

EXPERIENCE WITH THE NAPHTHALAN OIL BATH TREATMENT OF LEPROSY

BY PROF. DR. V. N. KUZNEZOV

*Director of the Experimental Clinical Leprosarium
Krasnodar, North Caucasus*

Naphthalan oil is found in the village of Naphthalan, which belongs to Aznept and is situated 18 kilometers from the Gue-ran station of the Trans-Caucasian railroad. It occurs at the depth of 150 to 160 meters. According to Professor Alexandrov it occurs only in Russia.

The healing properties of this oil on external application has been known from the most remote times. Only in 1931, however, was the exploitation of Naphthalan as a health resort begun and treatment started under systematic medical control. The following affections are indicated for treatment at this resort: diseases of the locomotor apparatus of rheumatic, arthritic and infectious origin; diseases of the peripheral nervous system: radiculitis, plexitis, neuralgia, neuritis, polyneuritis and neuromyositis; gynecologic diseases of inflammatory character; vascular diseases: phlebitis, ulcers of the legs; skin diseases: chronic eczema, neurodermitis and burns of the first and second degree. Contraindicated are cases with tuberculosis of the lungs and bones, nephritis and nephrosis, marked anemia and acute eczema.

There is an extensive literature on naphthalan or naphthalan unguent, which at the end of the last century was prepared in this village by Eger, a German, who heated the oil with freshly prepared neutral stearin soap to 200°. Before the war of 1914 naphthalan attained much popularity abroad, due to its efficacy and the fact that it was actively advertised. Study of the mechanism of its action, however, began only in the recent years.

Outwardly naphthalan oil has the same appearance as ordinary oil, but it differs from the latter in its composition. It belongs to the type of heavy oils which contain no petroleum, benzine or paraffin, thus differing from the industrial oils. Moreover, it contains olefins (ethylene combinations), aromatic and saponifying oxygen combinations, phenols and sulphur in association with organic radicals and vaseline. On burning fresh naph-

thalan oil a very small amount of ash is left (0.02 percent), consisting of iron, calcium, magnesium and sodium.

On analysis by distillation the following products were obtained (Alexandrov):

Oil with specific gravity 0.887.....	15%
Spindle oil, specific gravity 0.916.....	21%
Machine oil, specific gravity 0.913.....	8%
Heavy machine oil, specific gravity 0.934.....	6%
Cylinder oil, specific gravity 0.953.....	15%
Heavy cylinder oil, specific gravity 0.963.....	22%
Residue.....	13%

Naphthalan oil adheres very firmly to the skin and cannot be washed off with water. It dissolves only in chloroform, ether and benzene.

The literature does not contain any record of naphthalan bath treatment for leprosy. My observations indicate that when the body is extensively affected an attempt must be made to find a method of treatment which will act directly through the skin upon the organism of the leper. There are records of good effects obtained by treatment with sulphur baths, which my observations also confirm. For a number of reasons I decided to employ naphthalan oil baths, and to organize the treatment in surroundings similar to those in which they are carried out at the Naphthalan resort. During the summer season (July and August) the air temperature at Krasnodar is about the same as at Naphthalan; for example, the temperature in the sun rises to 60° and in the shade to 40°.

METHOD EMPLOYED

The baths were arranged on a platform facing southeast, with covers and benches with sunshades at the head. The naphthalan was warmed in the sun, usually at noon, when the temperature of the upper layer of the oil rose to 40° and the layers below 1°-2° lower. The patient was immersed up to the breast in the bath and the rest of the body was coated with the oil. He remained in the bath for 10 to 15 minutes, after which the oil was scrubbed off his body by hand with a small wooden stick. The patient then lay down in the sun on the bench for 15 minutes, and afterwards he was kept for 3 to 4 hours in bed. He sweated profusely, and was allowed hot tea to quench his thirst.

There arises the question of how to regard this sun bath. Korchagin and Joffe measured the coefficient of absorption of

radiant energy by naphthalan oil and concluded that a layer 0.5 mm. thick is sufficient to cause complete absorption of the violet rays, and a layer 2 mm. thick absorbs all of the red rays. Since, after the removal of the oil when the patient leaves the bath, there still remains quite a thick layer of it on his body, it is self-evident that during the time spent in the sun he does not get a real sun bath; all of the sun-rays being absorbed by the oil, he gets a continuation of the oil bath at a higher temperature. After this peculiar bath the patient dries his body with a towel. He does not wash during the entire period of the treatment, and his skin acquires a dark, brownish color. His bedding and clothing are impregnated with the oil. These are the main features that make the oil bath different from other balneologic procedures such as mud baths, after which the patient immediately washes himself under a warm spray.

Another important question that arises is whether or not the skin absorbs the oil. Leitman (cited by Chlenov) found changes in the hemopoetic and internal organs of rabbits and white mice after applying naphthalan oil over the internal surface of the ears of the rabbits and the backs of the mice. These changes were somewhat less marked after application of the naphthalan dressing. Egorov (also cited by Chlenov) explains the mechanism of action of the naphthalan baths on the grounds of a reflex action through the skin upon the vegetative centers and direct action on the blood. Alexandrov believes that the effect on the organism as a whole takes place not only by the reflex route but also through effects on the manifold functions of the skin itself. Consequently it may be concluded that absorption of the oil does take place through the skin during the bath; and according to Alexandrov's concept this absorption is further promoted by changes in the permeability of the skin due to the oil and to hyperemia of the skin. The latter is produced both by the oil bath and by the subsequent exposure to the sun.

CASES TREATED

During July and August, 1937, fourteen patients were submitted to the oil bath treatment. Of these there were eight women and six men, their ages varying from 8 to 70 years and the duration of the disease from 1 to 30 years. At the Naphthalan resort the patients usually receive 10 to 15 baths during the course of a treatment. The purpose of the present work was to ascertain the efficacy of local baths and also the effects

of a greater number of general baths. The patients were therefore divided into three groups.

First group (5 patients).—At first only local baths were prescribed for this group, but later both local and general baths.

CASE 1. P., female, aged 30. Duration of leprosy one year. The process was in an early stage, with macules on the face and lower extremities and loss of pain and thermal sensibility. She received 40 coatings on the face and upper extremities and 32 baths for the legs, 10 minutes each followed by exposure to the sun for 15 minutes. At the end of the course the macules showed retrogression, and the pain and thermal sensibility were recovered except in a small area near the knee. Weight remained unchanged.

CASE 2. Z., a girl, aged 13. Duration of the disease three years; neural form (*lepra II benigna*). Loss of pain and thermal sensibility on both legs. She received 40 baths for the legs, 10 minutes each, with subsequent irradiation in the sun for 10 minutes. Complete recovery of thermal and pain sensibility. The weight increased about 2 kgm.

CASE 3. P., female, aged 30. Sick for 10 years; nodular form (*lepra II maligna*). Considering a tendency to leprous exacerbations, she was treated with 10-minute baths for the upper and lower extremities, with subsequent sun treatment also for 10 minutes. After she had had 24 baths there was an exacerbation of the process and they were discontinued. There was recovery of pain and thermal sensibility on the soles of the feet, and the infiltrations on the extremities were somewhat reduced. Photophobia and pain in the eyes caused by leprous iridocyclitis disappeared. She gained 1.5 kgm. in weight.

CASE 4. G., female, aged 35, with the neural form of leprosy (*lepra III*) of 20 years duration. Received 20 baths for the feet, succeeded by 20 general baths. There was considerable recovery of pain, thermal and tactile sensibility on all extremities. A trophic ulcer of the foot healed. This patient had been under our observation for ten years and various methods of treatment had been tried, including sulphur baths, but no method employed had caused so rapid and stable improvement as the naphthalan oil baths. She gained 2.5 kgm. in weight.

CASE 5. F.Z., female, aged 44 years. Duration 13 years; nodular form (*lepra II maligna*). She was given 16 foot baths succeeded by 24 general baths. Plantar ulcers healed, the infiltrations on the face and legs decreased markedly, and the voice became clearer due to resolution of the infiltration of the larynx. There was a gain of 1.5 kgm. in weight.

Second group (3 patients).—Each of these patients received 40 general baths.

CASE 6. G., male, aged 8 years. Disease in an early stage, duration one year, with infiltrations of the face and disturbances and considerable decrease of pain and thermal sensibility on the legs. There was regression of the infiltration on the face and recovery of sensibility to pain on the legs. Gain in weight, 2 kgm.

CASE 7. S., female, aged 54 years. Duration 8 years; nodular form (*lepra II maligna*). There was recovery of pain and thermal sensibility on

the extremities and retrogression of the infiltrations and lepromas of the face, forearms and legs. The effect may be considered excellent. Gain in weight, 2.5 kgm.

CASE 8. S., male, aged 70 years. Duration about 20 years; nodular form (lepra II maligna). A bedridden patient, due to marked ankylosis of the knee joints. After 44 baths he began to walk without aid. However, two weeks after the end of treatment an exacerbation of the leprous process took place due, evidently, to the excessive number of baths.

Third group (6 cases).—Each patient in this group received about 20 baths.

CASE 9. P., female, aged 42. Duration 5 years; nodular form (lepra II maligna). Pain in the legs due to polyneuritis disappeared, the voice lost its hoarseness and became clear, and the infiltrations of the face decreased. Gain in weight, 3.5 kgm.

CASE 10. Sh., female, aged 29. Leprosy began 2 years before; nodular form (lepra II maligna). There was marked regression of the infiltrations of the face and extremities and recovery of pain and thermal sensibility on the forearms. Gain of 2 kgms. in weight.

CASE 11. M., male, aged 29. Duration 8 years; nodular form (lepra II maligna). After treatment there was complete recovery of pain and of thermal sensibility on the legs. A loss of about 1.5 kgm. in weight occurred.

CASE 12. L., male, aged 67 years. Leprosy of the nodular form (lepra II maligna) for a number of years. Treatment caused considerable recession of infiltrations of the face and extremities. Gain of 1 kgm. in weight.

CASE 13. L., male, aged 31 years. Leprosy began 2 years before; nodular form (lepra II maligna). Recession of infiltrations and lepromas of the face. Gain of 2 kgm. in weight.

CASE 14. P., male, aged 42 years. Duration about 30 years; (lepra III). Both legs were amputated at the lower third and there was mutilation of some of the fingers. After treatment there was recovery of response to pain stimulation and thermal sensibility on the forearms and remnants of the legs. One stump healed with a healthy scar. Weight unchanged.

DISCUSSION

Both the local and general baths caused rise of temperature, the general baths 1 to 20 degrees and the local baths 0.5 to 10 degrees. In most instances the temperature reaction occurred only after the first few baths. On the average the temperature returned to normal three hours after the bath.

Blood analyses was carried out before and after treatment, the numbers of the red and white elements and the Schilling formula being studied. From the data obtained it may be said that no special changes in the blood picture took place. Evidently more frequent blood studies are necessary in order to draw any conclusions regarding the changes that may occur.

An electro-physiological investigation was also carried out in five cases with the Burginon-Valters apparatus, using a 0.4 cc. active electrode. Determinations of the motor and sensibility chronaxy were made, of selected areas, of both healthy and anesthetic skin. It was found that chronaxy of both the motor and sensitive areas was somewhat reduced. Thus the naphthalan oil, acting through the skin on the terminal nerves, changes the excitability of the nervous tissue, causing a number of reactions which manifest themselves in the entire organism and, primarily, in the skin, marked by loss of anesthesia, resolution of infiltrations and healing of ulcers.

No skin lesions due to the oil itself were observed, owing mainly to the absence of petroleum and benzine in the naphthalan oil. The balneologic reaction was at the beginning of treatment rather mild, mostly expressed in exacerbation of pain in the extremities, since lepers are often subject to more or less marked polyneuritis. The temperature reaction has been described.

As a demonstration of the fact that the balneologic reaction is mild, the histories of two cases (Nos. 5 and 9) can be cited. These patients had hoarse voices due to infiltration of the larynx and, as is common for such patients, they were subject to easily excited exacerbations of the process in the throat under the influence of any treatment that might be used. However, under the action of the oil treatment the infiltrations disappeared and the voices regained their normal timbre. The leprous exacerbations in Cases 3 and 8 are to be explained by the excessive number of baths prescribed. It is emphasized that all patients endured this treatment quite easily, and in spite of considerable sweating most of them increased in weight.

With regard to the question of the number of baths to be prescribed, we came to the conclusion that twenty general baths are quite sufficient. Sometimes, in order to avoid exacerbations, it is advisable to prescribe them in two series of 10 baths each, with an interval of five to ten days.

It must be pointed out that this treatment gave stable effects in almost all cases. We have not observed such rapid improvement with any other method of treatment used in our other southern leprosaria. This paper, however, is to be regarded as a preliminary report, since our group of workers has undertaken a more extensive study of the mechanism of action and the efficacy of this method of treating leprosy. Of one thing we are certain, that it fully deserves more detailed study.