

THE TREATMENT OF LEPROSY WITH CYANOCUPROL.

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The present communication is a brief report upon the use of cyanocuprol in the treatment of leprosy. Cyanocuprol has proven of value in the treatment of tuberculosis in animals and has been employed also in the treatment of human cases of the disease.¹ Hence it was concluded to test its chemotherapeutic action in leprosy. Thus far no specific treatment for leprosy has been discovered, and I am presenting this report, though brief, for it seems to contain an advance at least in the treatment of that malady.

Because of a similarity which exists between the bacilli of leprosy and tuberculosis, the attempt to apply the same curative substances both to tuberculosis and to leprosy seems reasonable. Since the experimental production of leprosy in animals has not been effected and since cultivation of the bacillus of leprosy has not yet been surely accomplished, the application of proposed curative substances must necessarily be made to human cases directly. In this instance the chemical preparation has been administered to numerous human patients on a basis of established clinical observation.

In the treatment of tuberculosis with cyanocuprol special attention was paid to the local and general reaction, because in tuberculosis an intimate relation seems to exist between the dose and the pathological process. It was anticipated that the local reaction would be of consequence in the treatment of leprosy, for the local lesions chiefly occupy the surface of the body; but contrary to my idea no such reactions occurred. Moreover, general reactions were also absent.

At first 16 to 20 mg. were given every other week. I have now come to the conclusion that 20 to 24 mg. may be given weekly without ill effects. The administration was exclusively by intravenous

¹ Koga, G., *J. Exp. Med.*, 1916, xxiv, 107, 149.

injection with an ordinary syringe, the needle being inserted into the femoral vein. The injection is made very slowly. After seven or eight injections symptoms such as congestion of the head, forcible deep breathing, acceleration of the pulse, etc., similar to what is known as anaphylactoid in salvarsan injections have been encountered. But the symptoms are fleeting, and recovery occurs in a moment without discomfort. Women are more often affected than men. These effects can, however, be obviated if the injection is made slowly enough and the patient is allowed to rest for a short time after the operation.

The following are the reports of cases of leprosy treated in the I-hai-yen Leprosorium, Meguro Village in Tokyo. More detailed reports will be made later.

Case 1.—T. H., female, aged 25 years. *Lepra maculosa*. No family history. In February 1914, local anesthesia and pigmentation appeared on the right arm. Confined in December of the same year. At that time a great many large and small spots appeared all over the surface of the body. I examined the patient first in April, 1915. Her face was dark purple in color with many infiltrations in the skin. Many spots as large as the tip of the little finger were scattered over the face, arms, and body, which lacked sensation. An injection of 10 mg. was given on Apr. 22. No rise of temperature occurred, or any other ill effects. A second injection of 10 mg. was given on May 10. After the injection the lesions presented slight congestion. A peculiar sensation was felt in the arms. A third injection of 8 mg. was given on May 24, after which the general symptoms seemed to improve. A fourth injection of 8 mg., a fifth of 8 mg., a sixth of 10 mg., a seventh of 12 mg., and an eighth of 12 mg. were given successively on May 28 and June 3, 10, 17, and 28. During this period the infiltration and the pigmentation of the face gradually disappeared and the skin recovered a healthy color. A ninth injection of 12 mg. was given on July 5. This time, immediately after the injection, the patient complained of congestion in her head. A still stronger congestion was experienced after the tenth injection of 12 mg. on July 12. In each instance the congestion subsided in a few minutes. An eleventh injection of 10 mg., a twelfth of 10 mg., a thirteenth of 10 mg., a fourteenth of 10 mg., and a fifteenth of 10 mg. were given successively on July 20 and 26, and Aug. 2, 9, and 16. Each time a fleeting sensation of congestion occurred.

Gradual improvement of the symptoms has been observed since the first injection. The color of the face and the consistency of the skin have become nearly normal. Sensation has also been almost completely restored. However, several anesthetic, roseola-like spots still remain in the submaxillary region. The spots on the other parts of the body have become white, and sensation has

been completely restored. Some of the spots have assumed a normal color. Nutrition good.

Case 2.—H. O., female, aged 23 years. *Lepra maculosa* and *anæsthetica*. No family history. The first symptoms appeared 3 years ago. They seemed to improve for a while but became worse during the spring of 1915. I examined the patient for the first time in May, when most of her face was covered with dark red spots. The same kind of spots was present on both arms. The left little finger became withered and could hardly be clenched. Infiltration occurred in the spot. Sensation lacking. The first injection of 10 mg. was given on May 20. No reaction occurred. The second injection of 8 mg. was given on May 29. The infiltration of the skin seemed to improve greatly. A third injection of 8 mg., a fourth of 10 mg., a fifth of 12 mg., a sixth of 12 mg., and a seventh of 12 mg. were given successively on June 3, 10, 17, and 28, and July 2. Immediately after the seventh injection the patient suffered from a fleeting congestive feeling in her head. An eighth injection of 12 mg. was given on July 12, when there was still stronger congestion. A ninth of 10 mg., a tenth of 9 mg., an eleventh of 10 mg., a twelfth of 10 mg., and a thirteenth of 11 mg. were given successively on July 20 and 26, and Aug. 2, 9, and 16. All the last five injections were accompanied by congestion in the head.

A fourteenth injection of 11 mg. and a fifteenth of 11 mg. were given on Aug. 23 and 26, respectively. In the last two injections the liquid was introduced very slowly into the vein, and no reaction occurred.

At present the facial spots are hardly noticeable. All the other spots are becoming paler, and sensation is gradually being restored. The left little finger is gradually recovering its motility, but is still withered; the tips of the fingers are becoming rounder in form and the palm is becoming thicker. Nutrition good.

Case 3.—J. Y., male, aged 17 years. *Lepra maculosa* and *anæsthetica*. One of his brothers is a leper. The symptoms appeared first in 1914. I examined the patient for the first time in May, 1915. His right hand is withered and the fingers cannot be clenched or opened. On the inner side of the joint of the right arm, a spot accompanying thickening of the skin occurred. On the inner side of the lower right arm a row of small protuberant spots was present. On the exterior side of both upper legs were a great many spots.

The first injection of 10 mg. was given on May 10, and was accompanied by no reaction. A second injection of 10 mg. was given on May 20, and a third of 8 mg. on May 28. The symptoms in the right arm improved. A fourth injection of 18 mg., a fifth of 11 mg., a sixth of 12 mg., a seventh of 12 mg., an eighth of 12 mg., and a ninth of 12 mg. were given successively on June 3, 10, 17, and 28, and July 5 and 12. After the last injection congestion of the head was felt. A tenth injection of 10 mg. was given on July 20, which produced a slight feeling of congestion in the head. An eleventh injection of 10 mg., given on July 26, was accompanied by the same reaction. A twelfth injection of 10 mg. was given on Aug. 2. The patient was allowed to lie still during the operation and no reaction occurred after the injection. A thirteenth injection of 11 mg., a

fourteenth of 11 mg., a fifteenth of 11 mg., and a sixteenth of 11 mg. were given successively on Aug. 9, 16, 23, and 26.

The infiltration of the spots in the region of the joint of the right arm has disappeared, and the pigmentation and infiltration of the small nodular spots has improved. There appears little or no trace of leprosy changes. One of the fingers which could not be moved recovered its motility somewhat, as well as its power of sensation. The spots on the back and legs are becoming whiter in color and gradually disappearing. Nutrition good.

Case 4.—R. O., male, aged 35 years. *Lepra maculosa* and anaesthetica. No family history. The symptoms first appeared several years ago; recently new spots began to appear on the upper and lower limbs. Neurasthenia occurred occasionally. The first injection of 6 mg. was given on May 28. No reaction followed. A second injection of 10 mg. was given on July 5, when the tone of the pigment was observed to fade. A third injection of 10 mg. and a fourth of 10 mg. were given on July 12 and 20, respectively. The spots became very indistinct. After the fifth injection of 10 mg., given on July 26, congestion was felt in the head. A sixth injection of 10 mg., given on Aug. 2, was made while the patient was allowed to lie quietly in bed and no feeling of congestion in the head ensued. A seventh injection of 10 mg., an eighth of 10 mg., a ninth of 10 mg., a tenth of 11 mg., and an eleventh of 10 mg. were given successively on Aug. 9, 16, 19, 23, and 26.

Both the old and new spots are fading. No neurasthenia. Sensation is gradually being restored. The patient is receiving the injection twice a week, without any unfavorable reaction. Nutrition good.

Case 5.—N. K., male, aged 28 years. Complicated leprosy. No family history. At the review of the militia in 1915, he was found to have leprosy. A slight infiltration occurred all over the face. At the right arm joint three nodules as big as peas were present. Some small subcutaneous nodules were felt on both calves. The external side of the lower left limb was anesthetic.

A first injection of 10 mg., a second of 10 mg., a third of 10 mg., and a fourth of 10 mg. were given successively on Aug. 2, 9, 16, and 23.

After the first injection the nodules in the right arm were absorbed, leaving brownish spots. By the fourth injection, two of the three spots became white and sensation was restored. The remaining one is still anesthetic. The nodules on the calves are softer, while the face is paler. The anesthesia of the lower left leg is recovering. Nutrition good.

Case 6.—K. Y., male, aged 34 years. Complicated leprosy; has pulmonary tuberculosis. No family history. Small nodules occurred all over the face. Spots were also present at the left elbow and the right knee. On the exterior side of the lower right arm, a protuberant spot was present. There were some small nodules on the calves.

The first injection of 9 mg., given on Aug. 2, was accompanied by dyspnea. The temperature rose as high as 38.5°C. This reaction occurred invariably in tuberculosis. A second injection of 9 mg., a third of 10 mg., and a fourth

of 10 mg. were given successively on Aug. 9, 16, and 23. The last injection caused a rise of temperature of 37.5–37.6°C.

The infiltration of the face is fading. The nodules became more conspicuous for a while, but became gradually smaller. The infiltration in the spots of the left elbow is becoming softer. The nodules of the calves are also becoming softer. The tubercular lesions are becoming very small.

I have injected cyanocuprol three times in more than ten cases and twice in more than twenty cases with old lesions. Some of them showed great improvement. A more detailed report will be published later.

SUMMARY.

This brief report deals with six cases of leprosy in which cyanocuprol has been administered with what appear to be beneficial effects. The treatment is being continued in still other cases.