

STUDIES ON THE FAT-TOLERANCE TEST WITH PARTICULAR REFERENCE TO ISCHAEMIC HEART DISEASE*

I. A. D. BOUCHIER, M.B., CH.B. (CAPE TOWN).

Fat-tolerance tests, which measure the pattern of absorption and removal by the body of ingested fat, were carried out on 219 adult males of the 3 racial groups, Bantu, Coloured, and White, some of whom were hospitalized patients whilst others were ambulant volunteers. Of these, 58 had clinical and electrocardiographic evidence of ischaemic heart disease (IHD) and they formed the test group, whilst the remainder, who were apparently healthy, were designated controls.

Results

In patients with IHD the alimentary lipaemia was greater and more prolonged than in control subjects over the 7½ hours of study. There was in addition a greater fasting lactescence of the plasma. An overlap between the test and the control subjects was present, but the differences were significant 6 and 7½ hours after fat ingestion.

The test group was subdivided into 2 sub-groups, dependent upon whether phenindione ('dindevan') was being taken or not. The patients on phenindione, as a group, showed much less lipaemia than the group not on anticoagulant therapy. Twenty-six controls who were completing a course of parenteral penicillin and streptomycin (as antibiotic cover for minor surgery) were compared with those controls who had not received antibiotics. The patients on antibiotics showed much less lipaemia than the controls throughout the period of the test.

No racial differences in the fat-tolerance test were demonstrated. The age of the candidate did not affect the test.

In the 161 controls an analysis was made of those factors thought likely to influence an individual's response to a high-fat meal. Differences in income, diet, alcohol-intake, smoking habits, familial incidence of IHD, height, weight, skin-fold thickness, and serum-cholesterol level did not influence the test. Comparison between the hospitalized subjects and the non-hospitalized group showed that the former manifested a greater lipaemia following the test meal. It was suggested that (1) the overall ill-health of the patients in the hospital, and (2) their lessened activity were responsible for these findings.

The Intravenous Fat-tolerance Test

The mechanism of the greater lipaemia in the patients with IHD could arise from defective absorption or removal of fat. By comparing the effect of both oral and intravenous administration of cottonseed oil ('Lipomul IV') in matched pairs, the process of absorption was avoided and the function

of removal was studied. The fat, when fed orally, showed the characteristic differences between test and control subjects. When administered intravenously, no differences in the amount of circulating fat, or the rate of removal of the fat from the circulation, were detected between the two groups. These results were interpreted as indicating that differences in the mode of absorption of fat by subjects with IHD, might well be responsible for the differences in fat-tolerance tests.

Combined Radioactive ¹³¹I-labelled Fat and Butter-fat Tolerance Test

A comparison between the fat-tolerance test and the ¹³¹I-labelled fat ('triolein') test was performed by their simultaneous administration to 7 patients with IHD and 11 controls. On the following day the fat-tolerance test alone was repeated. The butter-fat tolerance test showed a greater and more prolonged lipaemia in patients with IHD on both days of the test. No significant difference was found between the radioactive tolerance test of the test and the control subjects in the first 24 hours. Significantly increased levels of circulating radioactivity were demonstrated during the second day of the test, i.e. 24–31½ hours after the administration of the 'triolein'. This would appear to be the explanation for the greater fasting plasma lactescence of the subjects with IHD. The experiment also suggested that mobilization of the recently ingested fat from the tissues was not a cause of the increased lactescence in subjects with IHD.

During the course of the above studies, various other aspects of the fat-tolerance test were studied. It was demonstrated:

1. That no increase of lactescence resulted from the ingestion of an isocaloric, fat-free meal.
2. That the fat tolerance of an individual was reasonably constant.
3. That no change in the serum-cholesterol level occurred during the period of the fat-tolerance test.
4. That standing overnight did not influence the lactescence of either plasma or serum.
5. That there were indications that lactescence of plasma differed from that of serum.
6. That a slight rise in the erythrocyte-sedimentation rate occurred during the period of the test.

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