

or less prolonged interval. Clinical observations act as guides to the time for reinoculation and the size of dose to be administered. The appropriate standards for size and frequency of doses have been previously established from opsonic estimations on laboratory patients with similar infections, and are not necessary for each specific case. Failure to immunize the patient artificially may be due to an abnormal condition of the skin, nonspecific bacterial suspensions, or incorrect dosage. Much time is saved in the use of stock suspensions by the elimination of opsonic indices and by the assistance derived from other therapeutic measures. Less suffering, less deformity, less danger of systemic infection and less liability to recurrence are the advantages derived from the use of bacterial suspensions as a therapeutic agent.

Atoxyl Dermic Reaction. According to Moro and Stheeman,¹ after repeated injections of atoxyl the skin reaction is not only more intense, but also appears more quickly than at first, and that there exists a notable parallelism between the primary atoxyl reaction and the cutaneous reaction of von Pirquet to tuberculin. This parallelism showed itself also in the degree of reaction, i. e., weak reactions to tuberculin corresponded in general to weak reactions to atoxyl and the reverse. The most marked primary reaction to atoxyl was met with in scrofulous children.

(1) Münchener med. Woch., July 15, 1909.

CHAPTER IV.

ACTINOTHERAPY AND RADIOTHERAPY.

Radium in Lupus Erythematosus is discussed by George Booth¹ who reports the case of an 11-year-old girl with a tuberculous maternal history. She was attacked by lupus on the bridge of the nose. X-rays were applied. The disease was arrested and eventually the part healed, with some loss of substance and consequent disfigurement. Whilst the nose was being treated, a second outbreak of the disease commenced a little to the inner side of the left leg, below the patella. X-ray treatment was applied unsuccessfully. As the disease was spreading, Booth decided to try the effect of radium bromid, placed on a small disc and covered with mica. The ulcerated surface was covered with thin oiled silk, and the disc was moved slowly over the surface for 20 to 30 minutes, once or twice a week, as was thought requisite. The treatment was continued for some time with excellent results.

X-Ray Treatment of Scalp Ringworm. For an extended discussion of this subject the reader is referred to the PRACTICAL MEDICAL SERIES, Vol. viii, 1909.

X-Ray in Erythema Multiforme. W. S. Lain² reports the case of a woman with extreme erythema multiforme, involving the extensor surfaces of the fingers, the hands and arms to the elbows. She had tried the usual internal eliminants and local applications without any subsidence of the symptoms. He began the x-ray Jan. 23, 1909, and continued giving treatments, each 10 minutes in length, on January 24, 25 and 28. By the last date the eruption had disappeared except for the brownish color. On February 10 there was a recurrence of all the former trouble at the same localities. He renewed the treatment

(1) British Med. Jour., April 3, 1909.
(2) Jour. Am. Med. Assoc., May 1, 1909.

on February 11, 12 and 13. All indications of the disease then ceased—and there has been no recurrence since. No other treatment was used except salines internally and plain gauze bandages moistened with calamin lotion externally, which had been used from the beginning.

Desensitizing the Skin to X-Rays. Owing to the sensitiveness of the skin to Roentgen and radium rays, and the liability to burns if they are applied for a prolonged time, the use of these therapeutic agents has been confined chiefly to treatment of superficial lesions.¹ Various devices have been tried to facilitate the use of the rays for deep-seated tumors, usually with discouraging results. Gottwald Schwarz,² working on seeds, found that their sensitiveness to the *x*-ray was in direct proportion to the metabolic activity. If he exposed dry seeds to the *x*-ray even over long periods, they were not affected by it and developed into normal plants, whereas, if sprouting seeds were so treated, even for a short time, marked changes, as dwarfism and pigmentations, appeared in the resulting plants. This difference he considered to be due to the differences in metabolic activity, and drew the conclusion that if by any method of metabolism of the skin could be reduced during exposure to the *x*-rays, the effect on the skin might be diminished. The method he used to reduce the metabolism was pressure. He placed two capsules containing radium side by side on the skin, one lying loosely, the other held firmly by means of a rubber band. The difference between the resulting dermatides was striking. Where the pressure was employed a slight blush appeared after some days, disappearing in 3 or 4 days, whereas, where there was no pressure a severe dermatitis occurred and lasted for more than a month. The same effect was produced by the *x*-ray, the rays being applied through thin blocks of wood. Where the blocks rested lightly on the skin, the effects were severe and lasting; where they were submitted to pressure, slight and transient. Schwarz concludes that the differences are due to different metabolic activities of the free skin and of that under compression. By pressure on the skin during radiation deep tissues

(1) Medical Record, July 24, 1909.

(2) Münchener med. Woch., June 15, 1909.

may be treated without danger of superficial burns. Transference of physiologic data from plants to animals is illogical. The first have no nervous system.

X-Ray and the Sweat Glands. Commenting on the procedure urged by F. J. W. Porter of treating excessive axillary sweating by operation, A. H. Pierie¹ remarks that it seems a very drastic method when a much less severe treatment with no operation, attains the same result. His attention was called 4 years ago to the fact that the effect of *x*-rays on the sweat glands was to destroy them. The first case was that of a joiner to whom he applied *x*-rays in treatment of a tuberculid over the hip. Some months after he was cured he no longer perspired on the part of his body on which the *x*-rays had fallen. Since that case Pierie has noticed the same condition in many tuberculous glands in the neck. Children lose permanently not only the downy hairs on the side of the neck by this treatment, but also the sweat glands. To destroy the sweat glands, 6 efficient *x*-ray treatments is all that is necessary—one treatment a month, giving at each sitting the maximum dose that the skin will stand. The sweat glands are the most readily affected of all the glands in the body by the *x*-rays, and the most readily destroyed. By sufficiently *x*-raying the axilla in the way described, not only are the sweat glands destroyed but also the hairs of the axilla. Sweating is usually a local expression of constitutional states. Destruction of sweat glands does not change these.

X-Ray Dermatitis. In this the following changes take place, according to S. Burt Wolbach.² There occurs obliteration of vessels by degeneration as well as proliferation of endothelium. The muscular coat of the blood-vessels also degenerates and connective tissue takes its place. It begins in the small vessels and, at length, involves the larger ones. This obliteration leads to the formation of foci of degeneration. The layer of these latter leads to ulceration. An important change is excessive proliferation of epithelium into and around the areas of degeneration.

(1) British Medical Jour., April 17, 1909.

(2) Amer. Jour. of Derm., May, 1909.

X-Ray in Rhinoscleroma. A. R. von Ruediger-Rydiger¹ points out that subjective improvement of the symptoms appears at a very early stage of the treatment and persists for a long time, even when the healing is incomplete. It tends to incline both the patients and the physician to discontinue treatment too soon and may induce neglect when recurrence occurs.

High-Frequency Currents in Dermatology. According to W. Parker Worster² vibratory electrification by means of high-frequency currents increases internal respiration of the tissues and by dilating the arterioles hastens the flow of blood into the capillaries, thus increasing metabolism. Currents of high amperage give no unpleasant sensations in passing through the body. They deepen inspiration and increase the amount of oxygen taken into the body. They are the best treatment for neuritis and chronic rheumatism, relieving pain and restoring function rapidly, and are equally good in sciatica, lumbago and gout. In arthritis deformans pain, stiffness and soreness rapidly disappear. They are useful in removal of moles, warts and small tumors. Many skin diseases yield readily to them; among them ringworm. Old ulcers are caused to heal by the use of an effluence. Diagnosis should be made carefully, as in unsuitable cases injurious effects occur.

Spread Radium in Dermatoses is discussed by J. M. Davidsen,³ who points out that there are great advantages in this method. First, it enables all the radium radiations to come into effective action on the surface to which they are applied. All the alpha, beta and gamma rays may be used, or by the interposition of certain screens all the alpha rays may be cut off, and, if necessary, the beta rays also. A sheet of paper suffices to cut off all the alpha rays, the beta rays may be cut off by aluminium or leaden screens of varying thickness. The quantity and quality of the rays best suited to cure any particular disease can only be arrived at by trial.

In all successful cases the remarkable effect is shown that by properly timed exposures the abnormal cells in-

(1) Berliner klin. Woch., Jan. 25, 1909.

(2) Medical Record, Sept. 18, 1909.

(3) British Medical Jour., March 19, 1909.

vading the human body are gradually destroyed and absorbed, while none of the normal healthy cells are destroyed. Such being the fact, two questions naturally arise: (1) Which of the radiations produce the beneficial results? and (2) What are the abnormal cells which are more resistant to the radiations than the normal body cells?

Radium is not the only radioactive body giving off alpha, beta and gamma rays. There are other substances which do so, such as thorium and actinium, and doubtless others which remain to be discovered. Radium itself does not directly produce all the rays. It first produces what has been called an emanation. The disintegration of this emanation causes it to give out the three types of rays. The therapeutic action of radium depends mainly on the amount of the emanation which it contains. If this store of emanation is driven off by dissolving the radium in water, it proves to be a gas, which, when collected, gives out the same amount of alpha, beta and gamma rays that it did when unseparated from the radium. But, when the deemanated radium goes on slowly producing and storing up more emanation until in about one month's time it has regained its maximum strength, the emanation which has been thus separated from its parent goes on decaying, losing about half its strength in about 4 days, and becoming in about 16 days almost powerless. The effect of the rays from a given quantity of separated emanation is as powerful as when it is contained in the radium, and thus, consequently, it is possible to send a tube of the emanation to be used in the treatment of a case at a considerable distance without any risk of losing radium in transport.