neck, and trunk than on the limbs, and consisted of closely packed but discrete crescentic and irregular macules, showing innumerable typical bright red papules, many of which were distinctly petechial. This necessarily produced a considerable variety of colours, and as he was a big man, with a very long and broad back, the total effect of this large mass of brilliant colouring was unusually striking.

Prognosis was difficult. Measles at 57 years of age is quite outside one's experience. It seemed just possible that as this disease gives rise to the more severe bronchial complications in infancy it might also be more serious in this respect in the later years of life, especially in a person already subject to bronchitis. As, however, the pulse was only 88, and there were no signs of serious toxæmia, and as by this, the eighth day, the fever had probably reached its height, it seemed likely that the next few hours would bring a general improvement. The only point of doubt was as to the possible extension of bronchial trouble. Our anxiety about this, however, was unnecessary, for in a few hours he began to improve, and after that continued to make an uninterrupted recovery.

It is interesting to surmise how and where he became infected, and still more how it was he had escaped infection earlier in life. As regards the former point, there was an outbreak of measles in the neighbourhood at the time, and an opportunity of infection seems to have been a journey in a public motor bus, just a fortnight before, to and from a neighbouring town some miles away. There were some children in the bus, but nothing is known as to who they were, or if any of them had the disease. Otherwise he led an unusually secluded life. Although married he had had no children. He lived in a large, rather isolated house, and had very few visitors. Curiously enough, his wife is said to have had measles twice, though whether either of the attacks occurred since marriage was not stated.

Students in taking clinical histories often forget to put down the patient's age, and when told to do so are apt to look upon their teachers as rather unnecessarily meticulous. As a matter of fact, in hearing the history of a case the experienced clinician unconsciously adjusts his thoughts to a certain group of cases directly he hears the patient's age; at any rate, he unconsciously eliminates a considerable number of conditions which he knows are not likely to occur at that particular period of life. Now and again, as in this case, it is the unexpected that happens. When it does, the ordinary clinical values become changed and require rather careful adjustment.

HIGH BLOOD PRESSURE AND CHOLESTERIN.

BY

I. HARRIS, M.D.KÖNIGSBERG, L.R.C.P.ED.,
PHYSICIAN TO THE LIVERPOOL HEART HOSPITAL,
AND

I. J. LIPKIN, M.D., CH.B.LIVERP., D.P.H., D.T.M.,
BIOCHEMIST TO THE LIVERPOOL HEART HOSPITAL.

WITHIN recent years various attempts have been made to seek in blood chemistry the causal factor for hypertension. Guanidine and its derivatives, sugar, uric acid, potassium and calcium salts, in abnormal quantities in the blood—each of these substances in turn has been held responsible for the hypertonic contractions of the vessels in cases of high blood pressure. The latest suggestion is that hypercholesterinaemia is responsible for the production of high blood pressure. According to Westphal¹ cholesterol in the blood circulation affects the vessels in such a way as to increase their susceptibility to adrenaline. The latter, of course, gives rise to hypertension. This author found in 71 per cent. of his high blood pressure cases an increase in cholesterol content of the whole blood.

Thomas² injected rabbits with cholesterol and observed an increase in blood pressure. Thölldt³ who repeated the experiment, was not able to confirm the findings. While the authorities thus differ as to whether cholesterol directly raises the pressure, greater unanimity exists in regard to cholesterol as a factor in the production of arterio-sclerosis. Tregnbow⁴ fed rabbits with cholesterol, and he found, as many others have discovered before him, that arterio-sclerosis develops as a result of this feeding. The arterial pressure, however, did not rise in these cases.

Shapiro⁵ also looks upon cholesterol as the chief factor in the production of arterio-sclerosis. He believes the increase of cholesterol in the blood is due to the activity of certain glands of internal secretion. Zachariae⁶ prepared a kind of vaccine, the purpose of which is to dissolve cholesterol in the blood, and he claims a marked improvement in the condition of his patients as a result of this treatment, the blood pressure becoming low. Askenazy⁷ found an increased cholesterol content in the blood in the great majority of his high blood pressure cases, and he highly recommended rhodan as a solvent of cholesterol in the circulation.

Amidst all the turmoil of conflicting opinion one simple fact stands out: arterio-sclerotic vessels invariably contain deposits of cholesterol and calcium. Our observation is based on actual blood cholesterol content found in hypertonic cases. In our investigation we administered cholesterol to patients, first in the form of food rich in cholesterol content, and subsequently by intramuscular injections, taking the blood pressure reading and determining the cholesterol content of the blood both before and after administration of the substance.

Method of Cholesterol Determination.

On to a fat-free filter-paper disc, pierced in the centre, and made to fit a specially constricted test tube containing 5 c.cm. of chloroform, is pipetted 0.25 c.cm. of oxalated blood. The tube is attached to a reflux condenser, and is immersed in a boiling-water bath. After thirty minutes the tube is detached from the condenser and cooled by putting under cold water; chloroform is added to the 5 c.cm. mark. To a similar tube 5 c.cm. of a standard cholesterol solution (8 mg. per 100 c.cm.) is added. To each tube is added 2 c.cm. of acetic anhydride and 1 c.cm. of strong sulphuric acid. The tubes are inverted twice to mix well and allowed to stand in cold water for ten minutes and compared in a Klett colorimeter.

The list of cases printed below gives the blood cholesterol of 11 hypertonic patients under observation at the Liverpool Heart Hospital. Cases with pronounced lesion of the kidneys were excluded, as it is known that these give a hypercholesterinaemia. We do not, however, for a moment suggest that all our cases are of the type of "essential" hypertony. We are definitely of opinion that it is quite impossible to differentiate clinically between "essential" hypertony and hypertony due secondarily to kidney disease; for the kidney efficiency tests give only information in regard to failure of the kidney function, and not in regard to the existence or otherwise of disease of the kidney, and the presence or absence of a trace of albumin and occasional casts does not mean much either way. The variation of blood cholesterol within normal limits is between 160 and 200. It will be seen that only in one case did the cholesterol blood content exceed 200. At any rate, even if the blood cholesterol were found to be increased, it by no means follows that it is the cause of high blood pressure. It is quite possible that a high blood pressure acting on the liver might produce hypercholesterinaemia.

Blood Cholesterol of 11 Hypertonic Cases under Observation at the Liverpool Heart Hospital.

CASE 1.—C. M., aged 53. Blood pressure, 225/110; cholesterol blood content, 172 mg. per 100 c.cm. of blood.

Clinical Signs.—Evidence of gross damage to the heart muscle; the QRS complex pronouncedly abnormal; left ventricle enlarged. Relative aortic and mitral regurgitation. All evidence pointed to a very old-established case of high blood pressure.

CASE 2.—A. H., aged 58. Blood pressure, 290/170; cholesterol blood content, 162 mg. per 100 c.cm. of blood.

Clinical Signs.—Typical case of high blood pressure. No albumin; left ventricle enlarged. Electro-cardiogram apart from left-sided preponderance normal.

CASE 3.—F. P., aged 40. Blood pressure, 190/80; cholesterol blood content, 204 mg. per 100 c.cm. of blood.

Clinical Signs.—Wassermann test negative. Moderate enlargement of left ventricle; double murmurs at the aortic area. Electro-cardiogram normal.

CASE 4.—R. B., aged 45. Blood pressure, 165/95; cholesterol blood content, 196 mg. per 100 c.cm. of blood.

Clinical Signs.—Combined valvular lesion, the predominant of which is aortic.

CASE 5.—C. McC., aged 64. Blood pressure, 230/115; cholesterol blood content, 160 mg. per 100 c.cm. of blood.

Clinical Signs.—Trace of albumin. Enlarged left ventricle; accentuation of second aortic sound. Electro-cardiogram normal.

CASE 6.—E. A., aged 52. Blood pressure, 165/90; cholesterol blood content, 182 mg. per 100 c.cm. of blood.

Clinical Signs.—Trace of albumin. Left ventricle enlarged; aortic systolic murmur. Electro-cardiogram, apart from left ventricular preponderance, normal.

CASE 7.—R. C., aged 53. Blood pressure, 180/100; cholesterol blood content, 126 mg. per 100 c.cm. of blood.

Clinical Signs.—Accentuation of second aortic sound; left ventricle enlarged. Wassermann reaction strongly positive. Electro-cardiogram showed left ventricular preponderance.

CASE 8.—C. M., aged 59. Blood pressure, 200/60; cholesterol blood content, 164 mg. per 100 c.cm. of blood.

Clinical Signs.—Relative aortic regurgitation; abnormal QRS complex.

CASE 9.—M. S., aged 53. Blood pressure, 170/95; cholesterol blood content, 164 mg. per 100 c.cm. of blood.

Clinical Signs.—Trace of albumin; heart not appreciably enlarged; accentuation of second aortic sound and the mitral second. Electro-cardiogram normal.

CASE 10.—A. C., aged 50. Blood pressure, 200/110; cholesterol blood content, 164 mg. per 100 c.cm. of blood.

Clinical Signs.—Wassermann reaction positive. Second aortic sound accentuated; systolic aortic murmur. QRS complex abnormal.

CASE 11.—B. M. Blood pressure, 240/75; cholesterol blood content, 162 mg. per 100 c.cm. of blood.

Clinical Signs.—Double aortic murmurs. QRS complex abnormal. Wassermann reaction strongly positive. Trace of albumin.

At first we attempted to increase the blood cholesterol by giving the patients about a pound and a half of brain daily. As, however, the brain has many other constituents as well as cholesterol, it was decided to administer actual cholesterol to the patient intramuscularly; 1½ grams of cholesterol was administered in olive oil.

Table showing Amount of Blood Cholesterol Before and After Administration of Actual Cholesterolin.

Date and Time.	Systolic Blood Pressure.	Amount of Blood Cholesterolin.
CASE B.		
November 13th, 1928.		
Before injection	125	1.6 mg. per c.cm.
Injection, 2.40 p.m.		
3.10 " " " " " "	130	—
3.30 " " " " " "	115	—
3.40 " " " " " "	116	2.14 mg. per c.cm.
4.30 " " " " " "	120	—
6.30 " " " " " "	120	2.04 mg. per c.cm.
7.30 " " " " " "	118	—
8.30 " " " " " "	116	—
November 14th, 10.0 a.m.	106	1.68 mg. per c.cm.
CASE C.		
November 9th, 1928.		
Before injection	140	1.6 mg. per c.cm.
Injection, 3.0 p.m.		
3.30 " " " " " "	130	—
4.0 " " " " " "	130	—
5.0 " " " " " "	132	2.1 mg. per c.cm.
6.30 " " " " " "	138	—
7.30 " " " " " "	136	—
8.30 " " " " " "	138	1.5 mg. per c.cm.
CASE W.I.		
November 6th, 1928.		
Before injection	105	1.8 mg. per c.cm.
Injection, 2.8 p.m.		
2.17 " " " " " "	115	—
3.8 " " " " " "	108	2.4 mg. per c.cm.
3.30 " " " " " "	120	—
4.0 " " " " " "	105	—
5.0 " " " " " "	110	—
6.30 " " " " " "	114	—
7.30 " " " " " "	116	—
8.30 " " " " " "	120	—
November 7th, 10.0 a.m.	120	—
11.30 " " " " " "	118	—
3.0 p.m.	108	1.7 mg. per c.cm.
November 8th, 11.0 a.m.	112	—
CASE W.		
March 15th, 1929.		
Before injection	128	1.6 mg. per c.cm.
Injection, 2.50 p.m.		
3.0 " " " " " "	142	—
4.0 " " " " " "	138	2.2 mg. per c.cm.
4.30 " " " " " "	135	—
5.0 " " " " " "	138	—
6.15 " " " " " "	136	—
6.45 " " " " " "	130	—
7.15 " " " " " "	136	—
7.45 " " " " " "	130	—
March 16th, 2.0 " " " "	124	1.5 mg. per c.cm.

It is clear that cholesterolin did not increase the blood pressure, although the blood cholesterol was enormously increased as a result of the injection.

Discussion.

The assertion that cholesterolin causes a direct rise of pressure becomes untenable in the light of our observation. An enormous increase in blood cholesterol does not raise the pressure. Cholesterolin is supposed to act on the adrenals. In this respect the following experiment in which one of us (I. H.) has taken part is interesting. As is well known, the effect of an intravenous injection of adrenaline in raising the arterial pressure is only a momentary one. A cat was given an injection of adrenaline and the pressure registered. After the systolic pressure had returned to normal, blood was taken from this cat and injected into another. The adrenaline effect was demonstrable again in the second cat, although when the blood was taken from the first animal this effect had already disappeared. This experiment demonstrates conclusively that although a large amount of adrenaline is present in circulation for some time, it is unable to raise the pressure for any length of time, for the simple reason that the organism counteracts any disturbance of the equilibrium in the level of blood pressure. The same thing happens if we attempt to reduce arterial pressure artificially. After venesection, for instance, within a few hours the blood pressure in most cases reaches the same level as before venesection, and we all know how difficult it is to raise the pressure in cases of hypotension.

All these facts go to show that the presence in itself of pressure-raising substances in the blood would never produce chronic hypertonia. High blood pressure is a condition in which, for some unknown reason, it is necessary for the tension to find an equilibrium at an abnormally high level. Luckily for the patients, all attempts on the part of the physician to disturb the new equilibrium usually end in failure.

As long as the real factors which produce high blood pressure are unknown the therapy of this condition will remain the miserable quackery it is to-day. At any rate, cholesterolin is unable to solve the mystery of high blood pressure.

The other problem, as to whether cholesterolin is the cause of arterio-sclerosis, has not been touched by our observation. There is little doubt that cholesterolin is capable in rabbits of producing arterio-sclerosis, but whether this is applicable to man is another question. It is possible that the deposits of cholesterolin found in arterio-sclerotic vessels are not the end-results of degeneration but have been caused by hypercholesterinaemia. It has been generally assumed that arterio-sclerosis of the larger vessels does not raise the pressure, but arterio-sclerosis of the small vessels effects an increase in pressure. Cholesterolin when affecting the smaller vessels may indirectly raise the pressure. This would mean, of course, that arterio-sclerosis is the primary condition and the rise in pressure the secondary. There is, however, insufficient evidence to support such a hypothesis.

REFERENCES.

- ¹ *Zeit. f. klin. Med.*, 1925, 101, 584. ² *Arch. d. mal du cœur*, 1926, 19, 641. ³ *Beitr. z. path. Anat. u. z. allg. Path.* ⁴ *Zeit. f. Kreislaufforschung*, 1929. ⁵ *Med. Journ. and Record*, 126, No. 5. ⁶ *Fortschr. Ther.*, 1928, 4, 4. ⁷ *Münch. med. Woch.*, 1927, 74, 1793.

PASSIVE IMMUNIZATION BY MEANS OF SCARLET FEVER ANTITOXIN.

BY

JAMES M. COWIE, M.D., D.P.H.,
MEDICAL OFFICER OF HEALTH, BURTON-ON-TRENT.

AMONG the many difficult problems of fever hospital administration is that of safeguarding the patient admitted with indefinite symptoms against the risk of acquiring infection in hospital.

Three years ago the type of scarlet fever prevalent in this district was of so mild a character that many patients, on admission to hospital, showed only a very slight rash on the body; the temperature was normal; they presented no throat, tongue, or other signs; sometimes there were not even traces of a rash. It seemed impossible at first to decide whether these patients were suffering from scarlet fever or not; but from the fact that a few developed an attack in hospital it became evident that at the time of admission the latter were not suffering from the disease.