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Mycobacterial Diseases

Commentary

Etiology and Epidemiology of *Mycobacterium lepromatosis*

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DESCRIPTION

The acid-fast *bacilli Mycobacterium leprae* or the closely related organism *Mycobacterium lepromatosis* cause leprosy, which is a chronic infection. These organisms have a distinct preference for peripheral nerves, skin, and upper respiratory tract mucous membranes. Symptoms range from anaesthetic polymorphic skin lesions to peripheral neuropathy. The clinical diagnosis is confirmed by biopsy. Dapsone and other anti-mycobacterial drugs are commonly used in treatment. After starting therapy, patients quickly become non-contagious.

Epidemiology of leprosy

Globally, the number of cases of leprosy is decreasing. In 2020, approximately 130,000 new cases were reported, with approximately 73% of cases occurring in India, Brazil, and Indonesia.

In 2020, 159 new cases were reported in the United States, with roughly three-quarters of them occurring in six states: California, Florida, Hawaii, Louisiana, New York, and Texas. The majority of leprosy cases in the United States involve people who emigrated from or worked in leprosy-endemic countries. The majority of indigenously acquired cases involved people living in southern states where nine-banded armadillos infected with unique *Mycobacterium leprae* genotypes are found. These same distinct genotypes were discovered in US patients who most likely contracted leprosy in the US, and many of these patients reported direct contact with armadillos. Leprosy can develop at any age. Although age is a risk factor, disease occurs most frequently in people aged 5 to 15 years or older.

Etiology

Mycobacterium leprae's primary natural reservoir is humans. Other than humans, armadillos are the only confirmed source, though other animals and environmental sources may exist. Leprosy is thought to be transmitted from person to person *via* nasal droplets and secretions. Casual contact (e.g., simply touching someone infected) and short-term contacts do not appear to spread the infection. Approximately half of those infected with leprosy contracted it through close, long-term contact with an infected person. Most people do not develop leprosy even after coming into contact with the bacteria; health care workers frequently work for years with people who have leprosy without contracting it. Because of effective immunity, most immunocompetent people infected with *Mycobacterium leprae* do not develop leprosy. People who get leprosy have a poorly defined genetic predisposition. *Mycobacterium leprae* develops slowly (doubling in 2 weeks). Incubation periods typically range from 6 months to 10 years. Hematogenous dissemination can occur once an infection has developed.

Classification of leprosy

Leprosy is classified according to the type and number of skin areas affected:

Paucibacillary: 5 skin lesions with no bacteria found in samples taken from those sites.

Multibacillary: 6 skin lesions, bacteria detected on skin lesions samples, or both.

Leprosy is also classified based on the cellular response and clinical findings:

- Tuberculoid
- Lepromatous
- Borderline

Tuberculoid leprosy is characterised by a strong cell-mediated response that limits disease to a few skin lesions (paucibacillary), and the disease is milder, less common, and less contagious.

Person with lepromatous or borderline leprosy typically have low cell-mediated immunity to *Mycobacterium leprae* and suffer from a more severe systemic infection with widespread bacterial infiltration of the skin, nerves, and other organs (eg: nose, testes and kidneys). They have more multibacillary skin lesions, and the disease is more contagious.

Symptoms and signs of leprosy

Symptoms of leprosy usually do not appear until more than a year after infection (average 5 to 7 years). When symptoms first appear, they progress slowly.

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Leprosy primarily affects the skin and peripheral nerves. Numbness and weakness are caused by nerve involvement in areas controlled by the affected nerves.

Tuberculoid leprosy: One or more hypoesthetic, centrally hypopigmented macules with sharp, raised borders constitute skin lesions. The rash is nonpruritic, as with all forms of leprosy. Because of damage to the underlying peripheral nerves, which may be palpably enlarged, areas affected by this rash are numb.

Lepromatous leprosy: Much of the skin as well as many other parts of the body, including the kidneys, nose, and testes are affected. Patients have symmetrical skin macules, papules, nodules, or plaques. Peripheral neuropathy is more severe than in tuberculoid leprosy, with more areas of numbness and weakness of specific muscle groups. Patients may experience gynecomastia or lose their eyelashes and brows.

Borderline leprosy: The characteristics of both tuberculoid and lepromatous leprosy. Borderline leprosy may become less severe and more like the tuberculoid form without treatment, or it may worsen and become more like the lepromatous form.

Complications of leprosy

The most serious complications are caused by peripheral neuropathy, which causes a loss of touch and a corresponding inability to feel pain and temperature. Patients may inadvertently burn, cut, or injure themselves. Repeated damage may result in digit loss. Muscle weakness can cause deformities (eg; clawing of the 4th and 5th fingers caused by ulnar nerve involvement, foot drop caused by peroneal nerve involvement).