an increase occurred it was considerably less than when adrenaline had been injected alone (see table). Judged by this criterion, Mackenzie Wallis's preparation, trypsinogen, especially when prepared without gold and arsenic, and to a less extent insulase and pancrehepatine, would seem to contain an antiglycogenolytic fraction which is absorbed from the alimentary tract, and, so far as one can tell without means of accurately comparing the dosage, is as active as in raw pancreas. It is probable that the age of the preparation influences its efficiency in this respect, for a sample of pansecratin which had been kept in the laboratory for over a year was found to have no power to neutralize the effect of adrenaline, whereas a fresh sample used immediately after its receipt from the maker gave a better result.

If raw pancreas and pancreas preparations taken by the mouth act in human beings as they do in rats it would seem that they cannot be relied upon to replace the internal secretion of the pancreas entirely when it is deficient or absent, for although glycogen storage may be improved by their administration, the utilization of sugar by the tissues is not affected and the progress of the disease will not be materially influenced; when, however, there is merely a relative deficiency of the antiglycogenolytic factor due to the abnormal activity of some influence which, like adrenaline, prevents glycogen storage, the excessive formation of sugar from glycogen can apparently be controlled and prevented by an adequate dosage of one or other of these substances. In other words, it seems probable on experimental grounds that true pancreatic diabetes, dependent upon organic or functional deficiency of the gland, is not likely to benefit from the treatment to any appreciable extent, but that "non-pancreatic" glycosurias in which the functions of the pancreas are being normally or nearly normally carried out and there is merely a relative deficiency of the internal secretion will probably be improved and may even be cured, if suitable restriction of the diet is practised at the same time, especially in the earlier stages.

My clinical experience with various pancreas preparations, and especially with Mackenzie Wallis's extract and trypsinogen, tends to confirm these conclusions, for I have found that when their administration is confined to cases where analysis of the blood shows that defective glycogen storage is responsible for the glycosuria the results of adequate and prolonged treatment are satisfactory, but that it is useless, or worse than useless, to waste time on oral treatment where examination of the blood gives decisive evidence of an absolute deficiency of the internal secretion of the pancreas; in such cases insulin subcutaneously is required, either as a temporary expedient while the pancreas is recovering its functions, or permanently when there is organic disease of such extent that an adequate diet cannot be metabolized without. As a rule the non-pancreatic forms of diabetes or glycosuria are met with in the later years of life, and it is interesting to note that most of the cases in which treatment with raw fresh pancreas is reported to have been beneficial have been middle-aged or elderly. In some there has been a family history of diabetes or glycosuria—a more common occurrence in the non-pancreatic than in the true pancreatic forms in my experience.

The first case in which diabetes was successfully treated by the oral administration of fresh pancreas was described by Cowles in 1911.¹ The patient, a middle-aged man, is said to have consumed an average of over three fresh pancreases daily, and as a result his appetite improved, his thirst disappeared, a gain in strength and weight occurred, the quantity and specific gravity of the urine fell, and the sugar diminished, although he was never quite sugar-free. The diet was not much restricted, only sugar being forbidden. Eventually the patient discontinued the treatment, the symptoms returned, and he subsequently died after developing a large carbuncle on his neck. *Post mortem* the pancreas was found to be represented by a fibrous cord about one-fourth the size of the normal gland. In this particular instance there was undeniable evidence of serious organic disease of the pancreas, yet large doses of raw pancreas by the mouth were

found to be beneficial. The explanation probably lies in the nature of the disease, which was evidently a chronic interstitial pancreatitis, and this leads me to a brief consideration of the reason why the sugar-utilizing fraction of insulin when given by the mouth does not usually gain entrance to the circulation, like the antiglycogenolytic fraction.

The starting point of Banting's work upon insulin was his conviction that the failure of previous experimenters to preserve the antidiabetic hormone in extracts of the pancreas was due to the presence of the associated proteolytic enzymes by which it was destroyed, and his success arose from the adoption of methods of extraction by which their action was avoided. It seems probable, therefore, that the inactivation of insulin and pancreas preparations taken by the mouth is due to the action of trypsin in the intestine, and that this is the case is further suggested by the results of experiments upon healthy rats which Mr. Howard and I have recently performed. We have found that when means are taken to minimize tryptic action in the intestine the effects of insulin given by the mouth, upon both the blood sugar and the respiratory quotient, approximate more nearly to those resulting from the injection of insulin the more completely the action of trypsin is prevented—results which incidentally suggest that it may be possible eventually to overcome the present disadvantages of oral administration and make it applicable to all forms of diabetes. These results also offer an explanation of the success of the raw pancreas treatment in Cowles's case, for when the external secretion of the pancreas is absent or deficient, as analysis of the faeces shows it is if the gland is sclerotic, the inactivation of insulin, or the internal secretion contained in fresh pancreas, will not take place or will be less complete than when a normal amount of trypsin is entering the intestine; consequently the effect upon carbohydrate metabolism will be greater, particularly as regards the sugar-utilizing factor. It is probable, therefore, that fresh pancreas and active pancreas preparations given by the mouth will improve carbohydrate metabolism in some forms of pancreatic diabetes as well as in the non-pancreatic varieties, under suitable conditions; but as my examinations of the faeces from a very large number of diabetics have shown that an excess of the external secretion of the pancreas is much more commonly met with than a deficiency, more especially in young people and in the earlier stages of the disease, there still remains a very considerable proportion in which no benefit can be expected, at least as the treatment is at present carried out.

REFERENCE.

¹ *Boston Medical and Surgical Journal*, 1911.

THE ULTRA-VIOLET RAYS IN DERMATOLOGICAL PRACTICE.

BY

W. F. CASTLE, D.S.C., M.D.CANTAB., M.R.C.P.LOND.,

PHYSICIAN TO THE SKIN DEPARTMENTS, QUEEN'S HOSPITAL FOR CHILDREN
AND WEST END HOSPITAL FOR NERVOUS DISEASES.

FROM time immemorial the value of sunlight has been recognized in the treatment of disease, but it is only recently that, in this country at any rate, physicians have been able to ensure a constant supply of ultra-violet rays. The mercury vapour and the carbon arc lamps were at once recognized as providing a remedy of high potential value, and were tested against various diseases. Exaggerated claims were made for these lamps before a sufficiently long clinical trial had been given them, but they have now been used over a period of some months in the treatment of many different dermatological conditions, and experience has shown in which success may be looked for.

The action of the lamps is both general and local. The general action is that of a powerful stimulant. Young persons respond more readily to this general action than do the old, but patients are few, especially if they live in a town, who do not obtain great benefit. The improve-

ment, physical and mental, in hospital children has to be seen to be believed. The local effect of the ultra-violet rays is in part bactericidal and in part stimulating. The call on the lamp is great, but it has been found safe to put children suffering from impetigo contagiosa under the lamps in actual contact with other children without the infection having spread in a single case. The local stimulating effect, such as is required in patches of infiltration and in sluggish ulcers, almost equals that of the x rays, and, as far as is known, is considerably safer. In most cases general treatment has been given, when practicable, in addition to local treatment. It is as well, when commencing a course of general treatment, to find out as a preliminary the "erythema dose," as by this means larger doses can be given, with perfect safety, than would otherwise be the case. Special caution should be used when treating asthmatic patients, as their skin is apparently extremely sensitive to the ultra-violet rays. The erythema dose is measured by strapping a belt on one arm with four circular apertures in it. The arm is then exposed to the light at thirty inches and the apertures are covered over, one after the other, at two-minute intervals; by this means the reaction may be tested over a small area of skin after two, four, six, or eight minutes. As a rule, the fairer the patient's skin the smaller is the erythema dose.

Of the lamps available, the mercury vapour and the carbon arc are the most generally useful; each has its advocates, but in private practice the mercury vapour is the more suitable because of the much shorter exposure required. Locally, the mercury vapour will do all that the carbon arc can do, and do it even better, but it seems probable that the general tonic effect is greater with the carbon arc. Possibly this view may be due to the fact that patients treated by the carbon arc develop, as a rule, considerable pigmentation, and so look very healthy, while with the mercury vapour there is no pigmentation worth mentioning.

In the following paragraphs only those diseases are discussed in which either the mercury vapour or the carbon arc lamp has been used in a long series of cases with success. In many dermatological conditions application of the ultra-violet rays is the reverse of beneficial, and no mention has been made of them. In order to discover, as accurately as possible, the therapeutic power of the rays, all treatments given in hospital were unaccompanied by the use of any extraneous applications, such as lotions, ointments, or powders. When the preliminary experiments had been carried out adjuvant measures were employed, with a view to determining the quickest methods of cure.

Infective or "Septic" Group.

Impetigo.—Lesions of the face and body can, even in the absence of any local applications, be treated by the ultra-violet rays with the most successful results. Daily exposures, either general or local, quickly prevent the disease from spreading. The crusts drop off and the affected places dry up and heal rapidly. Care should be taken not to stop treatment too soon, as otherwise relapses are frequent. Light treatment combined with local applications affords the quickest and pleasantest form of cure yet devised.

Sycosis.—In the early stages of this disease treatment with the mercury vapour lamp will often bring about a rapid cure, while in cases of long standing steady perseverance may avert the necessity of using the method of epilation by x rays with its attendant dangers. Care must be taken not to give too heavy a dose to begin with, and the treatment should be continued for a considerable time after the appearance of the last lesion. As is well known, this affection has a strong tendency to relapse, and treatment should be resumed as soon as any warnings present themselves.

Boils and Furunculosis.—Local application of the rays of the mercury vapour lamp to a boil has one of two results: if treated early enough the boil will abort and dry up without ever having come to the suppurative stage; if, however, the boil has already burst, then the rays, by their antiseptic action, will cause rapid healing. In furunculosis generalized exposures have proved themselves the most powerful agent in the prevention of any further abscesses.

The exposures will go a long way towards relieving the malaise associated with these two conditions.

Carbuncles.—What has been said about boils applies to the treatment of carbuncles. Heavy doses of the rays cause healing at a very much more rapid rate than by any other known method. Pain, discharge, and malaise cease after one or two exposures.

Septic Wounds.—Exposure to the rays will in many cases cause the discharge to dry up and the wound to heal quicker than by any other method. In fact, infections by the pus-forming cocci are, with a very few exceptions, quickly mastered by the mercury vapour lamp.

Multiple Subcutaneous Abscesses of Infants.—After incision or rupture of the abscesses, daily exposures should be given during the whole course of the disease. Not only does the lamp assist very materially in causing rapid healing of the lesions, but the general effect in overcoming the toxæmia may actually be the means of saving the child's life. No hesitation need be felt in exposing an infant, however young, to the rays, so long as small exposures only are given.

Other Conditions.

Alopecia Areata.—Whether one regards this disease as being due to some micro-organism or as of neurotic origin, the accepted treatment is the same: stimulating lotions containing antiseptics will bring about a cure in a large proportion of cases; others will get well spontaneously. But there will always remain some to resist all forms of treatment, and it is in this group that the ultra-violet rays are so useful. Of six cases treated recently in hospital by the lamp only, one alone failed to respond after six weeks' treatment. All these cases were of at least two years' standing. The rays have a more powerful stimulating and antiseptic action than any lotion the scalp can tolerate.

Psoriasis.—Much has been written about this treatment for psoriasis, and many extravagant claims have been made, but this much is certain, that in a large series of cases a good proportion rapidly regain a normal skin. This applies to the generally disseminated group and to those cases practically indistinguishable from seborrhoea. Patients with thickened patches of long duration require heavy doses at close range; these can be given with greater safety than the x rays, so far as my experience goes. For ladies especially this new treatment is an advantage, since ointments will ruin any clothes. Treatment of the scalp should be given by lotions and shampoos, because the hair cuts out a large quantity of the rays, making it difficult to judge the dosage accurately. If the patient can be treated at the commencement of an attack the chances of obtaining a very rapid cure are extremely good.

Seborrhoea.—In any but the most acute forms a few general exposures will effect a cure. Seborrhoea as a rule affects mostly those parts of the trunk not exposed to sunlight, and is not found among persons who, by reason of working in warm climates, wear but few clothes; hence the rationale of the treatment. Infiltrated patches clear up rapidly with a few big doses.

Acne Vulgaris.—The results with this disease have been very satisfactory. It is as well to commence with general treatment for the first few exposures and then to give the affected parts a fairly big dose—one large enough to cause a moderately profuse exfoliation. These big doses should be repeated every fourth or fifth treatment, as one good exfoliation will accomplish more than weeks of mild treatment.

Lupus and the Tuberculides.—Considerable experience of the treatment of tuberculous infections by the rays has shown that, while no startling results are to be expected, steady improvement takes place in most cases. Treatment must, however, be continued over a period of some months, three or more exposures being given weekly. Several writers have pointed out the need for caution when treating patients with any active lesions in the chest.

Chilblains.—By reproducing summer conditions as nearly as possible, a large proportion of cases can be greatly improved. With the onset of cold weather the treatment of those who habitually suffer from this complaint should be begun, and continued intermittently throughout the winter.