The acute pain of the dissecting aneurysm and the leaking saccular aneurysm is the pain most likely to be misdiagnosed as one of the more usual types of acute abdominal emergency. The intense abdominal pain may mimic that of acute pancreatitis, perforated peptic ulcer, or mesenteric vascular occlusion. In such a case radiation of the pain into the loins, neck, or lower extremities may be significant. Previous symptoms of cardiovascular disease are usually absent, although the presence of hypertension may be suggestive.

The problem of the case which presents with extravasation at the hernial orifices is well illustrated in our two cases.

The concomitant occurrence of severe abdominal pain, lower-limb pain, and the presence of lower-limb vascular insufficiency may indicate a dissecting aneurysm, although similar signs may occur in a case of abdominal embolism.

Summary

Two cases of ruptured abdominal aortic aneurysm are recorded which presented clinically as incarcerated herniae.

The pathological and clinical features of abdominal aortic aneurysms are discussed.

The diverse modes in which these aneurysms, both ruptured and unruptured, may present are stressed and the differential diagnosis is indicated.

Our thanks are due to Mr. Clifford Jones for permission to publish Case 2, to Mr. Richard Charles for permission to publish Case 1 and to Mr. Trevor Shaw for a record of the necropsy findings.

REFERENCES

- Barrett, G. M. (1949). *British Medical Journal*, 2, 319.
Bryant, J. H. (1903). *Clin. J.*, 23, 71.
Eckert, G. A., and Baker, R. E. (1931). *Nav. med. Bull., Wash.*, 29, 667.
Jennings, G. H. (1941). *Lancet*, 1, 719.
Kampmeier, R. H. (1936). *Amer. J. med. Sci.*, 192, 97.

FOOD SUPPLY, BODY WEIGHT, AND ACTIVITY IN GREAT BRITAIN, 1943-9

BY

J. M. HARRIES, B.A.

Statistics and Intelligence Division, Ministry of Food

AND

DOROTHY F. HOLLINGSWORTH, B.Sc., M.I.Biol.

Scientific Adviser's Division, Ministry of Food

Between 1943 and 1949 a survey of the body weight of the population of Great Britain was made for the Ministry of Food with the object of providing an independent check on the adequacy of the national food supply. On certain broad assumptions a fall in body weight would have been a warning that food supplies were inadequate. Only gross changes in weight were being looked for, and none were found. There were, however, certain well-defined trends, and the opportunity has therefore been taken to determine whether these might themselves be related to trends in the energy value of the food consumed. The validity of such a comparison is bound to be influenced by changes in bodily activity such as those that might be associated with increased industrial productivity. As is shown below, attempts were made to arrive at an assessment of such activity, but without success. Nevertheless, the results recorded are so striking that it was felt that they warranted publication.

Experimental

The method of sample selection and the initial measurements of the Ministry's Body Weight Survey have already been described by Kemsley (1950, 1952), and a further paper describing the changes which occurred during the course of the survey is in the press. The survey was originally designed to cover the principal sections of the civil population over school age; as it continued, certain groups were omitted. The data used in this note refer to the two groups for which continuous records are available—industrial workers (male and female) in small firms and housewives. The former group was fairly well spread over the light industries, including some wholesaling and retailing trades. The latter group comprised working-class women who spent most of their time looking after their homes. For the present purpose only adults between 25 and 54 years have been included, because at ages outside these limits it is likely that growth or senescence will directly affect weight. Those individuals included in successive quarterly samples were compared, the weight changes thus obtained being averaged. These average changes, based on between 3,000 and 4,500 individuals, have been added cumulatively from the beginning of the survey, taking April, 1943, as the zero base-line. This quarterly index is shown by the dotted line in Figs. 1 and 2.

There are several sets of data referring to food consumption which might be compared with these graphs. Total supplies of foods as published in the various reports on Food Consumption Levels (Ministry of Food, 1949, 1951a) are not suitable, because they are complicated by changes in retail and household stocks and therefore do not adequately reflect current consumption. Changes in the ration scales are not realistic because they do not include unrationed foods or foods which were sold against points. For the present purpose, therefore, data from the Ministry of Food's National Food Survey have been used. These recorded the actual domestic food consumption of urban working-class households. The relevant results, together with details of the method of sampling and the techniques used, have already been published (Ministry of Food, 1951b). The data were based on actual purchases of foods and changes in larder stocks, and from these the average energy values of the food consumed could be calculated for comparison with the results of the body weight survey. No allowances have been made for food eaten in catering establishments, or for certain items, such as sweets, ice-cream, alcoholic and some soft drinks, for which the housewife could not readily provide complete data. Nor, on the other hand, are allowances made for food eaten in the home by visitors. These omissions do not, however, invalidate the figures for the present purpose, since on the average their energy values did not vary appreciably during the years under review.

Fig. 3 shows the resulting estimated changes in food consumption between 1943 and 1949, based on some 20,000 to 30,000 individuals per year. The dotted line shows changes in quarterly averages of the energy value of the food available for consumption in the home per head per day. It has been constructed on the same basis as the graphs in Figs. 1 and 2, changes being recorded from an arbitrary zero base-line starting at April, 1943.

In all three figures the medium-term trend line has also been calculated, based on a centralized moving average of four successive readings. The purpose of this, shown as a thicker continuous line on the graphs, has been to eliminate seasonal fluctuations.* Both body weight and calories varied seasonally in a fairly regular manner, but such variations were regarded as extraneous to the present purpose, which is to consider medium-term trends.

The simpler statistical methods of correlation are not applicable to time series without modification, and it is not

*It is known that under normal circumstances seasonal, and roughly parallel, fluctuations occur in body weight and food consumption. It was important, therefore, to eliminate these in considering longer-term trends.

possible to use the special methods devised for the correlation of time series to measure the agreement between the medium-term trends of these graphs, mainly because the series are not long enough—that is, there are too few readings. It would have been feasible to calculate a correlation

co-efficient for the seasonal fluctuations, but, for the reason stated above, this would have been irrelevant. As both body weights and consumption levels are derived from samples of typical urban working-class groups their results may be validly compared.

Results

Visual comparison shows a very striking resemblance between the graphs. In each there are three fairly clear phases. The first extends from April, 1943, to the beginning of 1945; the second from the beginning of 1945 to the beginning of 1947; and the third from the beginning of 1947 to the end of 1949. It will be seen that in all three phases the changes in body weight closely parallel the changes in the energy value of the foods consumed. Thus in the first phase the energy value increased by about 140 calories† per head per day, while the body weight rose by about 1½ lb. (680 g.) for men and 3 lb. (1,360 g.) for women. During the second phase, when there was a decrease in the number of calories per head per day of about 120, the body weight fell by about 1 lb. (454 g.) for men and ½ lb. (227 g.) for women, the latter starting to lose weight slightly later than the men. During the third phase, when the energy value of the food consumed again increased by about 120 calories, the body weight again rose by 2 lb. (907 g.) for men and 3 lb. (1,360 g.) for women. It will be noted that the general trends of the graphs in Figs. 1 and 2 are practically parallel during the first and third phases. The fall in weight during the second phase is statistically significant for both men and women.

Although there have been some inquiries into the body weights of adults under peacetime conditions of relative abundance, none of them has examined *changes* in weight, so that no data are available to determine whether the increases in weight during the first and third phases are normal for adults. As each was preceded by a period of stringency in the food supply—the calorie values of total food supplies for 1940–3, like those for 1946–7, being below 2,900 per head per day (Ministry of Food, 1949)—it is possible that each was rather greater than normal, a conclusion which is supported by Kemsley's (1950) comparison with earlier data.

It has been stated that Figs. 1 and 2 are based on two groups—industrial workers (male and female) in small firms and housewives. The former group were drawn from firms with and without canteens, and it was therefore possible to examine their weight increases separately (Kemsley, 1950). It was found that the greatest fall in weight took place amongst housewives and those workers who had no access to canteen facilities. The remainder, who had access to canteens, showed either a small loss in weight only, or even a small gain.

Growth Rates of Children

It is well known that unexplained secular changes, apparently unconnected with food supplies, occur in the growth rates,

FIG. 1.—Changes in weight of adult males, 1943–9.

FIG. 2.—Changes in weight of adult females, 1943–9.

FIG. 3.—Changes in energy value of working-class diets, 1943–9.

†This and subsequent calorie values given in this paper are calculated according to the convention adopted by the Medical Research Council (1945).

and hence the body weights, of children. Nevertheless it seemed desirable, in considering the decline in body weight of adults in 1945 and 1946, to determine whether there had been any parallel changes in the growth rates of children. Changes in growth rates have varied in different parts of the country; Liverpool and London are examples noted by the British Medical Association's Committee on Nutrition (1950). The chief sources of information are the annual reports of school medical officers and special inquiries by the Ministries of Education and Health which have been summarized by Bransby (1944, 1946). From these and from the later reports quoted below the trends of changes in the growth rate of schoolchildren may be summarized as follows. Growth rates were well maintained during the war years among children living at home. There were small decreases in the growth rate (fractions of a pound and of an inch) in some localities in 1940 and 1941, and even cases of actual loss in weight as compared with pre-war, chiefly amongst older children, but these had been rectified by 1943. The groups showing the greatest fall made the quickest recovery, and the improvement was continued up to the end of 1945. There is evidence that this improvement was not maintained in 1946 and 1947.

Examples are to be found in the Report on the Medical Inspection and Treatment of School Children for the year ended July 31, 1950, for the Corporation of Glasgow (1950), which shows (p. 93) that the weights of 13-year-olds in 1946 were slightly less than those in 1945, and that the weights of 5-year-olds in 1947 were also less than those in the preceding year; in the Report on the work of the School Health Service for the year 1950 for the City of Liverpool Education Committee (Frazer, 1950), where graphs (p. 15) for comparative weights of boys and girls aged 5, 8, and 12 show greater but similar changes in weight in 1946 and 1947 (the shapes of these graphs are similar to those of Figs. 1 and 2); and in the Report of the School Medical Officer of the London County Council (Daley, 1948), where some reductions in weight in 1947 are recorded. Although these inquiries did not all demonstrate statistically significant decreases in growth rate during 1946 and 1947, the fact that the trends are similar in each confirms the view that there was some retardation. The figures for 1948 onwards show that in all the areas quoted above a definite recovery in the growth rate had set in. It is instructive to compare these fluctuations in growth rate with similar and, in some instances, more pronounced changes which have been reported from several European countries at the time of severe food rationing—for example, Trémolières and Boulenger (1950); *Tijdschrift voor sociale geneeskunde* (1945).

Discussion

As mentioned in the opening paragraph of this paper, the validity of any comparison between food consumption and changes in body weight is apt to be influenced by changes in bodily activity such as those which might be associated with increased industrial productivity. Thus Kraut and Müller (1946) showed that a change in the calorie value of the food supply affected both body weight and productivity, and that when the calorie value was held constant but non-food incentives were offered, body weight and productivity varied inversely.

In Kraut and Müller's experiments the workers were, however, engaged under strict supervision in shovelling waste matter from trucks on to an embankment—a form of work in which the measurement of productivity can be taken as a direct index of bodily activity. On a national scale this simple relationship no longer holds, since industrial productivity is influenced by many factors other than the degree of muscular work—for example, by changes in the efficiency of management, by the development of labour-saving devices, and, on the broader scale, the availability of raw materials and the redistribution of man-power among different industries. Moreover, such indices of industrial productivity as are available could not in any event be used to assess total bodily activity. For instance, figures per

man-hour or per man-shift make no allowance for extra hours worked or for absenteeism, both of which would affect bodily activity on a national scale. Again, the classifications used as a basis for assessing total production and employment between different industries have been recorded on different bases during the period covered by the present study (the Standard Industrial Classification was not introduced until 1949), so that no continuing index is available.

Such evidence as there is for the years 1943–8 suggests that in any event changes in the nation's industrial productivity were relatively small (Rostas, 1948). It is, moreover, relevant to point out that the present study included not only workers in the light industries but also housewives, whose activities are very unlikely to have varied appreciably over the period covered. It is therefore not unreasonable to assume that bodily activity may be regarded as having remained constant and that a direct comparison of food consumption and body weight is valid. It is true that any violent change in food consumption might itself affect the energy output of the body. It seems clear, however, that the changes in diet which actually took place would have been quite insufficient to affect either the specific dynamic action of the foods eaten* or the average basal metabolic rates of individuals within the population. Nor is there reason to believe that the body weights, which are dependent on water content as well as on food consumption and muscular activity, could have been appreciably affected by changes in water balance.

If these assumptions are accepted the body weight data presented here can justifiably be used as at least an approximate index of the adequacy of the diet. In an earlier publication (Special Joint Committee of the Combined Food Board, 1944) a suggestion, based on evidence of the early years of the war, was made that a food supply providing 2,800 calories per head per day "is for the United Kingdom about marginal." Comparison of the relation between the food-consumption levels and the body weight changes recorded in this paper and the calorie value of total supplies of food moving into civilian consumption (Ministry of Food, 1949, 1951a) shows that during 1944, when the calorie value of the total food supply was just over 3,000 per head per day, adult men and women gained weight; that during 1945, when the calorie level was over 2,900, weight was roughly constant; that during 1946 and the early part of 1947, when the calorie level fell below 2,900 and dissatisfaction over the food supply was voiced publicly, adults lost weight. In 1948, when the calorie level had again risen above 2,900, the trend of 1946 and 1947 was reversed. As already noted here, the trends for the growth rates of children were very similar. These comparisons suggest that, in order to maintain full working efficiency and morale, the apparently normal slight annual increase in weight in adults, and the satisfactory growth of children, the marginal figure of 2,800 put forward in 1944 is probably too low. When the supply was just under 2,900 the differential weight loss as between those with and without canteen facilities reflects the marginal nature even of a supply of 2,900.

Because it is notable that the decreases in body weight described here were not accompanied by any measurable ill effects to health (Magee, 1946; British Medical Association, 1950) it seems that body weight can be used as an earlier index of inadequacy in food supplies than clinical examinations. It is true that temporary weight losses such as those recorded in 1945 and 1946 would probably have been too slight to have had any direct detrimental effect on health. But it is reasonable to assume that if such weight losses were to persist for longer periods they could not be safely neglected, not only from the health aspect but from the point of view of the morale of the population and of their potential effects on productivity.

*The range in the daily supply of protein (the greatest factor in determining specific dynamic action of the total food consumed) between 1943 and 1949 was only 5 g. per head (Ministry of Food, 1949, 1951a, 1951b).

Summary

The average changes in weight of groups of industrial workers (male and female) in small firms and of housewives measured during the course of the Ministry of Food's Body Weight Survey (1943 to 1949) have been compared with the calorie value of the food consumption recorded for urban working-class households in the Ministry's National Food Survey during the same years. Body weights of adults fluctuated with the calorie values of the diet. There is evidence from various parts of the country of parallel changes in the growth rates of children.

The bearing of these results on the desirable calorie levels of the national food supply is discussed.

REFERENCES

- Bransby, E. R. (1944). *Monthly Bull. Minist. Hlth, Lond.*, 3, 212.
 — (1946). *Ibid.*, 5, 57.
 British Medical Association (1950). Report of the Committee on Nutrition. London.
 Corporation of Glasgow (1950). Report on the Medical Inspection and Treatment of School Children for the Year ended July 31, 1950. Health and Welfare Department.
 Daley, Allen (1948). *Med. Offr.*, 79, 242.
 Frazer, W. M. (1950). Report on the work on the School Health Service for the year 1950. Education Committee, City of Liverpool.
 Kemsley, W. F. F. (1950). *Ann. Eugen., Camb.*, 15, 161.
 — (1952). *Ibid.*, 16, 316.
 Kraut, H. A., and Müller, E. A. (1946). *Science*, 104, 495.
 Magee, H. E. (1946). *British Medical Journal*, 1, 475.
 Medical Research Council (1945). Nutritive Values of Wartime Foods. War Memorandum No. 14. H.M.S.O., London.
 Ministry of Food (1949). Food Consumption Levels in the United Kingdom (Cmd. 7842). H.M.S.O., London.
 — (1951a). *Bull. Minst. Food*, No. 611, p. 4.
 — (1951b). First report of the National Food Survey Committee. The Urban Working Class Diet, 1940 to 1949. H.M.S.O., London.
 Rostas, L. (1948). *The Times*, November 10-11. London.
 Special Joint Committee, Combined Food Board (1944). Food Consumption Levels in the United States, Canada, and the United Kingdom. H.M.S.O., London.
Tijdschrift voor sociale geneeskunde (1945). Nos. 1 and 4 Onderzoek naar den Voedingstoestand van Schoolkinderen te Amsterdam, 1935-45.
 Trémolières, J., and Boulenger, J. J. (1950). *Rec. Inst. nat. Hyg., Paris*, 4, 117.

HAEMOLYTIC ANAEMIA TREATED BY A.C.T.H., CORTISONE, AND SPLENECTOMY

BY

J. D. AITCHISON, M.B., F.R.F.P.S., M.R.C.P.

Senior Medical Registrar, Aberdeen General Hospitals

Encouraging results have been reported in the treatment of acquired haemolytic anaemia with adrenocorticotrophic hormone (A.C.T.H.), cortisone, and compound F (Gardner, 1950; Dameshek *et al.*, 1951; Davidson *et al.*, 1951; Rosenthal *et al.*, 1952). It has been suggested that this type of therapy succeeds in cases in which an abnormal antibody can be demonstrated (Dameshek, 1950), but the exact mechanism of action is still quite obscure.

A case of this type, encountered recently, has been treated with A.C.T.H., with cortisone, and, finally, by splenectomy. In reviewing the management of this patient several points of practical importance have emerged; they are reported here in the hope that this experience may be of value in the future conduct of such cases.

Case Report

A schoolteacher aged 63 was admitted to hospital on May 1, 1951, with severe anaemia. There was no family

history of jaundice or anaemia. In 1942 he became jaundiced because of gall-stones, and cholecystectomy was performed. The nature of the stones is not known. A year later, when in hospital with a spontaneous pneumothorax, his haemoglobin was 82% and red cells 5,000,000 per c.mm. In 1947 he became anaemic, and on June 19 of that year his haemoglobin was 40%, red cells 1,500,000 per c.mm., and colour index 1.3. A blood film showed "megalocytosis," and pernicious anaemia was diagnosed. He was given liver injections, and felt well until early in 1951, when he again became anaemic, despite treatment with liver and vitamin B₁₂.

On admission he was pale and slightly jaundiced. The liver edge was palpable, and the tip of the spleen could be felt. Blood examination showed: haemoglobin, 34%; red cells, 1,090,000 per c.mm.; colour index, 1.6; reticulocytes, 16%; white cells, 10,300 per c.mm. The differential white-cell count was within normal limits. There was macrocytosis and polychromasia of the red cells. Examination of the sternal marrow showed normoblastic hyperplasia.

Autoagglutination of the blood was noted. A direct Coombs test was positive. Autohaemagglutinins were present in a titre of 64 at refrigerator temperature, 8 at room temperature, and 2 at body temperature. The patient's blood was Group O Rh-positive. Red-cell fragility was within normal limits. Serum bilirubin was 2.2 mg. per 100 ml. There was a positive indirect van den Bergh reaction. The urine contained a trace of albumin and increased urobilinogen. Stool benzidine tests were negative. A fractional test meal showed a histamine-fast achlorhydria. Thymol turbidity was 2.5 units and plasma proteins 7.6 g.% (albumin/globulin ratio 1.25:1). Serum alkaline phosphatase was 75 units (King-Armstrong), and E.S.R. (Westergren) 150 mm. in the first hour.

On May 8 the haemoglobin was 32%. On the 10th a transfusion of Group O blood was started, but was discontinued because of a severe febrile reaction after a third of a pint (190 ml.) of blood had been given. On the 12th the patient was given 25 mg. of A.C.T.H. intramuscularly, six-hourly, and this was continued for three days. There was no apparent effect on the disease (Fig. 1) or on the eosinophil count even when the dose was increased to 40 mg. six-hourly. Three pints (1,700 ml.) of blood was transfused uneventfully on May 18. The haemoglobin level continued to fall, and on May 25 a further five pints (2,740 ml.) of blood was given. The patient was so ill that a proper interval for the observation of the effects of the transfusion could not be allowed, and 300 mg. of cortisone was given on May 27, 200 mg. on the next two days, and 100 mg. on the following four days. Signs of haemolysis diminished. The E.S.R. fell, autoagglutination of the blood became much less evident, and the haemoglobin level rose (Fig. 1). The improvement continued until the dose of cortisone was reduced to 25 mg. daily, when the E.S.R. rose and signs of haemolysis increased.

A second course of cortisone was started on June 19, and this also produced improvement, but less than had followed the first course. Again, as the dose of cortisone was reduced to 25 mg. daily, the E.S.R. rose, autoagglutination of the blood became more evident, signs of haemolysis increased, and the haemoglobin level fell. The dose of cortisone was increased a third time to 300 mg. daily, with even less effect, and, although the daily intake was maintained above 50 mg. (Fig. 2), the haemoglobin fell steadily until splenectomy was performed by Mr. S. G. Davidson on July 27. On the two days following operation autoagglutination was virtually absent, but reappeared thereafter. Signs of haemolysis diminished and the haemoglobin rose steadily. On August 8 the wound burst, and there was prolonged delay in its healing. Cortisone was discontinued on August 28, and the haemoglobin fell slightly after this. The E.S.R. rose again. Autoagglutination of the blood