

# **TB Basics**

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**Accelerating advocacy on  
TB/HIV**

**15th July, Vienna**

# How long has TB been infecting humans?

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- TB disease has been found in the mummies of ancient Egyptians and Andean Indians
- Global problem for thousands of years
- Consumption, white plague, Captain of the men of death!
- Cause of TB identified 24 March 1882 by Dr. Robert Koch

# A potted history of TB

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- 1882 TB bacilli identified by Koch
- 1907 TST - tuberculin skin test (von Pirquet)
- 1919 BCG – Bacille Calmette & Guerin vaccine
- 1943 Schatz & Waksman discover streptomycin
- 1948 BMRC trial of streptomycin vs bed rest
- 1952 Development of isoniazid
- 1966 Development of rifampicin
- 1978 Short course chemotherapy (DOTS)

# What is TB?

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- TB is a bacteria (single-cell organism)
- More specifically, it is a type of mycobacteria
  - “myco” means waxy in latin and refers to TB’s waxy cell wall
  - There are 70 different types of mycobacteria

# What is TB?

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- The scientific name for the TB microbe is ***Mycobacterium tuberculosis*** or **M.tb**

# What is TB?

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- Beneath a microscope, it has a long rod-like shape or 'bacillus'
- The thick waxy cell wall allows the germ to spread through the air in water droplets

*TB bacilli stained bright red using the Ziehl-Neelson stain (image copyright Dennis Kunkel Microscopy, Inc.)*

# How is TB transmitted?

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- TB is transmitted through the air
- TB bacteria are coughed up from the lungs of an infected person into the air
- Once the TB bacteria are inhaled, they push their way into the lungs

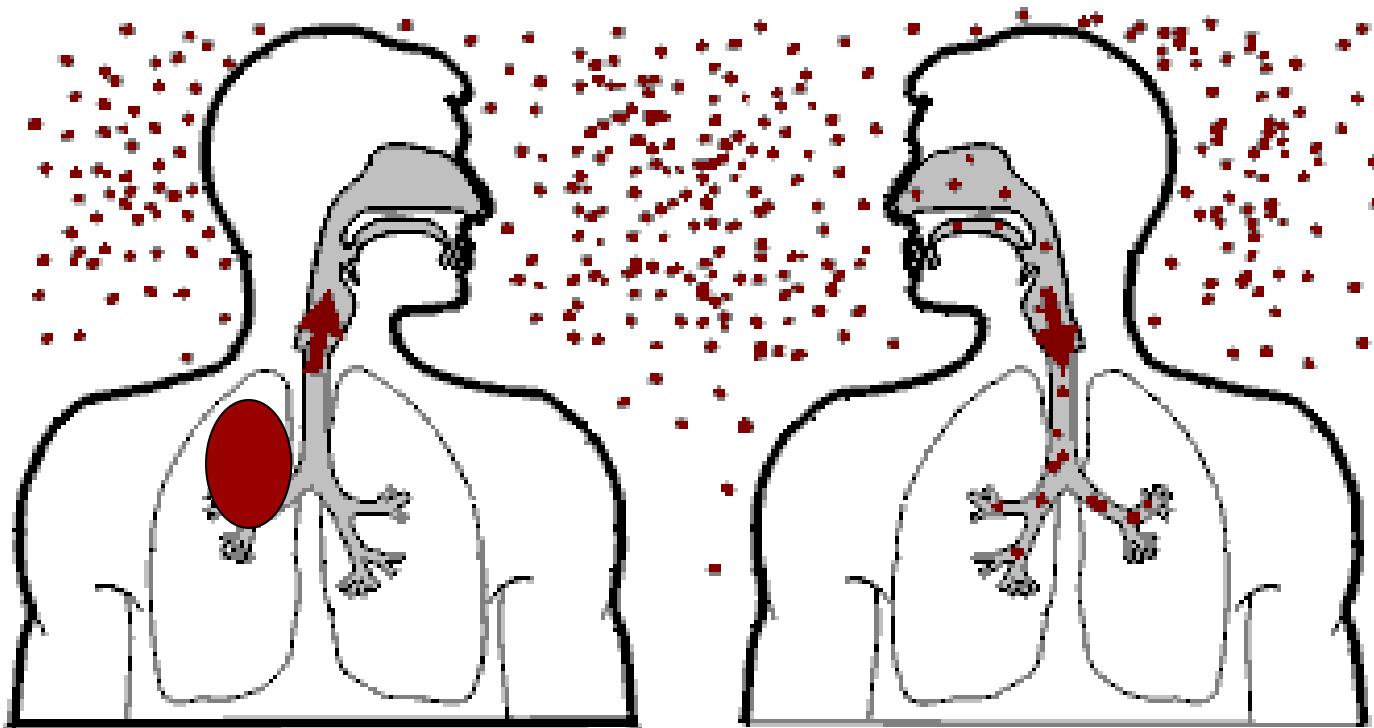


# TB Infection and Disease

## Transmission of TB

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- Droplet nuclei containing mycobacteria inhaled

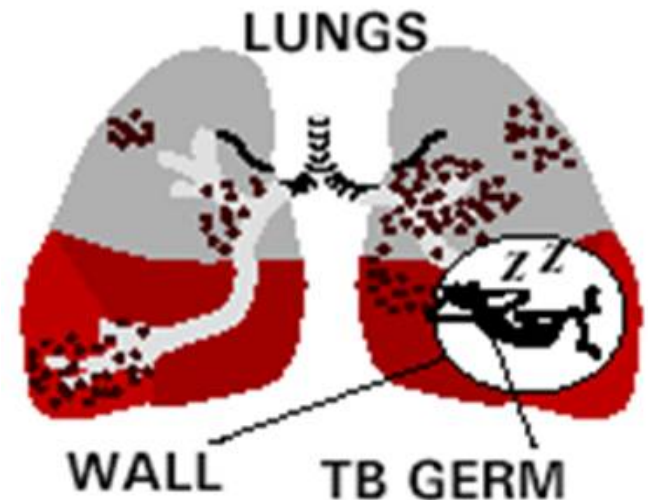




# Not all TB infections lead to TB disease

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- **Latent TB infection** (aka LTBI) occurs when the immune system contains TB and prevents disease.
- **Active TB disease** refers to the time when TB breaks out and causes disease.



# TB Definitions

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- **Latent TB infection (LTBI)**
  - TB bacilli live dormant inside the lung, but do not cause destruction of organs
  - No signs or symptoms of disease
  - Not infectious
- **TB disease**
  - TB bacilli progressively invade and damage a part(s) of the body
  - Signs and symptoms of disease appear
  - Can be infectious

# What is the risk of LTBI progressing to active disease?

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In HIV-negative persons, the body's immune system usually keeps TB infection under control.

Only 5-10% of LTBI cases progress to active TB during their **lifetime**.

People living with HIV with LTBI have a 5-10% risk of developing TB disease **each year**.

# TB Disease

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- The TB germ can "wake up" at any time (usually within 1-2 years) and make a person sick
- More likely to get TB disease when a persons body is weakened from:

HIV

Diabetes

Poor Nutrition

Cancer medications

Steroids

Drug use

Smoking

Old Age

# What happens during active TB disease?

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- Active TB disease may occur in the lungs (**pulmonary TB**) and/or in other parts of the body (**extrapulmonary TB**).
- **Pulmonary TB** is the most common form of TB disease and is the infectious form
- The damage caused by pulmonary TB sends pus containing TB bacilli into the lungs, which a person with TB may cough up in spit or sputum
- **Extrapulmonary TB** is normally rare but occurs in up to 40% of TB cases among people living with HIV



# Definitions: Patients with TB

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- **Pulmonary TB (PTB)**
  - Disease involves the lung tissue
  - Smear-positive: visible TB bacilli in sputum, very infectious
  - Smear-negative: no visible TB bacilli in sputum, less infectious
- **Extra-pulmonary TB (EPTB)**
  - Disease involving an organ other than the lung, includes pleural TB
  - Not infectious unless also have pulmonary TB

# What are symptoms of TB disease?

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- Due to general infection and immune response
  - Fever
  - Night sweats
  - Weight loss
- Due to direct damage
  - Pulmonary TB
    - Cough
    - Sputum – white, grey, green, red
  - Extrapulmonary
    - Just about anything.....depending on site
- People living with HIV develop symptoms late and are less likely to present with coughing.

# TB Basics Summary

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- Caused by *Mycobacterium tuberculosis*
- Transmitted through the air
- Infection can cause latent TB or progress to active TB
- Active TB can be pulmonary or extra-pulmonary
- Pulmonary TB can be smear positive or smear negative
- People living with HIV are more likely to progress to active TB and often develop symptoms late