

HYPO- METABOLISM

BY

ESBEN KIRK, M. D.

AND

SVEN ANCHER KVORNING, M. D.

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HYPOMETABOLISM

A CLINICAL STUDY OF 308 CONSECUTIVE CASES

BY

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HYPOMETABOLISM

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PREFACE

The present investigation was carried out for the purpose of establishing the frequency of the various forms of hypometabolism, encountered in a medical department, and the symptomatology of these forms.

The study is based on observations made on a large number of patients who were examined shortly after the opening of a medical service in a district of Denmark previously deprived of easy access to specialists in internal medicine. By these examinations a reduction in the metabolic rate was demonstrated in so many instances that a closer investigation of this problem appeared desirable. Besides illustrating the clinical aspects of hypometabolism the results obtained allowed to draw certain conclusions regarding the pathogenesis of the reduced metabolic rate as well as concerning the possibility and advisability of treating the hypometabolism and the disorders which cause it, for which reason it was considered advisable to present this comprehensive material in the form of a monograph.

In order to facilitate the presentation the accompanying text is deliberately limited, and a review of the previous literature is omitted, concerning which the reader is referred to the extensive surveys in the references.

For valuable advice, especially in the systematic division of the patients in subgroups, we are indebted to Professor Eggert Møller, M. D., University of Copenhagen.

In the numerical treatment of the material various statistical calculations have been carried out by Henry Fibiger Holm, Secretary of the Municipal Statistical Department, Copenhagen.

1. INTRODUCTION

The investigation comprises a clinical study of 308 cases of hypometabolism admitted to the Medical Department of the Holstebro District Hospital during the years 1940, 1941, and 1942. This period corresponds to the first three calendar years of the department's activity. The medical department serves a district in Northwestern Jutland including the cities of Holstebro and Struer and the surrounding counties (see Fig. 1). The population of the two cities is 13,500 and 6,800 respectively, of the rural districts approximately 50,000.

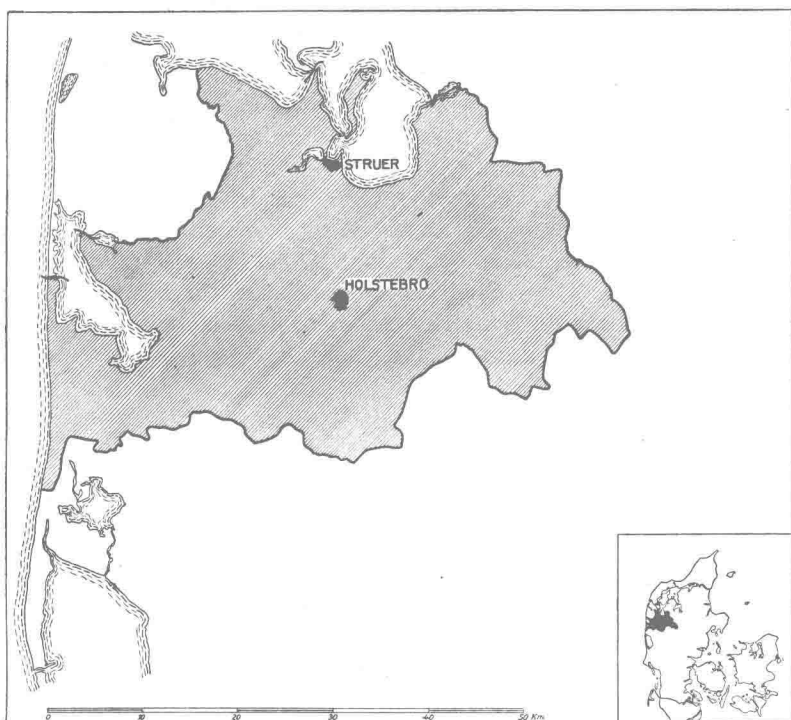


FIG. 1

Map of district served by the Medical Department of the Holstebro District Hospital.

The requirement for including the patients in the hypometabolism group was that the basal metabolism, generally on the basis of a series of determinations, was found to be reduced to 88 p.c. or less. In the period from February 1, 1941 to January 31, 1942, the determination was made on all adult patients whose condition permitted such an examination. In the remaining part of the period (January 1, 1940 to January 31, 1941 and February 1, 1942 to December 31, 1942) the metabolism determinations were not performed on all the admitted patients; the measurements were however employed to such an extent that the majority of patients with hypometabolism from these years must be supposed to be included in the study. The clinical diagnosis was based partly on thorough examinations during the first hospitalisation, partly on, as a rule repeated, post-examinations during subsequent admissions. In numerous cases it was possible to extend these post-examinations to the years 1943, 1944, and 1945, so that for a great number of the patients the observation period was extended to 3—5 years.

For comparison with the hypometabolism group a control material of 190 patients was obtained in the period February 1, 1941 to January 31, 1942. This control group consisted of patients whose metabolism was found to be higher than 88 p.c., who were not feverish, and who did not present symptoms of thyrotoxicosis, diabetes, renal diseases, severe blood diseases, cardiac decompensation or pulmonary insufficiency. From this control group were also excluded some patients whose condition did not permit a determination of their metabolism. Both the patients with hypometabolism and the patients of the control group were subjected to a uniform clinical examination as a supplement to the usual examination of the Department for the purpose of making the observations more easily accessible for comparison and statistic treatment. The data from the case history and the clinical observations for the individual patients with hypometabolism have been entered in the appended tables (Tables I—XIII).

2. OUTLINE OF THE CLINICAL EXAMINATION OF THE PATIENTS

In the above-mentioned supplementary uniform clinical examination of the patients, weight was attached to the following 11 symptoms in the history: chilliness, decreased sweating, fatigue, impairment of memory or reduced power of inculcation, somnolence, depression, dyspepsia, constipation, oliguria, conditions of menstruation, and rheumatism (cf. Table 2). In this connection it should be stated that the term "fatigue" comprises both physical and mental fatigue, since as a rule it was not considered possible to make the patients distinguish between these two forms. For the same reason the symptoms "impaired memory" and "reduced power of inculcation" have been entered in the same column. The term "dyspepsia" comprises both gastric and intestinal complaints, the symptom "rheumatism" both pains in the joints and pains localised to the muscles, tendons, fasciae, and subcutaneous tissues. The information given concerning oliguria must be supposed to be rather uncertain, as these particulars are probably to a greater extent than the others affected by the subjective judgment of the patients and their sense of decorum.

In accordance with the generally accepted view, the authors have regarded certain changes in the skin of the face as characteristic of genuine myxedema. These changes consist in coarse features, a mask-like expression, and puffiness of the eyelids. There is an often marked non-pitting edema with stiff wrinkles of the forehead (see Fig. 2); the skin of the face is dry and scaly, usually pale and slightly yellowish. The physical examination and observation of the patients in addition to these changes of the skin comprise the following 12 symptoms and signs, the evaluation of which does not require special mention: apathy, depression, scantiness of the hair of the scalp, scantiness of eyebrows, hoarseness, enlargement of the thyroid gland, sparseness of axillary and of pubic hair, thickening of the skin and the subcutaneous tissues on the extremities, perniosis, subcutaneous infiltrations, and myalgiae. Further, the pulse rate and the temperature were measured twice daily, and the height and weight of the patients ascertained. The observation from several different measurements of a pulse rate below 50, and a body temperature below 36° , has in the





FIG. 2

Photograph of a patient with genuine myxedema.

present exposition been denoted as bradycardia and hypothermia respectively. The calculation of the ideal weight was made according to Broca's formula

$$\text{Ideal weight} = \frac{(\text{Height in centimetres} - 100)}{100} \cdot 90$$

In several cases a measurement of the diuresis was also made and a determination of the serum cholesterol concentration according to Bloor.

All metabolism determinations were performed during hospital admission, the measurements being made in the morning, twelve to fifteen hours after the last meal, using a Krogh closed-circuit type of apparatus. The patients had received the ordinary diet of the ward on the days previous to the determination. For calculation of the metabolism values from the observed oxygen consumption the formulas of Harris and Benedict were used. As a rule, two to six determinations were performed on each patient on separate days, and the lowest of the measurements, if in agreement with the others, accepted as the basal metabolism of the individual.

3. REMARKS CONCERNING THE NUMERICAL TREATMENT OF THE MATERIAL

The data from the case history and the clinical observations for the individual patients were entered in tables which have been subjoined (Tables I—XIII). In these tables the presence of a symptom is denoted by a plus, while the absence of the symptom is marked by a 0. In some instances conclusive information is lacking; if so the place in the table is left blank. The number of unascertained symptoms amounts to 17.3 p.c. for the case history data and to 11.3 p.c. for the physical observations. The percentage occurrence of the symptoms was throughout calculated from the available number of conclusive observations.¹⁾

For the purpose of numerical and statistic calculations the symptoms have further been entered on punch cards. These punch cards were treated in the usual way in the computations.

As will appear from the following it has occasionally been necessary to omit some of the symptoms in the statistical treatment of the numerical material. Where this has been required, information will be given as to the lines followed in the omission of the symptoms. In some instances the principle has been to avoid including symptoms on which the delimitation of clinical groups of diseases had been based, or which must be regarded as a direct consequence of the primary disease.

It should be noted that in treating so large a numerical material the occurrence of apparent correlations which are a result of accidental coincidences cannot be avoided.

¹⁾ The data given for the frequency of oligomenorrhoea have been computed on the basis of the number of women in the age groups before the menopause.