

Third Sputum Smear Test Negative for XDR TB Patient Andrew Speaker

JUNE 05, 2007

DENVER — Andrew Speaker learned Monday evening that his third consecutive sputum smear test had come back negative. This confirmed results from several smear tests previously performed at other institutions.

The sputum smear test helps evaluate if there are large numbers of [tuberculosis](#) organisms in a patient's sputum, and is a helpful tool in determining how sick and how contagious a patient is. A sample of the patient's sputum is smeared on a slide, stained, then examined under a microscope. If a laboratory technician sees the organism, then the patient is considered "smear positive." A smear positive patient is considered infectious.

If the technician sees no TB bacilli, the test is deemed negative. Current Centers for Disease Control/American Thoracic Society Guidelines indicate that patients on therapy with three consecutive negative sputum smears may be regarded as non-infectious in most settings. However, in cases with multidrug or extensively drug-resistant (MDR/XDR) strains, additional caution should be exercised due to unpredictable responses to therapy and the unavailability of medications for preventive therapy in newly infected contacts.

A patient with a negative smear test may well have viable bacteria in his/her sputum, which were not detected through visual examination in the smear test. A recent study from San Francisco indicated that up to 20% of new TB cases could be traced back to contact with smear-negative patients.

Tuberculosis is transmitted in almost all cases by the air-borne route. Patients with active TB of the lungs cough, generating fine particles which float in the air for minutes to hours. Some of these particles contain the bacteria which cause TB, *Mycobacterium tuberculosis*. The more bacteria in the sputum, the greater the risk of transmitting infection. Mr. Speaker does not have a cough.

A patient with fewer than 10,000 mycobacteria per milliliter of sputum generally produces a negative smear test. By contrast, the average new, untreated case of cavitary (holes in the lungs) TB has between 1,000,000 to 10,000,000 mycobacteria per milliliter. Thus, there may be between 100- to 1,000-fold more bacteria in the smear positive case than in the smear negative case. Hence, the likelihood of transmission is substantially greater in such cases.

A sputum *culture* test can detect lower concentrations of mycobacteria in sputum. In this test, sputum is placed on a growth medium and grown in the laboratory. Mr. Speaker has had several positive culture tests in the past. When a patient is "culture negative," there are no detectable TB organisms in his/her sputum and the patient is considered completely non-contagious.

The likelihood of transmission derives primarily from factors related to the TB patient or the environments in which contacts are exposed.

PATIENT FACTORS. Patients with more bacilli in their sputum and coughing that has lasted a long time and is more frequent, are more contagious. Mr. Speaker has never had a positive smear test, and does not have a cough.

ENVIRONMENTAL FACTORS. People are more likely to contract TB from an infected person if they spend long periods of time in close contact in a confined airspace with limited air circulation.

CLARIFICATION. A clarification from my notice early Monday. A patient with three consecutive negative sputum smear tests *who has been on therapy for two weeks* is generally allowed to leave the isolation room for short periods of time with an escort and an N95-rated mask to get a little fresh air and sunshine. Mr. Speaker's case is extraordinary, and no decision has been made about when he will be able to leave his isolation room. Mr. Speaker has left his room for CT scans and X rays, but that was after other patients had left the facility. He was also wearing a mask.

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