

light on the body is not as yet fully understood, but we may say when the body is exposed to sunlight for a period of time there results: (1) increased pigmentation; (2) increased growth of hair; (3) increased metabolism; (4) increase in number of erythrocytes; (5) local hyperemia; (6) decrease in number of respirations; (7) increase in depth of individual respiratory act; (8) fall of blood-pressure, and (9) stimulation of nervous system.

Under the influence principally of the ultraviolet rays, pigmentation takes place on those parts of the body exposed. This is as a rule preceded by an erythema of varying intensity, according to the strength of the light. The pigmentation is characterized by an increase of the pigment granules in the epithelial cells, as well as in an increase in the number of chromatophoric cells, which are probably epithelial cells which have migrated into the connective tissue. This pigmentation by some is considered a protective process on the part of the body against the ultraviolet rays. Others hold that it transforms short-waved, chemical rays into long-waved rays, which have a deeper penetration. A combination of the two views is probably more nearly correct. It is very important in practice, as Rollier states that prognosis and rapidity of healing are as a rule proportionate to the degree of pigmentation. This pigment absorbs the violet rays, but not the red.

All rays of light penetrate the human body, the violet or chemical rays possessing this power to a less degree than the heat rays.

Lenkei says that only about a hundredth part of the light falling on the body penetrates it 0.5 cm., but some rays reach a depth of from 5 to 6 cm. That light penetrates the thickness of the hand is proved by the experiments of Oninus. When light penetrates the skin, practically all the chemical rays are absorbed by the blood. This is a striking fact and probably some day will help explain the good results of heliotherapy. When we consider that exposure to light causes a local hyperemia, the amount of energy absorbed by the blood must be enormous. Von Schläffer has also shown that blood during exposures to light absorbs light energy, which, in the dark, it can again transfer to a photographic plate. Is it not possible, as he says, that it can also surrender this accumulated energy to the internal organs, and thereby influence their function and possibly pathologic processes? Rollier rarely sees acne or furunculosis on pigmented skins, and during an epidemic of German measles noticed that all the well-pigmented children were free from eruption and even in those wearing jackets the eruption only appeared on those parts of the body not exposed to the sun-bath.

TECHNIC OF HELIO THERAPY AS USED BY DR. ROLLIER

While the French surgeons and even Bernhard of Samaden at first relied principally on local exposures of the parts affected, Rollier considers a general exposure of the body as fundamental and the local exposures as only secondary in importance. The dry, invigorating air of the higher altitudes is also called to assist the solar energy. This it does by increasing the action of the skin, thus aiding elimination, drying up wounds when present and increasing the general tone of the body. The treatment then is really a combination of light and fresh air. When light is not available the air-bath is used alone. According to Saake, mountain air also contains many more radio-active emanations than the air in the lowlands. Furthermore, in higher altitudes the differences in temperature in the shade and in the sun are very great,

so that at Leyson when there is snow on the ground, temperatures of 95 to 120 F. in the sun are not uncommon. This allows the treatment to be carried on without interruption in winter, as the patients do not suffer from the cold.

Rollier in his address before the Gesellschaft deutscher Naturforscher and Aerzte in Münster in 1912 says:

It is in surgical tuberculosis that we have seen the best results from heliotherapy, and we have made the treatment of it our life work. As a result of my experience in the use of the light-cure in higher altitudes, based on an experience of nine years, I maintain to-day that the cure of surgical tuberculosis in all its forms, in all stages, as well as at every age of life, can be accomplished.

The closed surgical tuberculosis always heals, if one will only be patient, and above all if one understands how to keep it closed. To transform a closed tuberculosis into an open one means to increase the gravity of the case a hundred-fold. A diminution of the vitality of the tissues is the inevitable consequence. . . . To regard a surgical tuberculosis as a local disease which can be cured by local treatment alone is a ruinous error. On the contrary, it is a general affection which requires general treatment. Of all infectious diseases it is the one in which the individual resistance plays a deciding part. Our first effort therefore is directed to improve general conditions and thus to bring about a healing of the local focus by treatment of the entire system. A rational local treatment is necessary as well, provided it is not too one-sided.

Patients on arriving at the sanatorium are put to bed for a few days, even those whose local condition does not make this imperative. They are thus allowed to become acclimated to the altitude. After three or five days as a rule, they are pushed out onto the verandas into the sunshine. The head is covered with a white hat or an umbrella, the eyes protected with dark glasses and a white garment worn over the body. On the first day the feet are exposed three times a day for five minutes; on the second day three times ten minutes, and the legs to the knees three times five minutes; on the third day the exposures are increased five minutes three times daily; on the fourth day thighs are included; on the fifth day the arms; on the sixth day the back and on the seventh the abdomen and chest, so that at the end of the first week some parts of the body are exposed for one and one-half hours per day. The exposures are increased five minutes three times daily until the patient gets a full sun-bath for from three to five hours daily. This, as a rule, is the maximum, although some bear the treatment for seven hours. Individualization of course is necessary, and in some instances the scheme of exposures must be modified to suit the case. Pulse and temperature are closely watched and used as an indicator of the patient's tolerance.

By this progressive increase of the time of exposure he avoids an erythema solare, and gradually the body acquires the desired degree of pigmentation which seems to be so essential. The rapidity and degree of pigmentation are as a rule in direct proportion to the power of resistance of the patient. Blonds and especially red-blonds who pigment less seem to offer a more unfavorable prognosis.

Nervous patients must be treated carefully as they often complain of headaches and nervous symptoms. These restless, excitable patients receive more air-baths and shorter exposures to the sun, while the fat phlegmatic patients generally bear the sun-baths well.

As the healing of surgical tuberculosis requires rest of the parts affected, all cases except those of the upper