UNIVERSITAS TRISAKTI
FAKULTAS KEDOKTERAN

Patofisiologi Tuberkulosis Terkini: Perspektif Fisiologi

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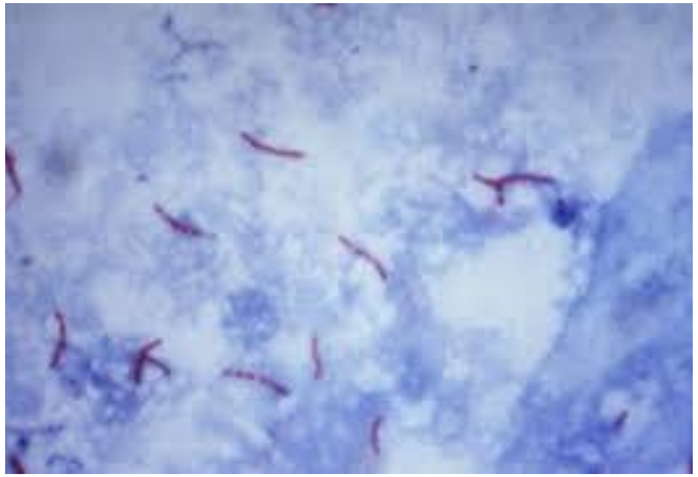
CONTENTS

01 Introduction & Brief History of Tuberculosis

- In 1882, Robert Koch identified the tubercle bacillus, also known as *Mycobacterium tuberculosis* (*M. tb*), as the etiologic agent of tuberculosis (TB). Since his discovery, the TB epidemic seems to be unabated, spreading in every corner of the globe.
- TB is **highly contagious airborne disease** and one of the top causes of death worldwide.
- **M. tb can stay dormant** for years and persist in the body without any indication of illness, in which many people become **asymptomatic carriers**.

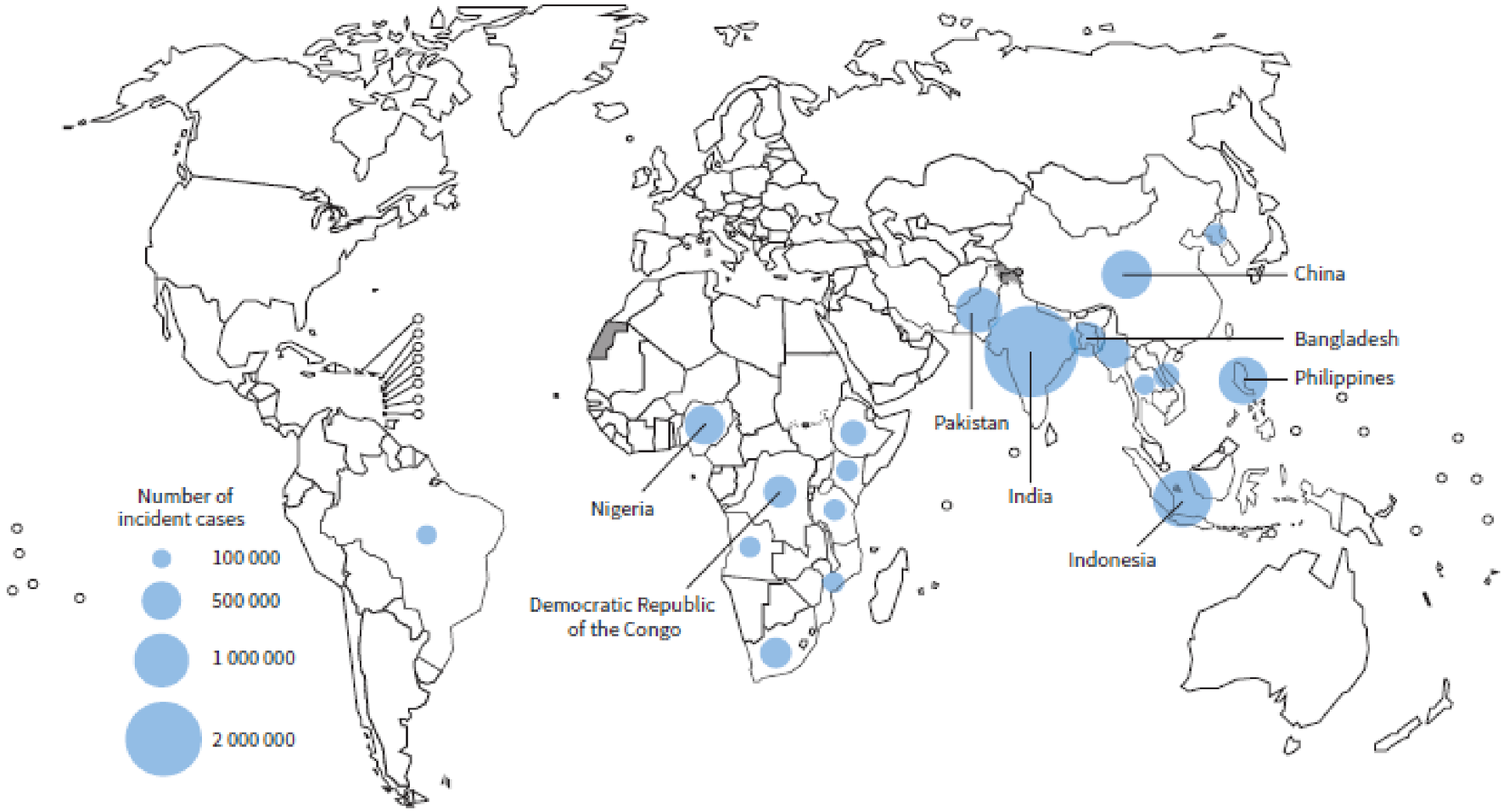


Alsayed SSR, Gunosewoyo H. Tuberculosis: Pathogenesis, Current Treatment Regimens and New Drug Targets. Int J Mol Sci. 2023;24(6).

02 Epidemiology

World Health Organization

Estimated number of incident TB cases in 2023, for countries with at least 100 000 incident cases[a]



[a] The labels show the eight countries that accounted for about two thirds of the global number of people estimated to have developed TB in 2023.

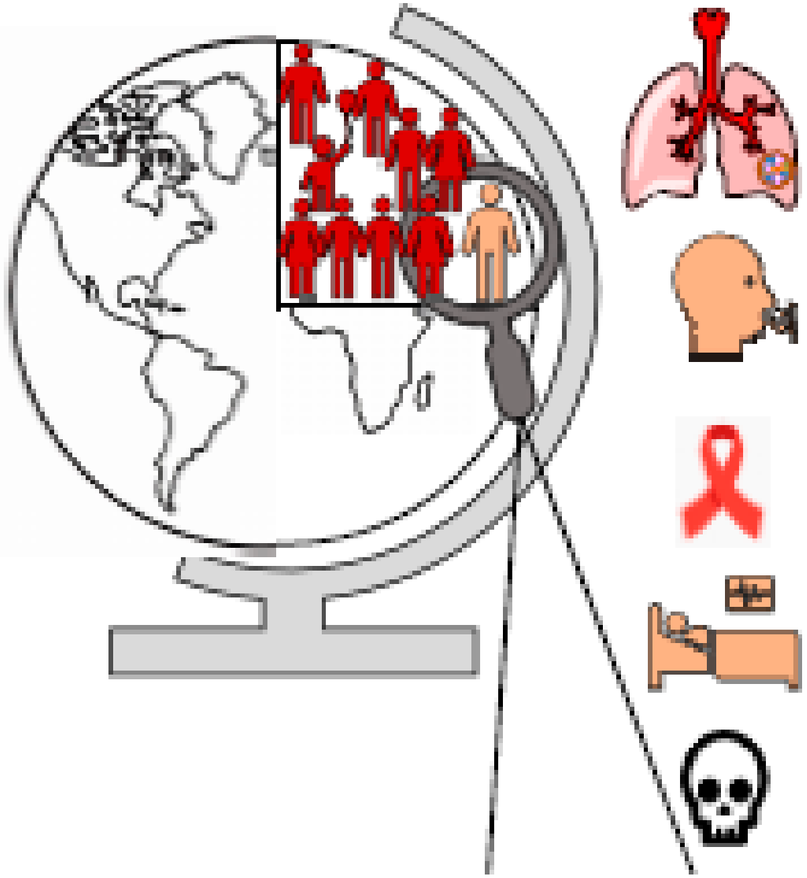
World Health Organization. Global tuberculosis report. 2024.

02

Epidemiology

World Health Organization

Global TB statistics



2 billion people harbour a dormant form of *M. tb* infection worldwide

5 – 10% of latently infected individuals are predisposed to developing active TB in their lifespan

HIV co-infection increases the risk of TB reactivation by 18 times

around 10 million people fall ill with TB every year at least since 2000

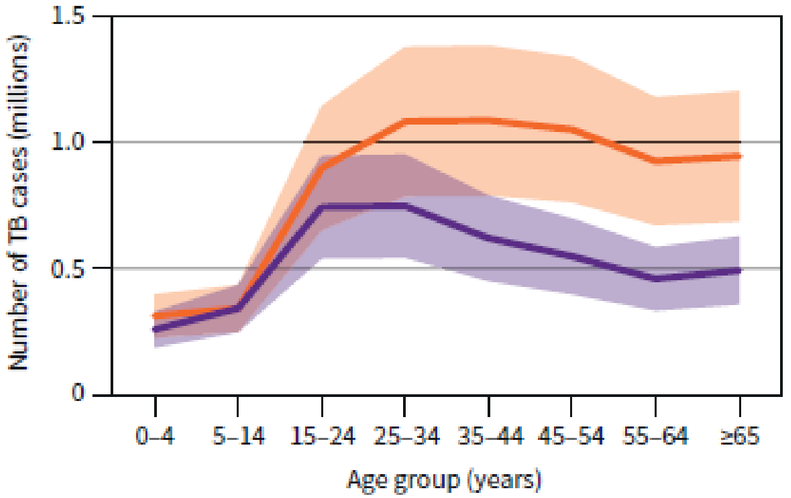
> 1 million people succumb to death from TB every year at least since 2000

World Health Organization. Global tuberculosis report. 2024.

02 Epidemiology

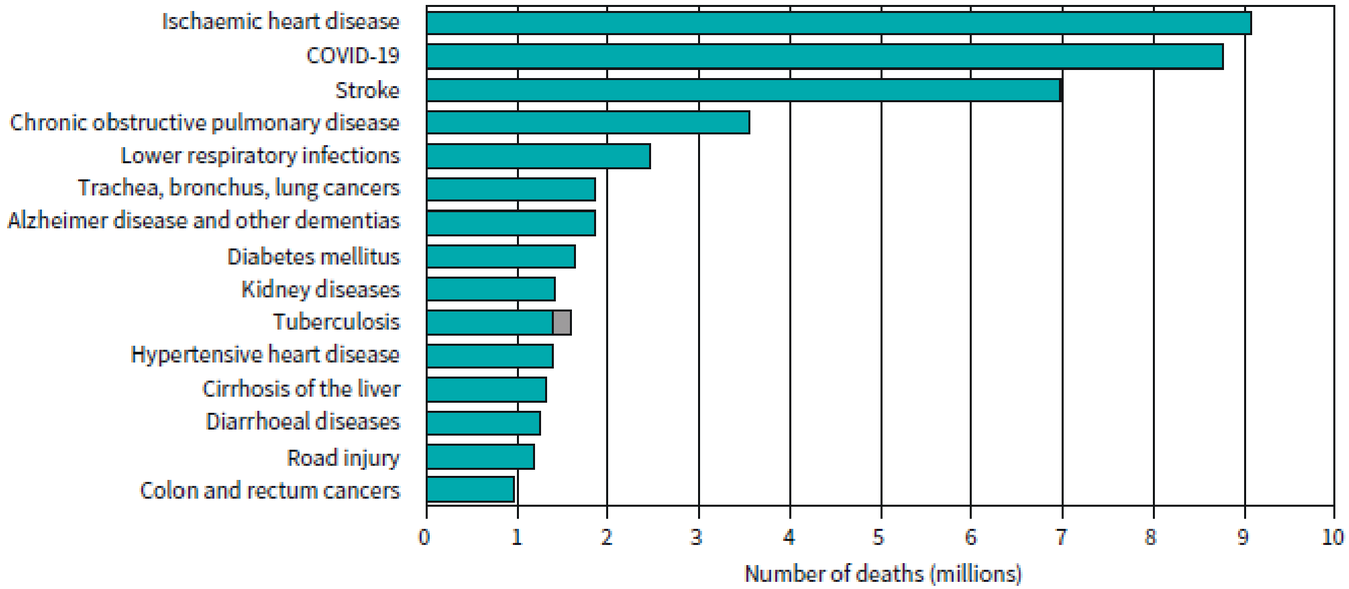
World Health Organization

Global estimates of TB incidence disaggregated by age group and sex (female in purple; male in orange), 2023



Top 15 causes of death worldwide in 2021[a,b]

Deaths from TB among people with HIV are shown in grey.



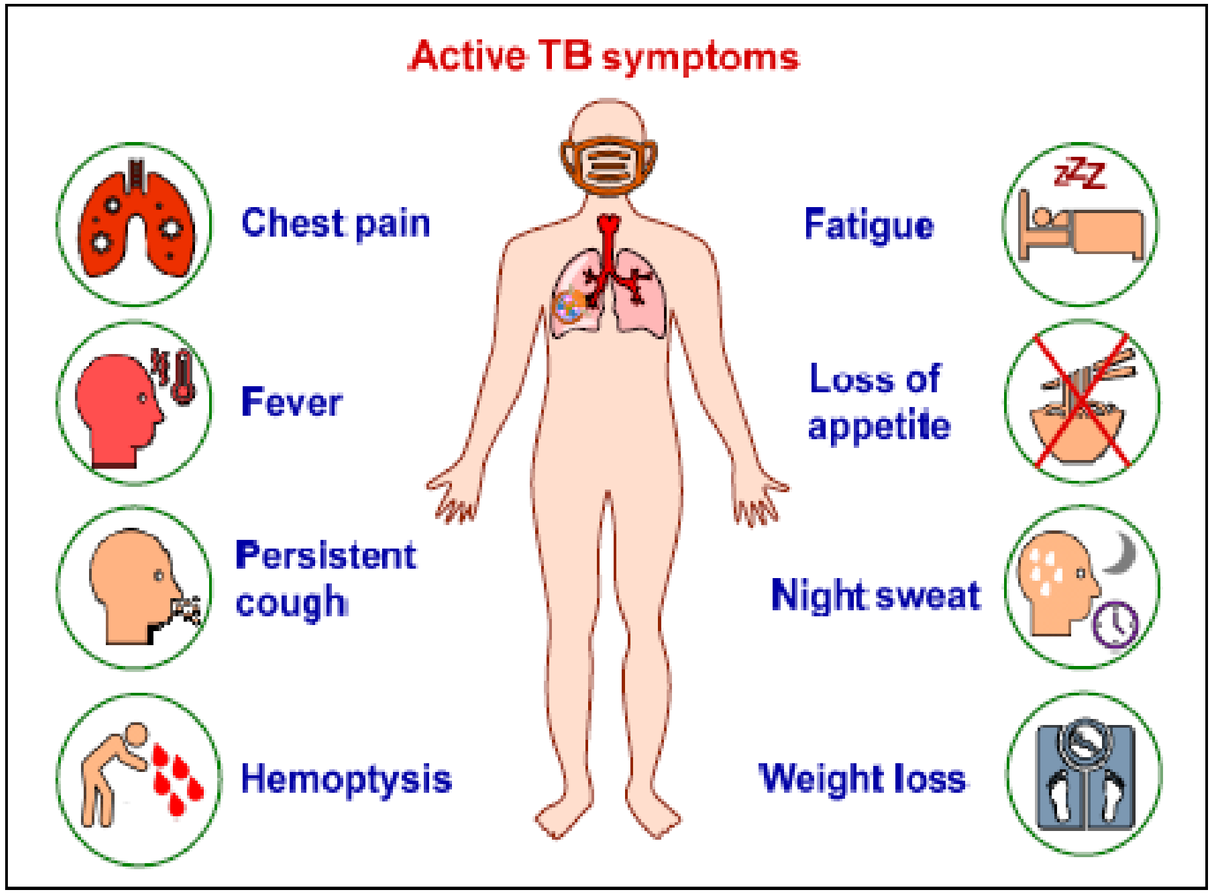
[a] This is the latest year for which estimates for all causes are currently available. See WHO estimates, available at https://www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/ghe-leading-causes-of-death.

[b] Deaths from TB among people with HIV are officially classified as deaths caused by HIV/AIDS in the International Classification of Diseases.

World Health Organization. Global tuberculosis report. 2024.

04 Clinical Manifestation

Centers for Disease Control and Prevention
National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention



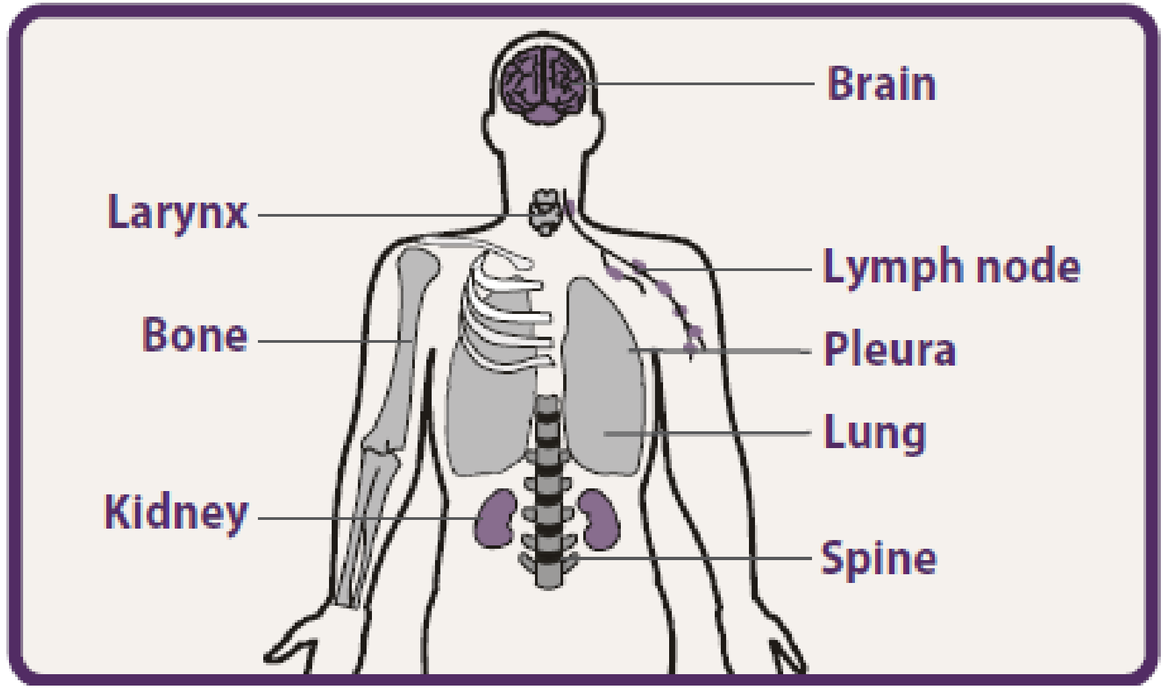
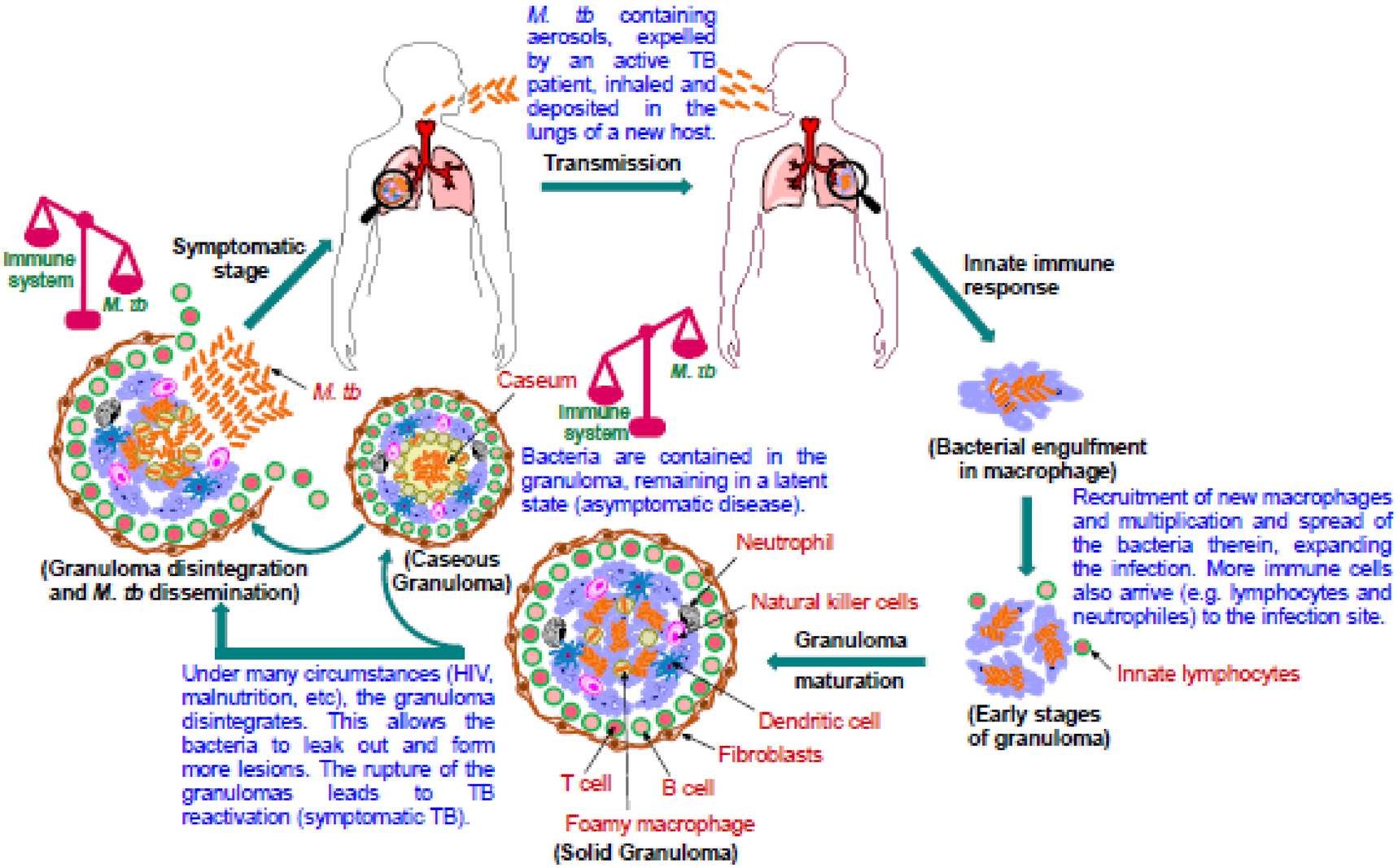


Figure 1.6 Common sites of TB disease.

Illustration showing common sites of TB disease. These sites include the brain, larynx, bone, kidneys, lymph nodes, pleura, lungs, and spine.

Alsayed SSR, Gunosewoyo H. Tuberculosis: Pathogenesis, Current Treatment Regimens and New Drug Targets. Int J Mol Sci. 2023;24(6).
CDC. Module 1-Transmission and Pathogenesis of Tuberculosis. Self-Study Modul Tuberc. 2019;1–32.

03 Pathophysiology



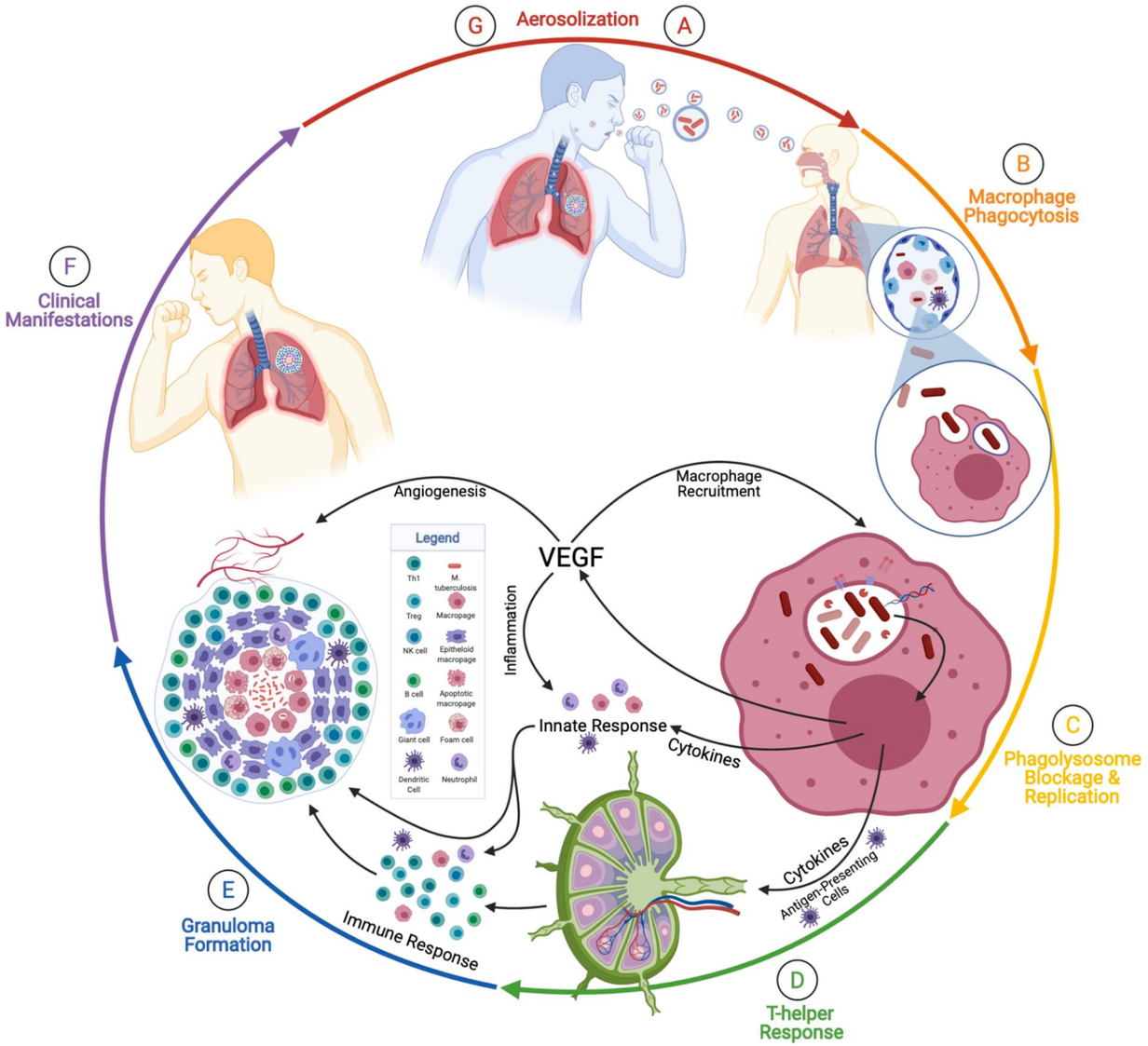
Alsayed SSR, Gunosewoyo H. Tuberculosis: Pathogenesis, Current Treatment Regimens and New Drug Targets. Int J Mol Sci. 2023;24(6).

05 Current update & potential of TB Therapy

M.tb induces the macrophage to express and secrete VEGF into the extracelluar space.

- ❖ Angiogenesis >>
- ❖ Monocytes accumulation
- ❖ Macrophage recruitment>>
- ❖ Inflammation >>>

Anti-VEGF therapy seems promising as an adjuvant therapy for tuberculosis



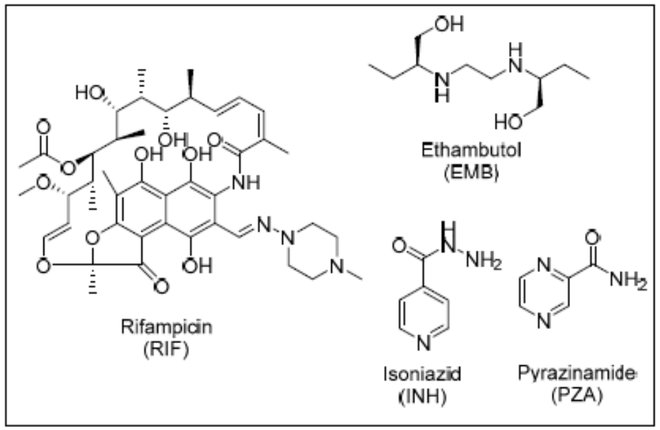


Figure 3. The four front-line anti-TB drugs.

Maison DP. Tuberculosis pathophysiology and anti-VEGF intervention. J Clin Tuberc Other Mycobact Dis [Internet]. 2022;28(May):100318. Available from: https://doi.org/10.1016/j.jctube.2022.100318

Conclusion

- There are many steps in the pathophysiology of tuberculosis.
- Unique character of M. tb are related to the structure of the cell wall and biomolecular mechanism when inside the macrophage
- Anti-VEGF treatments offer an avenue that has only yet seen brief exploration in humans with a drug exclusive to the A isoform of VEGF (bevacizumab).

Reference

1. Alsayed SSR, Gunosewoyo H. Tuberculosis: Pathogenesis, Current Treatment Regimens and New Drug Targets. Int J Mol Sci. 2023;24(6).

2. World Health Organization. 2024 Global tuberculosis report. 2024.

3. Maison DP. Tuberculosis pathophysiology and anti-VEGF intervention. J Clin Tuberc Other Mycobact Dis [Internet]. 2022;28(May):100318. Available from: https://doi.org/10.1016/j.jctube.2022.100318

4. CDC. Module 1-Transmission and Pathogenesis of Tuberculosis. Self-Study Modul Tuberc. 2019;1–32.


Thank You
Gracias
Спасибо
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Danke
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