PHYSICAL TREATMENT OF RHEUMATIC DISEASE

The following report by Sir Leonard Hill, F.R.S., and Mr. H. J. Taylor, B.Sc., on "Certain Physical Methods in the Treatment of Rheumatic Disease," has been forwarded for publication by the Scientific Advisory Committee of the Empire Rheumatism Council:

REPORT ON APPARATUS

Proclaimed as of value in the physical treatment of rheumatic disease, there are several forms of apparatus offered to the public. Some of these are advertised to the medical profession only; others are advertised to the general community. It is obviously important that these apparatus should be submitted to accurate scientific investigation. Some may be altogether useless. Others, while being in a measure useful, may make claims to have effects which cannot be justified. Yet others are questionable from an economic point of view, since the effects which they produce can, by other means, be gained more simply and at a less cost. In regard to this last category, some consideration should perhaps fairly be given to what may be termed the psychotherapeutic factor. If some apparatus which will secure a good effect but at a higher cost than a simpler means can inspire in the patient a special degree of faith, there is no great harm done except to the purse of the purchaser, provided, of course, that no false claims are made, and that the extra charge on "faith healing" account is not unduly excessive. That consideration has been kept in mind during the investigation we have made of various claims.

The following facts are submitted to members of the medical profession in the hope that they will be of use when they are called upon to prescribe apparatus for rheumatic patients. On the general public it cannot be too strongly urged that it is dangerous to employ electrical or other apparatus except on medical advice and under proper supervision.

Ultra-violet Radiation

The active ultra-violet rays which produce sunburn in the skin are the shortest in the sun's spectrum, 0.3μ . Still shorter rays are produced by arc lamps, but these have little power of penetration, and such activity as they have on the skin is not different from that of the ultra-violet rays. The active ultra-violet rays scarcely penetrate beyond the epidermis, and they affect primarily the living epidermic cells, which they damage. The inflammatory reaction of sunburn ensues after a latent period owing to the presence of damaged cell products. Vitamin D is also produced by the action of these rays on ergosterol in the skin.

The iron-cored carbon arc in an arc lamp is efficient and is cheaper to run than the tungsten arc. The addition of a small quantity of titanium to the tungsten arc does not make any difference to the ultra-violet output of that arc. The contrary has been claimed. The price of mercury vapour lamps is reasonable, but the charge for stand and reflector usually increases the total cost out of all proportion to their value.

The artificial sources of light rays produce in truth mainly infra-red rays, less than 10 per cent. of the radiation being visible light. There is no evidence of the value of different coloured lights other than that of suggestion.

Infra-red Radiation and Other Sources of Heat

Water in a layer 1 cm. thick is opaque to radiation of longer wave length than 1.4μ . A piece of rat skin 0.41 mm. thick absorbs all radiation of longer wave length than 3μ and partially radiation between 2μ and 3μ . A dark source of heat, which gives all or nearly all its radiation in the form of wave lengths longer than 2μ , can therefore have only a surface heating effect; it cannot penetrate the skin. As in the case of

a hot-water bath or a hot fomentation, heat is conducted in and carried away by the blood circulating in the derma. It is therefore unjustifiable to claim that dark sources emit rays of great penetrating power; and an ordinary domestic electric fire may be as good as a "dark heater" sold for treatment purposes at a far higher price. For example, as compared with an apparatus consisting of a heating coil and reflector costing, say, from eight to twelve guineas, an equally effective piece of apparatus in the shape of a bowl fire can be purchased for from 15s. to £1. Red rays and the short infra-red rays penetrate through the skin to the greatest depth.

Visible rays other than red on penetrating the epidermis are absorbed in the blood of the derma. Incandescent lamps are the best sources of the more penetrating rays. When a glow lamp is placed in the mouth about 10 per cent. of the rays penetrate the cheek, 5 mm. thick, of a white man; no rays penetrate the cheek of a negro.

The modern gas fire with bright radiants is one source of the more penetrating rays. These rays excite flushing and transudation and are more comfortable than rays which heat the surface only. It is claimed that the penetrating rays heat tissues under the epidermis more than they heat the surface.

The flushing, increased flow of lymph, and softening of tissue produced by heat, their analgesic effect and their heightening of tissue metabolism, are of great value, and can be obtained by simple inexpensive means such as baths, fomentations, and radiant heaters. For deep heating the ultra-high-frequency current can be used. This has no specific effect other than heat. Low energy high-frequency apparatus does not heat; therefore it has no effect other than that due to suggestion, although claims are made to the contrary by salesmen of various apparatus.

Mild Radio-activity

There is no trustworthy scientific evidence of any biological effect of weak radium doses. It is claimed that weak radioactive pads now on the market have a beneficial effect on rheumatism. If in such a pad 0.1 mg. of radium is put, the cost at the current price of pure radium bromide would be 8s. If a raw mineral ore containing radium is used the cost would only be a fraction of this. If such a pad is sold for ten guineas the profit is very great.

An electrically heated pad is useful for treating painful parts, and can be bought for about 30s. If an electrically heated "radio-active" pad is sold for twenty guineas the profit is exorbitant. No improvement of the clinical conditions other than subjective has been found from treating cases of chronic arthritis with weak doses of radon.

The Constant Current

The switching on and off of a direct current may cause nerve stimulation at some depth. One cannot therefore say that no effect is procured below the skin. The effect due to electrolysis, however, is confined to surface tissue, since the chemical changes take place at the electrodes. The skin flushes owing to the setting free of acid at the positive, and alkali at the negative, poles. The action can be intensified by dipping, before application, the positive (lint-covered) pole in dilute acid, and the negative one in dilute alkali. The current is used also for iontophoresis, therapeutically active ions being introduced into the tissues by its passage.

Mitogenic Radiation

Gurwitsch first claimed that growing rootlets, dividing yeast cells, etc., emitted radiation in the ultra-violet region of the spectrum. Over 600 papers have been published on the subject. The American Bureau of Standards, after carrying out much research and investigating every claim, have come to the conclusion that such mitogenic rays do not exist.

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