TREATMENT OF DISEASES OF THE SKIN BY ULTRA-VIOLET RAYS.*

BY

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ULTRA-VIOLET rays are stated to have a general tonic effect on the sympathetic, and it has been demonstrated that a general irradiation produces an increase of the calcium and phosphorus ions in the blood. Growing rats subjected to daily irradiation by the mercury-vapour lamp increase in weight, and their total calcium content goes up considerably in excess of the controls.

It would appear that injury to the cells due to slight irritation causes a reactive increased production of internal secretion (suprarenal, thyroid, ovaries, &c.), which stimulate calcium metabolism. The behaviour of photodynamic sensibilisators (chlorophyll, hæmoglobin, hæmatoporphyrin, pigment of skin, biliary pigment and other fluorescent colouring matter such as eosin, methylene-blue, heavy metals, &c.) is of greatest interest. If, for instance, hæmatoporphyrin is injected into mice, and the animals are then exposed to daylight, they quickly perish with severe œdema, whereas they show no injury when kept in the dark. Hæmatoporphyrin is a derivative of hæmoglobin: traces may be found even in normal urine, especially in fever, sulfonal poisoning, hydroa æstivalis (recurrent summer eruption). A. Perutz succeeded in producing hydroa æstivalis in rabbits by injecting into them fluorescent colouring matter which had been exposed to ultra-violet rays. Experience has shown that minimum quantities of heavy metals circulating in the blood (iron, mercury, bismuth, copper, silver, gold) considerably increase the effect of ultra-violet rays on the organism (catalytic effect), and that, *vice versa*, the efficacy of heavy metals is distinctly increased under the influence of ultra-violet light. Ostermann, of Vienna, has repeatedly found that the effect of iron in anæmia, of mercury in syphilis, of copper (lekutyl preparations) in surgical tuberculosis, of gold (triphal, krysolgan) in laryngeal tuberculosis, undoubtedly increases when the patient is at the same time exposed to general irradiations; whereas, for instance, iron alone fails to take effect and ultra-violet rays in themselves have no influence at all on the red blood picture. The local light irritation becomes obviously increased when combined with subsequent treatment with copper ointment (for lupus), with Reimer's heavy metal ointments (for ulcer of the leg), painting of the mucous membranes with nitrate of silver (sedimentation of metallic silver during the exposure to light). At the

children's clinic at Heidelberg, Gyorgy and Gottlieb found the internal administration of eosin (0.1 g. eosin cryst. brought from the Hoechst dye works, plus 0.2 g. sugar per day, taken during meals) has doubled the effect of quartz irradiation for rachitis (duration of a cure was reduced to one-half). He repeatedly succeeded in obtaining surprising results in septic processes and influenza pneumonia by a combined treatment with argochrome (methylene-blue and silver) intravenously, or collargol enemas and general irradiation. In this field a great future may be predicted for light therapy.

The skin is especially rich in cholesterol, and it has been shown that rats placed on the standard rickets producing diet, low in phosphorus, do not contract rickets if they receive a small ration of irradiated skin of some animal. Hess thinks that such experiments show that the anti-rachitic effect of ultra-violet light in men is due to the activation of the cholesterol in the superficial layer of the skin. As this effect can be produced in the test-tube, and is apparently independent of the bodily functions, it must be due to some definite chemical change. This property that light can produce chemical substances in the skin which are preventive and curative for rickets, forms an important factor in its actions. Such daily doses as 1/100 gr. of an activated cholesterol protects experimental animals (rats) from the changes produced by rickets in a vitamin-deficient diet.

TECHNIQUE OF TREATMENT.

For therapeutic purposes the applications are given over a large area, with the mercury-vapour lamp open and fully exposed, or to a more limited area, through diaphragms of various sizes. In cases where it is desirable to concentrate the rays, and give more extensive treatments, various sizes of quartz or quartz lenses are used as applicators, and in these cases pressure can be applied to small areas of skin lesions, and a much more severe reaction obtained, even to raising a bleb and producing a superficial ulceration, with some destruction of tissue. This is especially useful in cases of lupus vulgaris and nævus.

The frequency of the treatment must be regulated according to the dose, and the reaction obtained after each. As a rule, the rays can be safely applied once a week, but often more frequently if the reaction has not been too severe. The reaction takes the form of a superficial erythema, which may come on immediately or be postponed for a few hours. This is often followed a day or two later by a certain amount of desquamation. If prolonged applications are given, blebbing will result. As a rule, at the first treatment the lamp should be some 20 to 24 inches from the skin, and the duration not longer than two or three minutes, the distance being shortened or the time prolonged at each subsequent application. It must be remembered that the dose of rays varies with the square of the distance—that is to say, if the distance is halved, say from 20 to 10 inches, the actual dose given will not be doubled, but four times as great.

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There is no doubt that in the treatment of most skin eruptions the ultra-violet rays should be applied to as large an area of skin as possible, and then concentrated afterwards on to the actual individual lesions. Some skins show an erythema much more rapidly than others, and certain parts of the body are much more sensitive than others. The exposed parts, such as the face and hands, will take a much larger dose before erythema is produced than many of the covered parts. The areas which are especially sensitive are the bends of the elbows and the popliteal spaces. I have noted that where a part has been bruised or ecchymosed an erythema does not readily appear. Areas of skin which either naturally or pathologically are thickened or infiltrated, especially with tubercle, are very resistant. Skins of old syphilitic subjects are most susceptible and react rather violently.

Lupus.

The well-recognised value of these rays for all cases of tuberculosis of the skin, lupus vulgaris, tuberculosis verrucosus, &c., has been shown in a large number of cases both of tuberculosis of the skin and of the mucous membranes. It has been demonstrated in order to obtain satisfactory results in this group of cases, that the dose has to be increased beyond the recognised erythema one. The quartz applicators are very useful in the treatment of lupus in such areas as the interior of the nose, mouth, and throat. In many of the cases which have shown most rapid marked improvement, the treatments have been pressed to the point of raising a bleb over the seat of the lesion on the skin.

Psoriasis.

A group of cases which have shown most rapid and sometimes remarkable improvement has been psoriasis, especially those of old-standing extensive eruptions. After three or four erythema doses just sufficient to produce a slight superficial desquamation, the areas of psoriasis have been cleared up and become pale in contrast to the surrounding skin, presenting much the same appearance as an extensive psoriasis treated with chrysarobin, which clears up the scaly patches, leaving these areas pale and the surrounding skin deeply stained.

The results in lichen planus have not so far been satisfactory, either for the relief of irritation or the removal of the eruption.

Acne.

Acne vulgaris is another disease which reacts very satisfactorily to ultra-violet light. In these cases it is necessary to give a sufficient dose each time to produce an erythema and desquamation. If this is carefully regulated, treatments may be given about once a week. After a few desquamations, the condition will be very much improved, and in time probably cured. Various forms of dry rough skin are improved by ultra-violet rays, such as the different degrees of xeroderma, keratosis pilaris, and similar conditions. After a few

doses producing a slight desquamation these skins become much softer and smoother, and the harsh rough condition is much lessened. So also many forms of old-standing dermatitis will be relieved, both as to irritation and appearance, by a few exposures to the rays. Chronic indurative erythema also reacts well to the rays and a few treatments have a very beneficial effect on these often very troublesome cases, both in improving and removing the induration and giving great relief to the symptoms.

Ulcer.

This is a very useful treatment for all forms of ulceration, especially those indolent so-called varicose ulcers of the legs, even those without a specific history, but which are often syphilitic in origin. The pain is soon relieved and the granulations are stimulated, and an offensive discharge rendered less septic.

Alopecia.

All forms of alopecia, both the general thinning of the hair and the various areatas, both those of limited extent and those which have advanced to an extensive stage, are greatly benefited by ultra-violet rays, and many cases which have resisted various forms of treatments for long periods will soon show signs of new hair growth after a few exposures to the rays. Many varieties of nævi and telangiectases, even those produced by radiodermatitis after long exposures to X rays, can be considerably improved, if not entirely removed, by repeated ultra-violet exposures.

EFFECT OF ULTRA-VIOLET RAYS ON ANIMALS.

Ultra-violet rays are absorbed or cut out by the intervention of almost every substance except quartz, such as glass of all descriptions, windows, spectacles, &c., silks, with the exception of certain artificial silks which are not obstructive, and every kind of clothes. The surface of the body of civilised clothed races which is exposed to the rays is only represented by the face and the hands if ungloved. It is seen therefore that the area for the absorption of the rays is very small indeed. In many of the lower animals it is lower still, for hairs and feathers completely cut out all ultra-violet rays, and it can therefore only be the eyes, nostrils, lips, and dorsal surfaces of the feet which can absorb the rays. This applies to mammals and birds. This being the case, it must appear that a very minute dose of the rays is all that is necessary for the normal economy of the animal kingdom. The surface is enormously increased in the case of native races, but these are protected by corresponding increase in the pigmentation of the skin.

Arguing from this point of view, it might appear that ultra-violet rays are detrimental to the animal economy under normal conditions, and Nature does all in her power to protect the individual from them. Sunshine is not a universal panacea in disease, and in health some of us take pains to avoid it. In Sweden, where chemical experience of lights is considerably greater than our own, it is clearly

recognised that many people are unsuitable for such treatment, particularly in the case of neurotic and highly reflex types; so also individuals with blonde skins which do not easily pigment and easily freckle are not usually favourable subjects, and in these depression and not stimulation often follow the treatments. The same would also apply to all cases of hydroa aestivalis (recurrent summer eruption), in many of which there is an excess of hæmatoporphyrin in the urine. A condition of depression is also produced by an overdose in cases otherwise favourable.

It has been found that after exposure to light a rise in the hæmo-bactericidal power of the blood is demonstrable, which power persists for a few hours

and then returns to the normal. R. G. Bennerman has shown that an overdose of light, such as an initial exposure of half an hour to the mercury-vapour lamp, produces a rise in the hæmo-bactericidal power, which not only returns to normal, but which may fall below the original level and remain below it for some time before gradually rising to the normal. This was found to be accompanied by certain other phenomena, notably an increase in the rate of sedimentation of blood corpuscles which is taken to indicate a phase of diminished resistance. This apparent lowering of resistance may account for the condition of depression which is produced by the exposure to light of unsuitable cases.

SOME NEUROLOGICAL CASE NOTES.

BY

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TABES WITH NEGATIVE WASSERMANN REACTION IN BLOOD AND SPINAL FLUID.

A MAN of 46 recently presented himself with the following story:

At the age of 21 he had a chancre. He was treated with mercurial pills for two years, and was then told by a high authority that he could regard himself as cured. A year later he married and subsequently had two healthy children. At the age of 36 he began to complain of a curious feeling of soreness in the skin of his chest and back, so that when bathing he had to go very gingerly in rubbing these parts with flannel or towel. At 39 he noticed that his lower limbs began to tire very easily and about the same time began to have attacks of shooting pains in the legs. These were of momentary duration, and at first trivial with long intervals of freedom. A year later he began to suffer from occasional attacks of epigastric pain and vomiting without relation to food, and from a gnawing pain in the rectum at times after passing a motion. He was then examined by a medical man, who, finding absent knee-jerks and pupils which reacted sluggishly to light, suggested the diagnosis of tabes. Further advice was sought and the Wassermann reaction done upon the blood and spinal fluid. In both it was negative. Various opinions were expressed, one being that the sluggish reaction of the pupils to light was a congenital abnormality and that the absence of knee-jerks was also congenital. He was given no treatment.

During the subsequent six years the symptoms continued and the pains were more severe. He lost his sexual powers and his sense of smell.

On examination the pupils were unequal and irregular, with hardly any reaction to light on the right side and very little on the left, the contraction in accommodation being very fair. The knee- and ankle-jerks were absent. There was extensive analgesia to pin-prick over the legs and trunk. Postural sensibility in the lower limbs was quite good and the gait normal.

When the Wassermann test was introduced it was at first supposed that a positive reaction was always obtained in tabes. For some years it has been recognised that this was a false opinion and

that in some 20 per cent. of cases the test may be negative in blood and spinal fluid. This is more likely to be so in cases in which the disease has become spontaneously arrested or where the progress is slow. Negative reactions, therefore, should be discounted in the face of good clinical evidence. Tabes in its early stages is a disease of symptoms and the early symptoms are those of nerve-root irritation—pains and hyperæsthesiæ. The history given by this patient in the early stages of his illness is characteristic, and together with his story of a syphilitic infection would have sufficed for the diagnosis of tabes even in the absence of any physical signs.

The incidence of the disease upon the different groups of sensory fibres is variable. Quite commonly, as in the present instance, the pain fibres are affected without involvement of postural sensibility. There is, then, extensive cutaneous analgesia without ataxia.

The results of antisiphilic treatment in tabes are difficult to assess owing to the variable course of the untreated disease. In the opinion of many observers a prolonged course of arsenical injections has a good effect; but the best that can be expected is that the progress of the disease will be arrested. Hence the importance of *early* treatment. This should be given if symptoms are progressive whether the Wassermann reaction is positive or not. In stationary cases it is a wise plan to give a short annual course of four injections as a preventive measure.

CHRONIC SUBDURAL HÆMATOMA.

A man of 19 was seen on June 18th with the following history:

Last February at a riding-school he had a fall from a horse, striking the back of his head. He suffered no apparent injury and was able to catch his horse and continue riding. He afterwards appeared dazed and had no clear memory of the events immediately following the fall. A few days later he began to have headaches. These were intermittent at first and not very severe. He continued his work, which involved a journey to town from the suburbs every day, and led an active life. During the general strike in May he rode his motor-cycle as a despatch rider.

On June 3rd he attended a dinner in town, at which he drank more than was good for him, and did not get to bed