviation.

Francy and Amador,² have remained below 400 mg. per 100 ml. (fig. 2) except during the two respiratory infections accompanied by congestive heart-failure. During both of these the patient received hydrochlorothiazide as well as antibiotics. She has since received frusemide without a similar rise in serum-cholesterol. The mean postoperative serum-cholesterol concentration for 16 postoperative months, beginning on the 30th day following surgery and excluding the values obtained during the two episodes of infection and congestive heart-failure, has been 330 mg. per 100 ml., compared to a mean of 769 mg. per 100 ml. prior to surgery. The mean \pm 1 s.d. for all determinations in the past year, including the two episodes of pneumonia and congestive heart-failure, is 343 ± 71 mg. per 100 ml. The three most recent values, 15–17 months following surgery, have been 270, 286, and 315 mg. per 100 ml. Serum-L.D.L. levels, determined as previously described,¹ which were above 1000 mg. per 100 ml. preoperatively, have remained below 800 mg. per 100 ml. with a value of 732 mg. per 100 ml. 16 months postoperatively. Serum-triglycerides have never been elevated.

Serum biochemical tests 16 months after surgery, as determined by previously described methods,³ were: total serum protein, 6.6 g. per 100 ml.; albumin, 3.2 g. per 100 ml.; S.G.O.T., 28 I.U. per litre; S.G.P.T., 15 I.U. per litre; alkaline phosphatase, 112 I.U. per litre; conjugated bilirubin, 0.9 mg. per 100 ml.; unconjugated bilirubin, 1.4 mg. per 100 ml.; ammonia, 42 μ g. per 100 ml.; triglycerides, 65 mg. per 100 ml. Total L.D.H. activity was 380 I.U. per litre with the following normal isoenzyme pattern: I=23%; II=25%; III=24%; IV=15%; and V=13%. Fasting blood-sugars have been normal, the two most recent being 68 and 84 mg. per 100 ml. Fasting insulin levels have been slightly elevated (the two most recent 20 and 23 microunits per ml.).

Cardiac catheterisation was performed 16 months after portal diversion by the same individual (J. N.) who did the preoperative studies. The pressure-gradient of aortic stenosis, which increased from 24 mm. Hg in 1968 to 56 mm. Hg in 1972 has now decreased to 10 mm. Hg—a reduction associated with a diminished systolic murmur in the opinion of all examiners. The aortic valve, which was thickened and relatively immobile at previous studies, was now mobile to the point of minimal prolapse of the non-coronary cusp accompanied by faint regurgitation of dye into the left ventricle. There was no murmur of aortic insufficiency.

The coronary arteriograms obtained in November, 1972, 3 months before the portacaval shunt, revealed diffuse narrowing

2. Francy, R. J., Amador, E. *Clinica chim. Acta*, 1968, 21, 255.

3. O'Brien, D., Ibbott, F. A., Rodgers, D. O. in *Laboratory Manual of Pediatric Microbiochemical Techniques*, p. 98. New York, 1968.