

## Metabolism in Relation to Leprosy.

I. KERR.

**T**HE study of basal metabolism in connection with disease is not only of interest but of essential importance. Especially does this hold good with an insidious disease such as leprosy. Given a normally healthy body, leprosy infection will be held in check, waste products being eliminated from the tissues by the detoxicating effect of a healthy metabolism. This is, in all probability, one reason why many "contacts," though having the infection, do not develop leprosy, and also why many, who have acquired the disease, do not fall victims to its worst forms.

It is this normal metabolism which should be induced in our patients. We may call it raising their resistance or increasing their tolerance of our treatment, but the aim is essentially the same.

The basal metabolic rate is lowered by poor diet and unhygienic surroundings whether it be among the rice-eaters of South India or the dried fish-eaters of Norway.

According to Colonel McCarrison, the oils of the unsaturated fatty acid series stimulate the metabolic rate. The hydnocarpus group of oils, being more highly unsaturated than the others, presumably accelerate metabolism in more marked degree. By careful administration of hydnocarpus preparations and by grading the amount given, we are able to obtain just the degree of stimulation a patient may be able to bear. At the sites of injection, especially if the preparation is given intracutaneously, there is increased vascularity from the local inflammatory reaction. The phagocytes are stimulated by the irritation and in consequence there is an increase of metabolism locally while in due course the disease processes are modified.

The irritation by the oil is not confined to the part injected. That it spreads beyond the infiltrated area is manifest by the itching caused in the surrounding skin soon after injection. That part of the oil reaches the general system is evident from the fact that in distant untreated lesions there is also modification of the disease.

It is possible, however, to bring about improvement in leprosy lesions by administering hydnocarpus preparations by intramuscular injections only. By this method, the minimum of irritation is caused. But for the maximum amount of improvement, it would seem that both types of injection are necessary. Not only is there improvement in the injected lesions but the patient maintains that he feels

better, that is, the tonic effect of the oil is asserting itself or in other words, the basal metabolic rate is being accelerated.

Improvement of leprosy lesions by local irritation followed by improvement in the general health is not the result of hydnocarpus treatment only. Electrical treatment and light therapy are reputed to have this effect. Much local improvement is also brought about by the use of trichloroacetic acid, but as the writer has never treated any leprosy cases with this physical agent alone, its general effect cannot be gauged. By its irritant action, however, it increases the vascularity of leprosy lesions and permits drugs which accelerate metabolism to reach these lesions.

It is also possible to obtain improvement in cases of leprosy by drugs whose therapeutic effect is to increase the metabolic rate without local irritation. Potassium iodide is of this sort. It should not be used, however, until the physician has had considerable experience of leprosy treatment by the ordinary methods. It is useful in those cases who have undergone courses of hydnocarpus preparations and who have ceased to progress. Complications contra indicate its use. The general resistance of the patient must be good. To ascertain these needful conditions a knowledge of the Sedimentation Index is indispensable. Given these requirements, however, namely, an experienced knowledge of treatment on the part of the physician and a good resistance on the part of the patient as evidenced by the S.I., potassium iodide will be found to be a useful drug in the treatment of leprosy. It creates a state of greater re-activity to the hydnocarpus preparations. It is valuable in causing these to renew their therapeutic action when to all appearances the patient has become callous. This is the reason why after a course of potassium iodide, one has to be careful with the dosage of hydnocarpus preparations.

Another drug which is useful as an adjunct in leprosy treatment and which comes within the same category as potassium iodide, is thyroid extract. Its use also presupposes experience of the treatment and a careful scrutiny of the Sedimentation Index. For potassium iodide, however, it is necessary to have the S.I. comparatively low while thyroid extract may be most useful when this index is high. When the S.I. is high, the serum is loaded with waste products—partly because the metabolism is too slow to deal with their assimilation and excretion. This condition may be due to a minor hypothyroidism—an endocrine deficiency which in its latest form, is much more frequent than is generally believed and which is, in many cases,

a predisposing cause of leprosy as well as a complication caused by the disease itself. A vicious circle is produced; the diseased tissues depress the thyroid, the basal rate is slowed and the waste products cannot be dealt with. With a slow metabolic rate and a thyroid whose function is in abeyance, we get various degrees of hypothyroidism, while those in whom this deficiency exists are likely to develop a cutaneous form of the disease. It would seem that a slow metabolism causes the mycobacteria lepræ to collect in the tissues. They settle down here and since the normal metabolism is not operative to deal with waste product, pathological conditions are created and cutaneous lesions are the result. Nerve leprosy cases do not take thyroid well. It would seem that in them there is no endocrine deficiency of this nature.

Thyroid extract stimulates all the body cells. By its catalytic action it increases combustion "as a bellows blows a fire." The thyroid may act directly on the cells or indirectly through the nerves (sympathetic) or both. When that action in leprosy is withdrawn, we have a variety of symptoms which will show improvement if thyroid extract is given. Some of these are:—

Fatigue.	Alopecia of outer eye-brows.
Constipation.	Sensitiveness to heat and cold.
Acidosis.	Slight œdœmatous infiltration.
Ichthyosis.	Bilateral "anæsthesia."
Thickened tongue.	
Scaly lesions.	
Keratosis.	

The dose of thyroid extract is from gr. 1/8 of the fresh gland, using Parke, Davis, and Company's tablets. Two and half grains is a large dose when we take into account the fact that thyroid extract does not reach its maximum effect in the system till the ninth day, and is not entirely excreted from the tissues till three weeks.

The signs of thyroidism vary but the principal are persistent quickened pulse rate; giddiness; no increase in appetite or loss of appetite; rheumatic pains and the ordinary signs of lepra reaction.

Courses of small doses are most beneficial. Too large a dosage will cause loss of weight and the body tissue will be called upon to make up the waste. The small doses will cause actual retention of nutriment (nitrogen) and increase of weight. The latter aim is the ideal at which we should direct our efforts when minor hypothyroidism complicates leprosy.

In using a drug of the nature of thyroid, it is necessary that the patient should have the best possible diet in order that the processes of combustion may go on. If the drug is doing its work in the tissues, the appetite will increase. Hunger can be an excellent test of a healthy metabolism.

Thyroid extract, even if used with S.I. and record of body weight as guides, will occasionally cause lepra reaction. But this, even though severe, will be beneficial to the patient. After such a reaction, it is advisable to cease giving thyroid for some weeks. It is just possible that the patient's own thyroid gland has been stimulated. We must, therefore, take this into consideration.

Another method by which we can improve metabolism in our leprosy cases is by physical exercise, that is, manual work rationed according to the amount a patient can do. By this immunity is slowly acquired and the preparations which have been injected are better assimilated. Garden and field work provide all grades of labour. It is pleasing to watch how dependent on their work patients gradually become and how much they like it. As is evidenced among men who undertake heavy work, acidosis decreases and there is development of the muscles and other tissues.

In leprosy treatment, therefore, no single method can be adhered to. Even when we have utilised all our resources, we still find in many cases a residuum of the disease—"the last four anna's worth"—which may resist our efforts. But whatever treatment is chosen, the aim is the same, namely, by any means at our hand, to secure, maintain and increase the general good health of the patient so that he himself is able by natural physiological processes to throw off the disease.