

LEPROTIC CHANGES IN THE LUNG

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INTRODUCTION

The question arises from time to time whether leprotic changes occur in the lung. That they do has been held by Doutrelepont and Walters, Arning, Jeanselme and Sée, Philipppson, Uhlenhuth and Westphal, and Wise in Europe, and by Murata, Kojima, Kobayashi, and Sugai in Japan. Babes asserted that pure lung leprosy is not rare. Furthermore, Babes and Moseuna, and Rikli, held that bacilli can be found in microscopically normal lung tissue, and Riehl also found them in lung parenchyma without any pathological changes. Mitsuda holds that leprotic changes in the lungs of cases of nodular leprosy are hardly to be found except with the microscope. These changes when they occur consist of groups of lepra cells (microscopic lepromata) located in the alveolar septa.

The fact is that the matter has been confused with other conditions in the lung. This particularly refers to tuberculosis, but some authors have reported as lung leprosy conditions which were merely pneumonic.

TUBERCULOSIS

Tuberculosis is recognized to be one of the most frequent complications of leprosy. For example, Igarashi, at the Zensei leprosarium in Tokyo, applied the von Pirquet test to 826 patients. The results are shown in the first section of Table 1. The present writer, employing the Mantoux reaction, has tested 500 patients in the Aisei-en National Leprosarium. The findings are given in the second section of Table 1.

Comparing the findings in these two institutions, it is seen that the percentages of positive cases at Aisei-en are materially lower than at Zensei, 38.0 against 67.3. This is probably due chiefly to the fact that the patients at Zensei, which was established in 1909, have on the average been there longer than those

here at Aisei-en, which was opened in 1930, and the proportion of tuberculous cases increases with the time which patients have spent in hospital. At Zensei, out of 372 cases autopsied between 1925 and 1932, only 125 (33.6 per cent) showed no tuberculous changes in the lung. Kobayashi, at the Oshima leprosarium, which was established at the same time as Zensei, reported 28 nontuberculous autopsies out of 60 cases (46.7 per cent), but in 135 autopsies in our own institution only 47 (34.8 per cent) were without tuberculous changes. It is to be realized that the cases autopsied are on the whole the more advanced, long standing ones, wherefore it is not to be expected that the figures with respect to them would coincide with those of the tuberculin test of the general inmate populations. But it is evident that, with so much pulmonary tuberculosis in leprosy patients as a whole, it is necessary to differentiate the lung changes carefully before concluding that any of those found are due to leprosy itself.

TABLE 1.—Results of tuberculin tests in leprosy, by type of case. A. The von Pirquet test in 826 cases at the Zeinsei leprosarium (Igarashi). B. The Mantoux test in 500 cases at the Aisei-en leprosarium (Tajiri).

Type of case	No. of cases	—		±		1+ to 3+	
		Number	Per cent	Number	Per cent	Number	Per cent
A. ZENSEI							
Maculo-neural	193	54	28.0	10	5.2	129	66.8
Nodular	633	164	25.9	43	6.9	426	67.3
TOTAL	826	218	26.4	53	6.4	555	67.2
B. AISEI-EN							
Maculo-neural	110	58	52.7	4	3.6	48	43.7
Nodular	390	238	61.0	10	2.6	142	36.4
TOTAL	500	296	59.2	14	2.8	190	38.0

In both sections of Table 1 it is clear that there is no definite relation between the incidence of the positive tuberculin reactions and the type of leprosy. The figures for the two types at Zensei are practically identical. Though my own differ somewhat more widely, the difference is hardly significant. Since the maculo-neural group has the higher figure, such difference as was found is quite the reverse of what would be expected if positive reactions were due to activity of the disease. Igarashi compared carefully the results of the von Pirquet test with the autopsy findings in 50 cases and concluded that the reaction has no relation to leprosy itself.

LEPROTIC CHANGES IN THE LUNG

The writer has carefully examined at autopsy the lungs of five cases of nodular leprosy in which the Mantoux reaction was negative before death, and no tuberculous changes were found. In the hilus

pulmonis, bacilli and foamy cells were found in the tunica propria and the mucosa, evidently due to continuity of invasion from the trachea. However, these changes did not extend far into the lung, for they could not be found in the bronchi more than 5 or 6 cm. from the hilus.

In the nerves at the hilus, on the other hand, and in those which run alongside the bronchi, there were quite numerous bacilli, located in the nerve fibers and the connective tissue and even in the neurilemma and the axis-cylinder. This occurred without relation to whether the nerve fiber was medullated or not. The bacilli often formed globi in the nerve, without foamy cells, and a few of them could also be found in ganglion cells (Plate 14, Fig. 1). If one distinguishes between the nerves that are located inward from the bronchial cartilages and those that lie outside them, the former show bacilli more often than the latter.

With regard to the lung tissue itself, it is a fact that while changes of macroscopic size are hardly to be found, leprosy bacilli can be detected in the alveolar septa in foamy and endothelial cells, together with lymphocytes, plasma cells, etc. One or two bacilli, or several—sometimes even small globi—are found in the endothelial cells of the blood vessels, and in histiocytes, coal-dust cells, or foamy cells. Usually the bacilli are for the most part degenerated to the state of Much's granules. The cells which contain them are easily differentiated from others by means of staining the leprosy lipoid with Sudan III. Among the groups of foamy cells which are found, even the largest so-called lepromata of the lung measure only 0.1 mm. or less in diameter (Plate 14, Figs. 2 and 3).

Route of the infection to the lung.—There are several routes by which the leprotic changes may reach the lung.

(1) They may extend from the upper air passages by the trachea and bronchi. In the upper part of the respiratory tract (nose and throat) such changes are frequently quite marked, and in the upper part of the trachea they may still be distinguishable, though in its lower part—and especially in the lower portion of the bifurcation—they are no longer to be seen. However, it is a fact that bacilli spread along the bronchi into the lung for a distance of several centimeters from the hilus.

(2) They come through the nerves. Innervation of the lung is by the sympathetic and para-sympathetic nerves (N. vagus), which are invaded by bacilli which, in some instances, may even form globi. As stated, the nerves which are located inward from the bronchial cartilages contain more bacilli than those which are outside.

(3) They enter by the blood-stream. Since the numerous capillaries of the lung serve as a filter for foreign bodies in the blood, and since there are from time to time many bacilli in the blood of nodular cases of leprosy, it is not surprising that some leprotic changes should be found in the lungs of such cases. However, in organs like the lung and heart, which are constantly in automatic action, the bacilli are subject to degeneration and their development is very limited.

(4) The lymph plays a part. Leprotic changes (bacilli, foamy cells, cell-infiltrations and sometimes small lepromata) may be found in the subpleural lymphatics and in the lymph nodes at the hilus of the lung. These are traceable to entry of the bacilli by the lymphatic passages.

CONCLUSION

In a case of nodular leprosy bacilli enter the lung in more than one way, but chiefly by the blood stream, and there they produce small lepromata in the alveolar septa. These, however, do not grow to a size sufficient to be detected macroscopically, as usually occurs in the liver. As for the macular or neural case, leprotic changes never occur in the lung except in nerves.

ADDENDUM

The author has recently seen an article on lung leprosy published in India. In this is given an account of a patient whose sputum contained many acid-fast bacilli which when inoculated into guinea-pigs caused no infection, by reason of which it was concluded that the presence of the bacilli was due to lung leprosy. As is seen from the foregoing, the present writer is of the opinion that leprosy bacilli are scanty in the lung. It is believed that bacilli found in the sputum come from the upper passages rather than from the lung, since advanced cases of nodular leprosy always have leprotic infiltration of the pharynx and larynx, and these often ulcerate.

DESCRIPTION OF PLATE

PLATE 14

- FIG. 1. Drawing showing leprosy bacilli in a nerve and ganglion cells (Ziehl-Neelsen stain). G: ganglion cell; L: leprosy bacillus.
- FIG. 2. Drawing of a leproma in the alveolar septum (Ziehl-Neelsen stain). F: foamy cell; L: leprosy bacillus.
- FIG. 3. Photomicrograph of a leproma in an alveolar septum, stained by Sudan III to demonstrate the lipid (leproma) cells. F: foamy cell; C: coal-dust cell.
- FIG. 4. Photomicrograph of a subpleural leproma, stained by Sudan III. F: foamy cells; P: pleura.

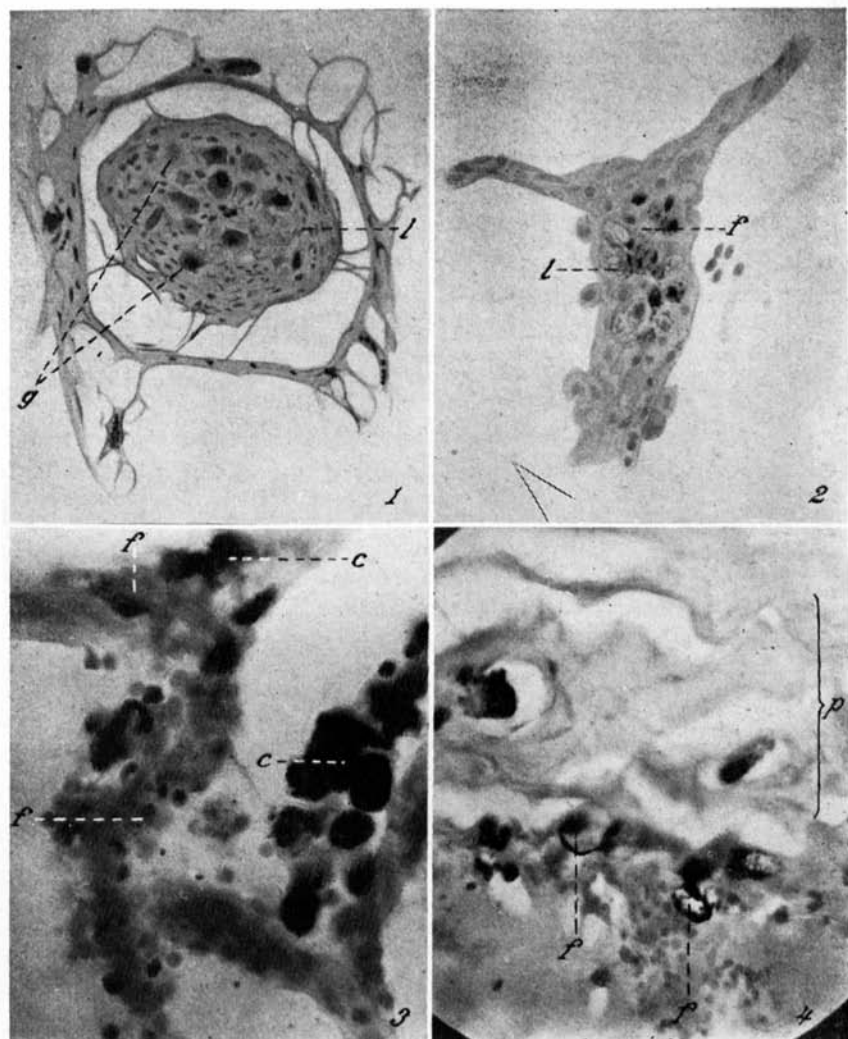


PLATE 14