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IDENTIFICATION OF A CONTINGENT PRONE TO TUBERCULOSIS AMONG THE POPULATION

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Annotation

Tuberculosis, one of the oldest diseases known to affect humans, is a major cause of death worldwide. This disease, which is caused by bacteria of the Mycobacterium tuberculosis complex, usually affects the lungs, although other organs are involved in up to one-third of cases. If properly treated, tuberculosis caused by drug-susceptible strains is curable in virtually all cases. If untreated, the disease may be fatal within 5 years in 50–65% of cases. Transmission usually takes place through the airborne spread of droplet nuclei produced by patients with infectious pulmonary tuberculosis.

Keywords: M. tuberculosis, tubercle bacilli, cell-mediated immunity (CMI), tuberculin skin test (TST), BCG vaccination.

M. tuberculosis is most commonly transmitted from a per son with infectious pulmonary tuberculosis to others by droplet nuclei, which are aerosolized by coughing, sneezing, or speaking. The tiny droplets dry rapidly; the smallest (<5–10 μm in diameter) may remain suspended in the air for several hours and may reach the terminal air passages when inhaled. There may be as many as 3000 infectious nuclei per cough. Other routes of transmission of tubercle bacilli (e.g., through the skin or the placenta) are uncommon and of no epidemiologic significance.

Unlike the risk of acquiring infection with M. tuberculosis, the risk of developing disease after being infected depends largely on endogenous factors, such as the individual’s innate immunologic and nonimmunologic defenses and level of function of cell-mediated immunity (CMI). Clinical illness directly after infection is

classified as primary tuberculosis and is common among children up to 4 years of age and among immunocompromised persons. Although primary tuberculosis may be severe and disseminated, it is not generally associated with high-level transmissibility. When infection is acquired later in life, the chance is greater that the mature immune system will contain it at least temporarily. The majority of infected individuals who ultimately develop tuberculosis do so within the first year or two after infection. Dormant bacilli, however, may persist for years before reactivating to produce secondary (or post-primary) tuberculosis, which, because of frequent cavitation, is more often infectious than is primary disease. Overall, it is estimated that up to 10% of infected persons will eventually develop active tuberculosis in their lifetime. The risk is much higher among HIV-infected persons. Reinfection of a previously infected individual, which is common in areas with high rates of tuberculosis transmission, may also favor the development of disease. At the height of the tuberculosis resurgence in the United States in the early 1990s, molecular typing and comparison of strains of M. tuberculosis suggested that up to one-third of cases of active tuberculosis in some inner-city communities were due to recent transmission rather than to reactivation of latent infection. Age is an important determinant of the risk of disease after infection. Among infected persons, the incidence of tuberculosis is highest during late adolescence and early adulthood; the reasons are unclear. The incidence among women peaks at 25–34 years of age. In this age group, rates among women may be higher than those among men, whereas at older ages, the opposite is true. The risk may increase in the elderly, possibly because of waning immunity and comorbidity.

A variety of diseases and conditions favor the development of active tuberculosis. The most potent risk factor for tuberculosis among infected individuals is clearly HIV co-infection, which suppresses cellular immunity. The risk that latent M. tuberculosis infection will proceed to active disease is directly related to the patient's degree of immunosuppression. In a study of HIV-infected, tuberculin skin test (TST)–positive persons, this risk varied from 2.6 to 13.3 cases per 100 person-years and increased as the CD4+T-cell count decreased.

All in all, by far the best way to prevent tuberculosis is to diagnose and isolate infectious cases rapidly and administer appropriate treatment until patients are

rendered non-infectious and the disease is cured. Additional strategies include BCG vaccination and treatment of persons with latent tuberculosis infection who are at high risk of developing active disease.

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