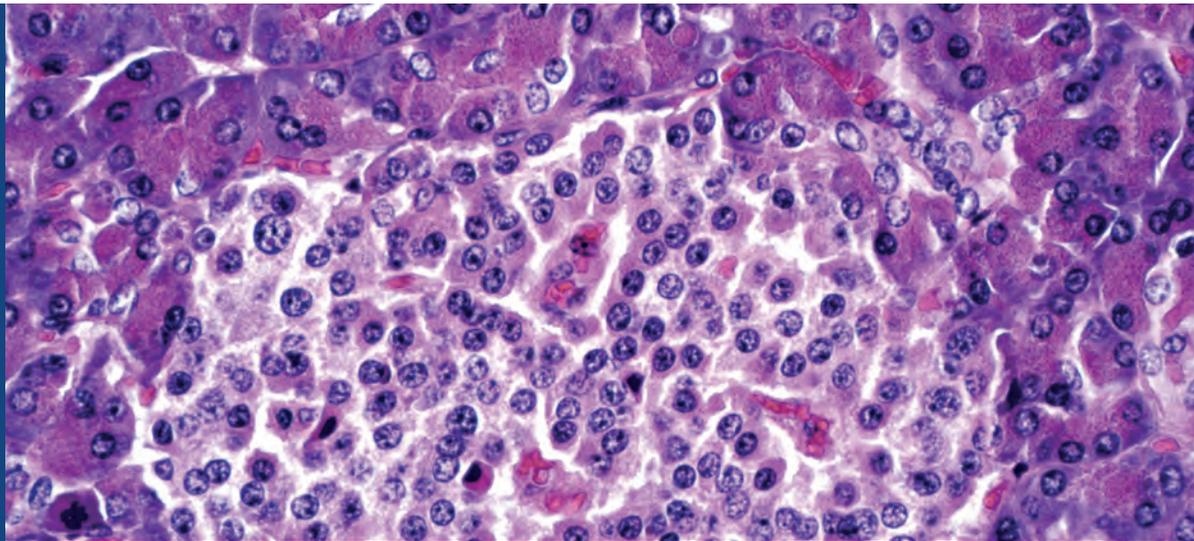


## Summary

Nonhuman primate (NHP) colonies can pick up tuberculosis (TB) from infected human caretakers. It's highly contagious and spread through the air from person-to-person, person-to-animal, and animal-to-animal. Symptoms in humans include cough, fever and weight loss. TB can be fatal in human and not treated.



RESEARCH MODELS AND SERVICES

# Tuberculosis (TB)

## Classification

*Mycobacterium tuberculosis*

## Family

*Bacterium*

## Affected Species

Nonhuman primates (NHPs) and humans

## Frequency

Several outbreaks of tuberculosis (TB) in NHP colonies have been reported. TB infects one-third of the world's population, and is one of the world's deadliest diseases. In 2016, 10.4 million people around the world developed TB disease. Epidemics in primate colonies may be caused by contact with infected human caretakers; therefore, it is very important that all visitors with direct access to NHPs are routinely screened for TB-positive reactivity.

## Transmission

TB is a disease caused by bacteria that are spread through the air from person-to-person, person-to-animal, and animal-to-animal. When a person inhales TB bacteria, the bacteria can settle in the lungs and begin to grow. TB can also infect other parts of the body (e.g., kidney, spine), but is usually not infectious. TB disease can be fatal in NHPs and humans if not treated.

## Clinical Signs

The symptoms of active TB disease (i.e., cough, fever, night sweats, and weight loss), may be mild for many weeks to months. This can lead to delays in identifying infected animals and result in transmission of the bacteria to colony cohorts.

## Diagnosis

The Mantoux tuberculin skin test (TST) is the primary method used to determine if an animal or person is infected with TB. Diagnosis of TB in living NHPs is based on skin testing by intradermal injection of mammalian old tuberculin (MOT) into the eyelid. Administration and interpretation of these tests requires restraining the animal, training, supervision, and practice. PRIMAGAM® and multiplex TB-Plex serological assays can also be used to test for TB infections. PRIMAGAM® is an *in vitro* blood-based assay based on the cell-mediated immune response to *M. bovis* tuberculin purified derivatives (PPD). PPD antigens are presented to NHP lymphocytes in NHP whole blood culture. Production of interferon gamma (IFN- $\gamma$ ) by TB-exposed cells is detected using an antibody-based ELISA.

Both TST and PRIMAGAM® assays lack desirable sensitivity, specificity, and high-throughput. TB-Plex is a multiplex and high-throughput immunoassay based on the Luminex® bead technology. Multiple TB antigen coupled beads can simultaneously detect for the presence of antibodies against TB immunogens based on the immune response pattern in a serum or plasma sample. Additional alternate detection methods include microscopic analysis of sputum smears for the presence of TB bacterium, or newer tests (e.g., Xpert MTB/RIF rapid test) that can assist in determining possible antibiotic resistance of the TB bacterium.

## Interference with Research

Due to the possible rapid transmission of TB in NHP colonies, early diagnosis is critical to limit the spread of the disease. In general, researchers and colony managers opt to euthanize infected NHPs, excluding them from research studies. An exception to this practice is with zoo NHPs that may be treated and maintained long term.

## Prevention and Treatment

Routine screening of caretakers and visitors for TB is essential to avoid outbreaks of TB in NHP colonies. During outbreaks, identification and isolation of suspect TB-infected animals is critical to limit the spread of the disease. TB is a treatable and curable disease. Active, drug-susceptible TB disease is treated with a six-month course of multiple antimicrobial medications.

## References

<https://www.cdc.gov/tb/>

<http://www.who.int/mediacentre/factsheets/fs104/en/>

*Antigen Recognition by Serum Antibodies in Nonhuman Primates Experimentally Infected with Mycobacterium Tuberculosis*. Pier Natale Brusasca, Robert L. Peters, PhD, Sherri L. Motzel, DVM, PhD, Hilton J. Klein, VMD, Maria Laura Gennaro, MD. Comparative Medicine, Copyright 2003 by the American Association for Laboratory Animal Science, Vol 53, No 2, April 2003, p165-172.