

# Session 1: Introduction to TB and TB/HIV

\*\*\*

Eleonora Jimenez-Levi - TAG

Gracia Violetta Ross Quiroga -VIH REDBOL

ACCELERATING ADVOCACY ON TB/HIV

JULY 6, 2011

PANAMA CITY, PANAMA

# Topics to be covered

- Why should we care about TB?
  - ▣ Global perspective
  - ▣ The TB/HIV overlap
- What is TB?
- How is TB transmitted?
- How does our immune system react to TB
- Latent TB Infection vs. Active TB Disease
- TB treatment
- Drug-resistant TB
- TB/HIV – the deadly duo

# Global estimates of TB

- It is estimated that one-third or 2 billion of the world's population is infected with TB.
- In 2009, there were an estimated 9.4 million new cases of TB.
  - ▣ 1.1 million new cases were among people living with HIV.
  - ▣ 3.6 million new cases were among women.
- In 2009, there were an estimated 1.7 million TB deaths or 4,500 deaths per day.
  - ▣ 380,000 deaths among people with HIV.

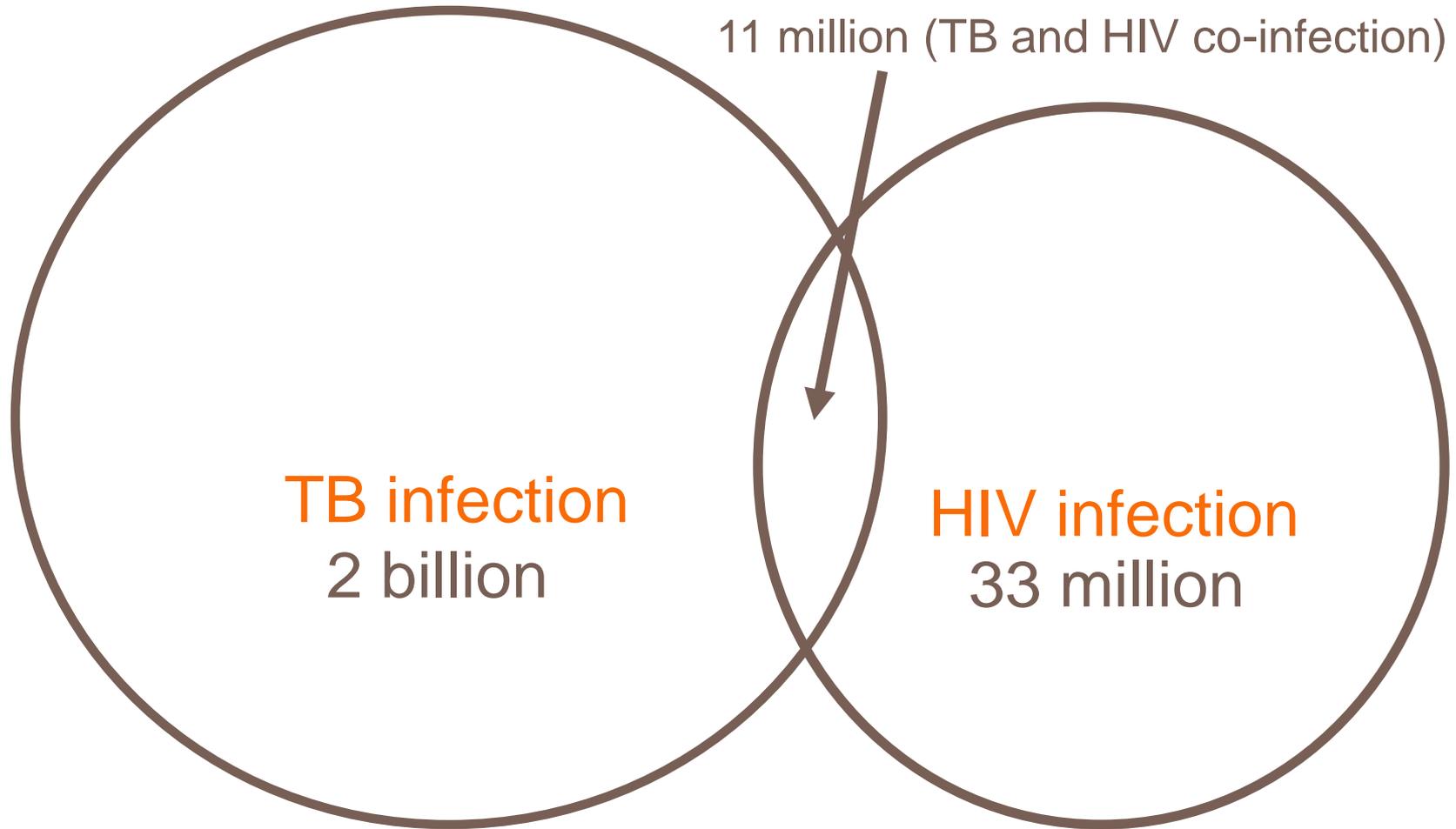


# Global estimates of HIV

- Number of people with HIV globally:
  - ▣ 33.4 million (31.1 - 35.8 million)
  
- New HIV Infections in 2009:
  - ▣ 2.6 million (2.4 - 3.0 million)
  
- Deaths due to HIV in 2009:
  - ▣ 1.8 million (1.7 - 2.4 million)



# The Overlap between TB and HIV



**TB is the leading cause of death among people with HIV**

# TB/HIV high-burden countries

- Globally there are 63 TB/HIV high-burden countries.
- In the Americas region, 13 countries are considered high TB/HIV burden countries:

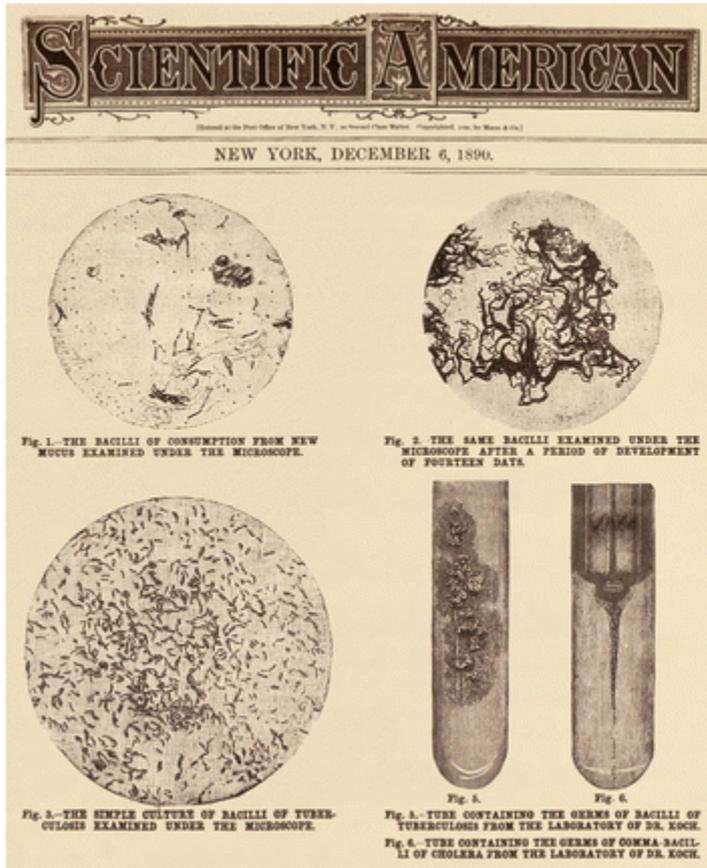
- Bahamas
- Barbados
- Belize
- Brazil
- Dominican Republic
- Guatemala
- Guyana
- Haiti
- Honduras
- Jamaica
- Suriname
- Panama
- Trinidad & Tobago



# What is TB?

# A brief history of TB

- TB is a bacteria.
- It has been found in the mummies of ancient Egyptians and Andean Indians demonstrating that it has been in humans for thousands of years.
- The TB bacterium was first identified by Dr. Robert Koch in 1882.



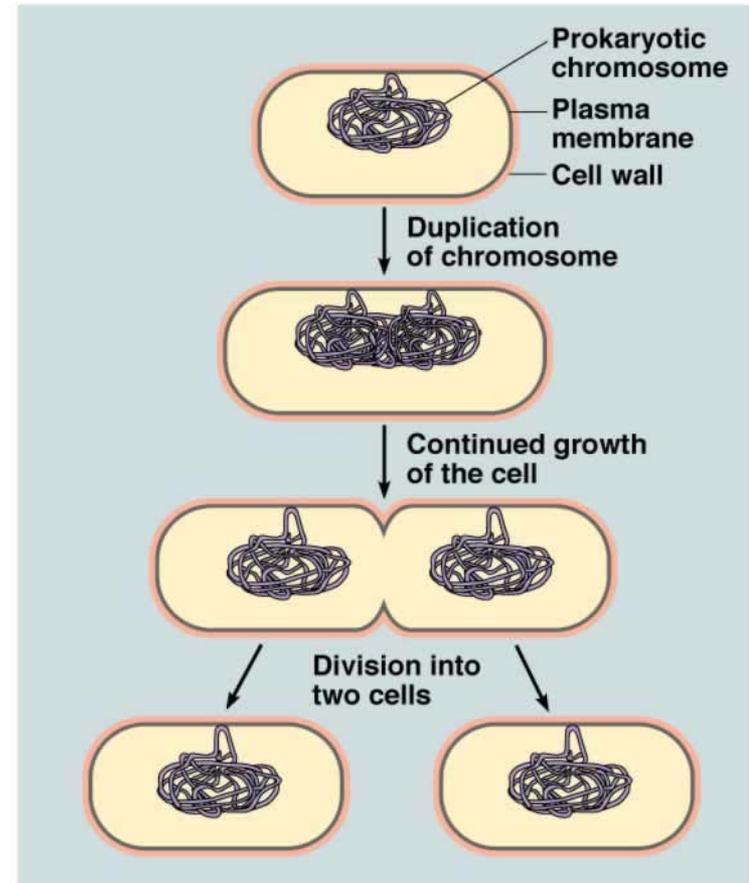
# What is TB?

- The scientific name for TB is **mycobacterium tuberculosis (MTB)**.
- Beneath a microscope, it has a long rodlike shape and thick, waxy-looking coat.
- The thick waxy cell wall allows the germ to spread through the air and survive outside of the body.



# TB reproduction

- TB is a slow bacteria.
- Unlike most bacteria, which divide within minutes or hours, TB splits in two once every 16 to 20 hours.
- This asexual process is known as binary fission
- The slow reproduction process can result in longer times in diagnosing TB.





---

How is TB transmitted?

# How is TB transmitted?



- TB is transmitted through the air.
- When an infected person coughs or sneezes into the air, bacilli in the saliva are released into the air.
- TB loves oxygen. So it often makes its way to the oxygen-filled regions of the lungs through the nose or mouth.
- Once the bacilli are inhaled, they can push their way into the lungs and settle in tiny air sacs known as alveoli.



# Factors that may affect TB transmission

- Not all persons exposed to TB become infected.
- Factors related to the person being exposed to TB:
  - ▣ Closeness and frequency of contact with the infected person
  - ▣ Age of contact: Young children and older adults may be at increased risk for transmission
- Environmental factors:
  - ▣ Ventilation can reduce the number of bacilli in the air
  - ▣ Size of room or space
  - ▣ Duration of exposure
  - ▣ Sunlight or Ultraviolet (UV) light can kill TB bacteria



# How is TB NOT transmitted

---

- via blood
- sperm
- vaginal fluids
- food or liquids
- eating utensils
- dust
- dirt
- vehicle fumes



# Immune response

In HIV-negative persons, the body's immune system usually keeps TB infection under control. In fact, most people with latent TB infection never develop TB disease, and only 1 in 10 cases progress to active TB.

On the other hand, HIV-positive persons with latent TB infection (LTBI) have an annual risk of about 10 percent of developing active TB disease. In other words, they have a 1 in 10 chance every year, of progressing to active disease.



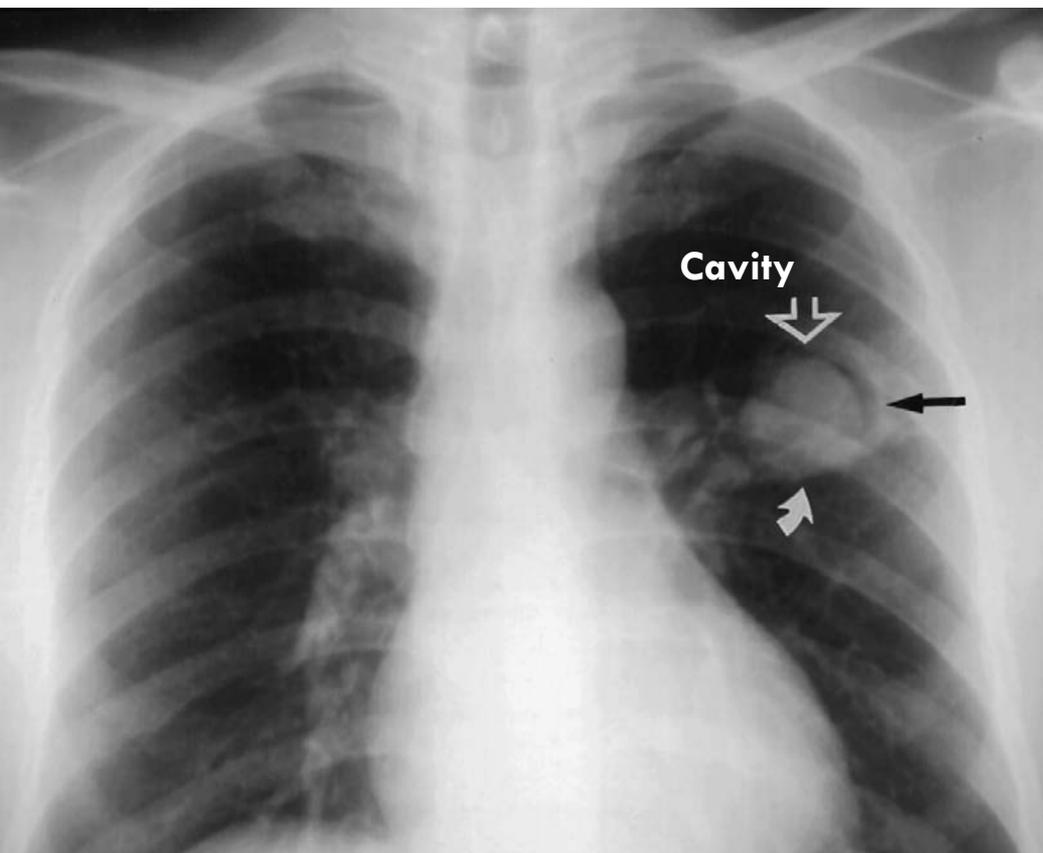
# Latent TB Infection vs. Active TB Disease



# Latent TB infection versus Active TB disease?

- Many people incorrectly use the terms TB infection and TB disease interchangeably.
- Latent TB *infection* (LTBI) refers to the period of time when the immune system has been successful in containing the TB and the person is not sick or contagious.
- Active TB *disease* refers to when TB breaks through the immune system's control and causes symptoms of disease; making the person contagious.

# How do LTBI progress to Active Disease?



- Latent TB infection can progress to active disease when the body becomes weak from disease, malnutrition, immune suppression (e.g. HIV infection), or even old age.
- When the immune system is compromised, the tubercles may begin to multiply, damaging the lung tissue creating cavities.

# Active TB disease

- Active TB disease may manifest 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.
- Extrapulmonary TB is rare in adults with healthy immune systems but occurs in up to 40% of TB cases among people with HIV (rarely involves a single organ) and children.
- Extrapulmonary TB may attack one specific organ or multiple areas of the body (bones & joints, lymph nodes). Because of this, many medical providers mis-diagnose it because of the many possible symptoms of this disease.

# Clinical symptoms of TB

- Persistent cough for more than two weeks
- Fever
- Night sweats
- Chest pain
- Pain with breathing and coughing
- Coughing up blood
- Loss of appetite and weight loss
- If extrapulmonary TB, symptoms can vary based on site of infection

# Challenges

- Diagnosing TB based on these symptoms is difficult because many infections have similar symptoms (ex: pneumonia). This can lead to long delays, making the patient more sick and at increased risk of dying.
- Diagnosing extrapulmonary cases is even more challenging as symptoms vary depending on location of disease.

# Principles of TB treatment

- TB is curable!
- The aim of treatment is to provide the safest and most effective therapy in the shortest period of time.
- Three basic principles of TB treatment:
  1. Regimens must contain multiple drugs to which the TB bacteria responds to.
  2. The drugs must be taken regularly; discontinuation or interruption can lead to the bacteria developing resistance to the drugs.
  3. Drug therapy must continue long enough to kill all remaining TB organisms (as little as 6 months and as long as 2 years).



# How do we treat TB?

---

- Treatment of latent TB infection (LTBI)
- Treatment of drug-sensitive active TB disease
- Treatment of drug-resistant active TB disease



# Treating latent TB infection

- 6 months of daily isoniazid (INH) preventive therapy (IPT) is recommended by the WHO for the treatment of LTBI in children and adults.
- There is a lot of resistance on the part of National TB Program Managers and health care providers to implement IPT as a policy to prevent TB disease, despite strong evidence to support its uptake. Some of the reasons are:
  1. Difficult to exclude cases of active TB disease
  2. Development of isoniazid resistance if someone is mistakenly given IPT when they have active disease
  3. Side effects and toxicity
  4. Concerns about adherence



# Treating drug-susceptible TB

- There are two phases of treatment for drug-susceptible TB (DS-TB):
  1. The **initial phase** of treatment is designed to kill actively growing and semi-dormant TB bacilli. Patients receive two months of isoniazid/rifampin/pyrazinamide/ethambutol.
  2. The **continuation phase** eliminates most (or all) residual TB bacilli and reduces failures and relapses. Patients receive four months of isoniazid and rifampin.



# Treating Extrapulmonary TB

---

- Patients with extrapulmonary TB receive two months of streptomycin followed by four months of isoniazid and rifampin.



# What is drug-resistant TB?

# Drug-resistant TB

- Microbes like tuberculosis and HIV can develop resistance to drugs when:
  - ▣ people do not complete a full course of treatment, or
  - ▣ are inconsistent about taking their medications, and/or
  - ▣ have not been prescribed the most effective treatment regimen.
- When treatment is not completed, TB bacteria that remains in the body mutates, becomes resistant to the drug, and begins to multiply. Patient will then feel sick again.



# Treating drug-resistant TB

---

- Multidrug-resistant TB (MDR-TB) is a form of TB that is resistant to isoniazid and rifampicin, two of the most powerful first-line drugs.
- Suspected drug-resistant cases should be confirmed by drug susceptibility testing (DST) whenever possible. Treatment of drug-resistant TB takes, on average, two years. Cure rates for MDR-TB reach 70% in the best run health systems.

# Treating drug-resistant TB

- Extensively drug-resistant TB (XDR-TB) is resistant to isoniazid and rifampicin as well as any of the flouroquinolones (e.g. oxofloxacin, levofloxacin) and at least one of the second-line injectables (amikacin, capreomycin or kanamycin).
- Treatment of MDR and XDR TB is very costly and difficult to secure, lengthy (up to 24 months), and has toxic side-effects. Cure rates range from 30-70% only. Better drugs are urgently needed!



# TB/HIV – the deadly duo



# How do TB and HIV impact one another?

People who are coinfectd with TB and HIV are at increased risk for:

- ▣ Progressing from latent TB infection to active TB disease
- ▣ Progressive primary TB disease (skipping over latent TB infection)
- ▣ TB recurrence (a second episode of TB)
- ▣ Smear-negative TB (low bacillary load)
- ▣ Extrapulmonary TB (TB outside of lungs)

If diagnosis is delayed or missed and TB treatment is not offered, people living with HIV are at increased risk of dying from TB.



# How do TB and HIV impact one another?

## □ Vaccines

- ✓ BCG vaccine is not recommended for HIV-positive children

## □ Diagnostics

- ✓ The most commonly used TB diagnostic tools lack the sensitivity to detect drug-susceptible, drug-resistant and extrapulmonary TB

## □ Treatment

- ✓ Difficult to dose anti-TB treatment and ARVs at the same time

# Session Summary

- Almost 2 billion people have latent TB infection and are able to lead healthy lives.
- 9.4 million people develop active TB disease annually and require treatment.
- People with HIV are more likely to develop active TB disease.
- TB is the leading cause of death among people with HIV.
- TB is transmitted through the air.
- TB is curable!
- TB treatment involves many drugs for a long period of time (6 months – 2 years).

# Session Summary

- Treatment for MDR or XDR TB is very challenging. There is a need for better, cheaper drugs to treat drug-resistant TB.
- The emergence of MDR and XDR TB threatens people with and without HIV. Because of limited diagnostic capabilities and supplies of second- and third-line TB drugs in many high-burden settings, drug-resistant TB remains undiagnosed and improperly treated, resulting in increased morbidity and mortality.