

TOPIC: MICROBIAL INFECTIONS – RESPIRATORY SYSTEM

Tuberculosis

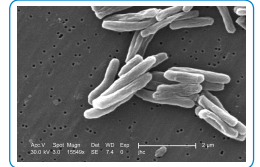


Tuberculosis ()

Bacterial

GRAM ____ bacteria

SHAPE: Non-endospore forming rod.

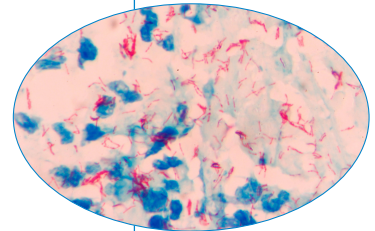


(Ray Bulter, MS/ CDC)

CAUSE

Mycobacterium tuberculosis (*M. tuberculosis*).

- ♦ ____ growing.
- ♦ Mycolic acid – ____ outer layer of cell wall.
- ♦ Cord factor: glycolipid containing ____ acid in cell wall.
 - Keeps daughter cells attached.
 - ____ to mammalian cells.
 - Inhibits ____.



SPREAD

Direct transmission → respiratory droplets.

- May infect tissues other than the lungs as well.
- Less common for ____ infection.

SYMPTOMS

Change with disease progression.

- ♦ Latent: ____ symptoms. Immune system isolates bacteria inside ____.
- ♦ Progression of active infection:
 - Difficulty ____.
 - Chest pain.
 - ____ in sputum.

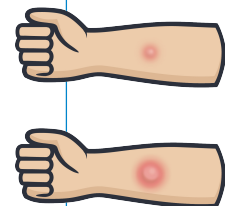


DIAGNOSIS

Mantoux Tuberculin Skin Test: injects purified protein derivative (PPD).

- ♦ Negative: ____ reaction → no immune response.
- ♦ Positive: ____ at injection site → ____ response.
 - Past/latent infection; immunized; active Infection.

Chest ____: looks for Ghon complexes.



TREATMENT

Intensive ____ treatment.

- ♦ **Multidrug-resistant strains:** resist first-line drugs (Isoniazid & Rifampin).
- ♦ **Extensively drug-resistant strains:** virtually ____.

IMMUNITY

____ vaccine: usually only given in areas w/ ____ TB infection rates.

EXAMPLE

Gina must take a Mantoux test (PPD test) before she can start volunteering at a hospital. After receiving the injection, she came back 48 hours later with an induration that measured 12 mm, which is considered a positive result.

- a) Does this mean that she is contagious for tuberculosis? _____
- b) What could be the possible causes of her positive result?

- c) Based on the results of her Mantoux test, the doctor decides to take a chest X-ray. What may the doctor be looking for on the X-ray to indicate TB infection? _____

PRACTICE

Which of the following is required for *M. tuberculosis* to be virulent?

- a) Ghon complexes.
- b) Presence of neuraminidase enzyme.
- c) Infection by a phage.
- d) Presence of cord factor.

PRACTICE

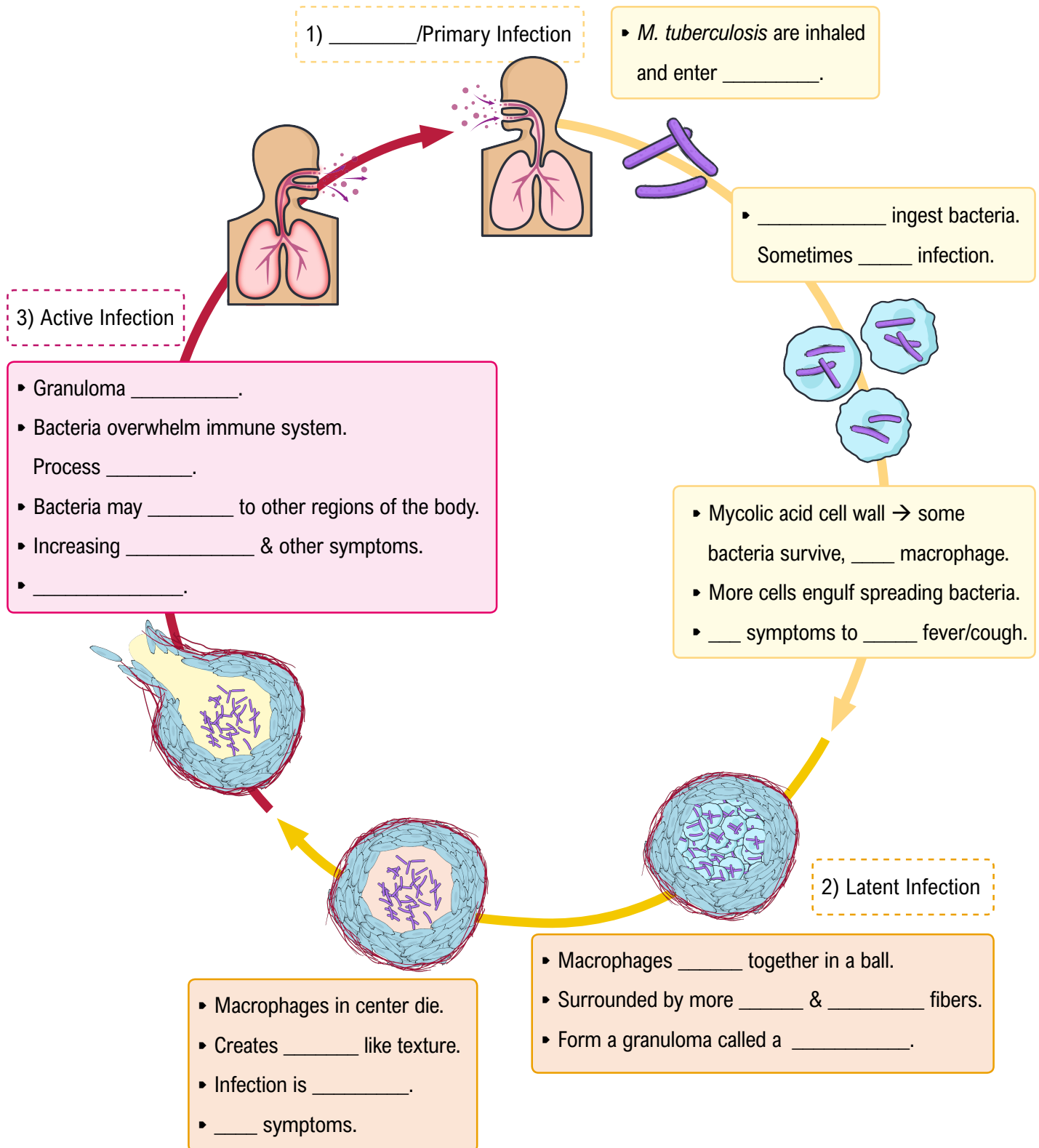
Tuberculosis can be especially difficult to treat for which of the following reasons?

- I. It is slow-growing.
- II. Multi-drug-resistant strains are becoming more common.
- III. The presence of mycolic acid and cord factor in the cell wall.
- a) I & II. b) I & III. c) II & III. d) I, II, & III.

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Tuberculosis Pathogenesis

♦ *M. tuberculosis* infections have ____ stages:



EXAMPLE

For each statement below, write “**T**” if the statement is **true** and “**F**” if the statement is **false**.

Correct each false statement on the line below.

1. An active tuberculosis infection is characterized by *M. tuberculosis* bacteria actively reproducing within a tubercle: _____

2. In the majority of people, most tubercles will never rupture and the disease will never move past the latent stage: _____

3. Tuberculosis may infect other regions of the body, but it is generally considered a less serious infection when it does: _____

4. *M. tuberculosis* are able to reproduce inside of macrophages: _____

PRACTICE

The exact progression of tuberculosis can vary based on the individual. For individuals that progress to severe disease, which of the following orders the stages of a tuberculosis infection correctly as most commonly experienced?

- a) Active infection → latent infection → dormant infection.
- b) Initial infection → dormant infection → latent infection.
- c) Dormant infection → active infection → latent infection.
- d) Initial infection → latent infection → active infection.

PRACTICE

Which of the following statements about tuberculosis tubercles is correct?

- a) They contain cord factor as part of the mycolic acid component of their cell wall.
- b) They have been infected with a phage that codes for an exotoxin.
- c) They infect the alveoli rather than being sequestered to the upper respiratory tract.
- d) They are part of a pseudomembrane, which allows them to become established in the airway more easily.