The Sedimentation Index: Its Value in Leprosy Treatment.

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IT is an old adage in medicine that over a healthy muscle you will get a healthy skin. This especially holds good in a disease like leprosy. Mycobacteria lepræ cannot flourish in a healthy body. In the non-infective stage of the disease we can watch the fight between "invader and victim." And the more healthy we are able to keep the human system the more prolonged will be the fight. Mycobacteria lepræ are the organisms of low pathogenic power and cannot grow and spread unless they find suitable conditions.

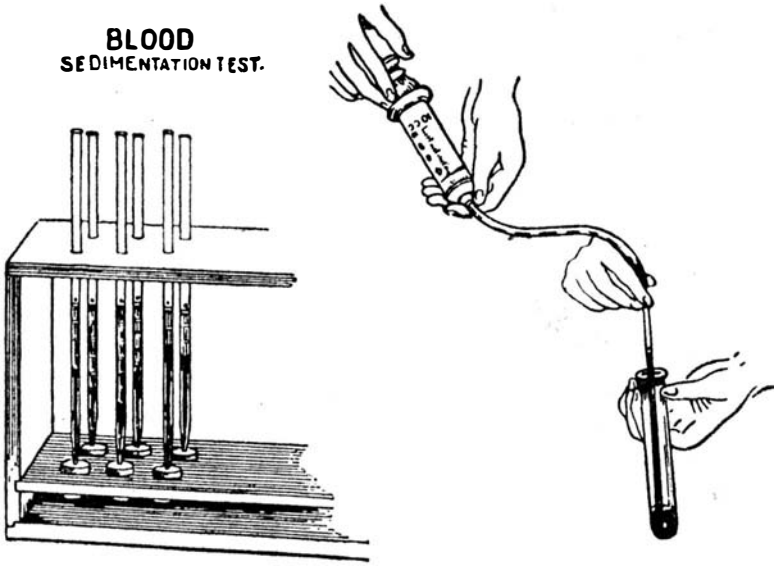
These conditions develop when for some reason the resistance is lowered. We find, for example, youths show symptoms of leprosy as they approach puberty. There is a strain put upon the system at that time, and leprous infection if present, finds its opportunity. If measures are taken to help such a patient to tide over this time by strengthening his resistance as well as by definitely dealing with the infection he will conquer; but if not, the disease will get the upper hand.

This sounds and looks very simple, and it is so in cases in the A1-B1 stage of the disease. In B1 and B2 the problem is different. Here the natural resistance of the body has broken down, and what there is left of this resistance will vary. It is this variation of resistance that determines our treatment. In undertaking treatment it will not be possible to get all the information we require by looking at the patient, though we may get some guidance by measuring his height and weight and enquiring into complications.

By checking the sedimentation rate of the erythrocytes of the blood it is possible to get a good idea of the resistance of our leprous patients. This has been fully worked out in leprosy by Dr. E. Muir, of the School of Tropical Medicine in Calcutta, who gives the technique as follows:—

> 0·3 c.c. of a 5 per cent. solution of sodium citrate in distilled water is drawn into an all-glass 2 c.c. syringe; 1·2 c.c. of blood is drawn from the patient's vein into the same syringe and, a small quantity of air having been drawn into the syringe barrel, the blood and citrate solution are thoroughly mixed by reversing the syringe several times, and the mixture is evacuated into a clean test-tube. If several patients are to be tested, their bloods are taken in a similar manner and placed in labelled test-tubes in a rack. Sedimentation is carried out in 300 m.m. pipettes graduated from above downwards from zero to 100, there being a space of 3 m.m. between each mark. The content of the pipettes when

filled up to zero is approximately 1 c.c., but a variation of 0·05 c.c. is allowed, as such a variation makes no appreciable difference in the results. The pipettes are placed upright in a rack, and their points inserted in small holes bored in rubber corks (as in illustration).



One of these pipettes is taken from the rack and its upper end is attached to a 10 c.c. syringe by means of a rubber tube. The point of the pipette is inserted in one of the test-tubes and suction being applied by pulling on the piston of the syringe, the blood-citrate mixture is drawn up into the pipette to the zero mark. The pipette is then replaced in the rack, the point again being inserted in the rubber cork which prevents the mixture escaping, and this rubber tube is then disconnected from the pipette. In this way the other pipettes are filled up to the zero mark from the other test tubes.

The top-level of the erythrocytes is read off after 1½ hours and again after 2½ hours and the average of these two readings is taken as the Sedimentation Index (hereafter called the S.I.). Thus if the level of the top of the blood-cells falls to 10 (30 m.m.) after 1½ hours and to 20 (60 m.m.) after 2½ hours, the S.I. will be the average of 10 and 20, which is 15. The maximum reading is about 80 (240 m.m.).

The simplicity of the test makes it possible to deal with a large number of bloods at the same time. The pipettes ought to stand quite straight and there should be no movement by wind from an open window, while the sodium citrate should be obtained from a reliable firm to make sure that there will be no variation in its purity.

As success in the treatment of leprosy depends on balancing the dosage of a drug with the resistance of the

patient, a knowledge of the S.I. is of great value. Medicinal reaction in leprosy is equivalent to a dose of an autogenous vaccine and by the S.I. we can gauge to a nicety the amount of vaccine generated by a drug like potass : iodide.

Patients suffering from uncomplicated nerve leprosy register a S.I. of 10 to 20 units which is the same as we find in healthy people. It is in skin leprosy that the test is most useful since by it we can not only gauge the amount of infection in the tissues but also check therapeutic changes. For example, if the mycobacteria are few and difficult to find, the S.I. will be nearly normal, perhaps as low as 22. Again, if they are plentiful such as one finds in a nodular case, the S.I. may reach 70, while between these extremes we find all sorts of variations. Also the case that registers 28 previous to a dose of a reaction-producing drug like potass : iodide may twelve hours after administration register 35 or more, thereby showing the effect of the drug. As clinical symptoms may or may not accompany this reaction, the change in the S.I. may be the only indication that the patient is reacting to potass : iodide at all.

Whatever method of treatment we adopt it is wise to take the S.I. at the commencement. If it is low, say 20 to 28, we can begin with the creosoted oil and when the patient has reached the maximum dose and shows no sign of reaction, potass : iodide can be added to the treatment provided a careful watch is kept on changes in the S.I. When a rise in the index number has been noted the reaction dose has been reached. When this is so the dose should not be increased till the S.I. remains practically unchanged before and after administration.

Should the S.I. be high, *e.g.*, 40 or more, potass : iodide should be given with extreme caution. In such cases, it is preferable to work with resistance-raising drugs like sodium hydnocarpate and hydnocarpus oil. As resistance increases the rate will fall.

In A1, B1, and B2 cases a very good idea of the resistance of patients is obtained by the S.I. In B3 cases, however, other factors come into play and we find that we can give larger doses of potass : iodide when the S.I. is high. Nephritis is the complication we have to guard against in this class of case. In my experience this has been caused not by the potass : iodide alone, but by the combined use of large doses of oil preparations to which the patients have not been accustomed.

The S.I. is very useful also in that it shows when a reaction has completely passed off. The non-reaction level and the

rapidity with which the S.I. rights itself are the real tests of resistance. It is necessary to come back to this level between each administration of potass: iodide. If this is not secured it is easy to see how one reaction is grafted on top of another and the patient is not allowed to recuperate. Experience shows that some patients need longer time between reactions than others just because of the lack of this recuperative power. If we allow reactions to follow on one another too quickly the condition of our patient will get out of hand.

The S.I. likewise shows that in complicated leprosy the disappearance of the clinical signs of reaction (temperature, erythema, etc.) is not always proof that a reaction has ceased. Here the S.I. comes in to help as it will return to the non-reaction level later than these signs.

By the S.I. we are able to detect complications. A persistently high rate, say 40 in a B1-A1, shows that there is some complicating factor we have not dealt with. Malaria, syphilis, sepsis, starvation, all raise the S.I. which will fall as soon as these complications have been eradicated.

From the above observations it should be evident that in the S.I. we have a means of controlling leprosy treatment hitherto unavailable and that there are limitations to treatment that cannot be ignored. It repays one to study the relative resistance of each patient and even if our treatment be slow, on no account should this resistance be impinged upon.

The "Medicine Men" are Interested.

The following interesting passage is quoted from a letter written by a nurse working in Tanganyika:—

> "It is the first time that any of the people in this district have ever had treatment for leprosy so it is very hopeful, and the improvement in their condition is causing great interest to the native 'medicine men.'"