



University of Washington's Advanced TB Research Training Course

Host-pathogen interactions in the lungs

September 12, 2022

Rhea Coler

Seattle Childrens Research Institute
Center for Global Infectious Disease Research
University of Washington School of Medicine,
Departments of Pediatrics and Global Health



Seattle Children's®
HOSPITAL • RESEARCH • FOUNDATION

UNIVERSITY *of* WASHINGTON

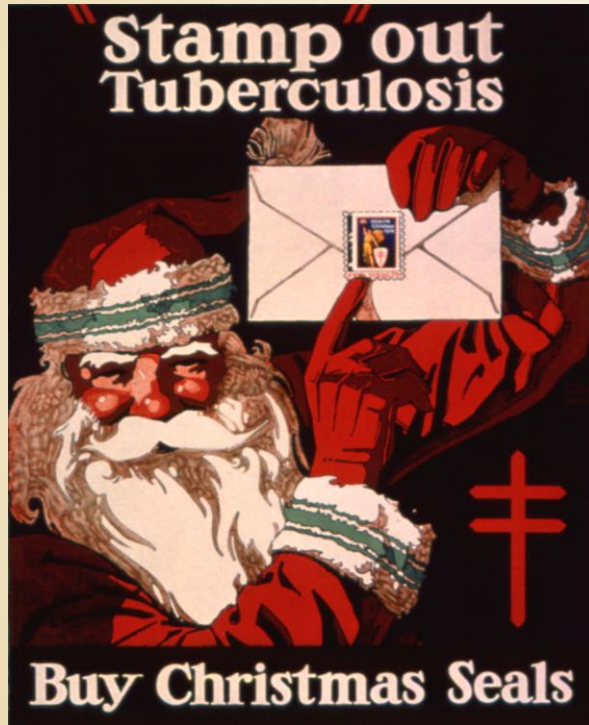
TRTC | TUBERCULOSIS RESEARCH
& TRAINING CENTER
UNIVERSITY *of* WASHINGTON

Respiratory (Lung) Diseases

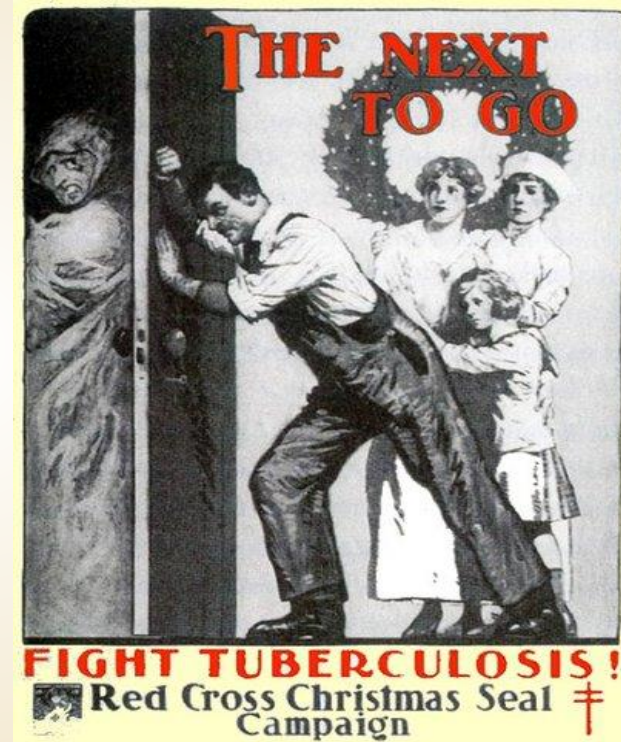
- Spread person to person in air (cough)
- Example - common cold
- Severe disease - infection of the lungs (pneumonia)
- Prevalence - 1% of the population / year
- Highest rates in the very young and the old
- Infectious agent known in about 1/2 to 2/3 of cases
- Other agents yet to be discovered



Tuberculosis

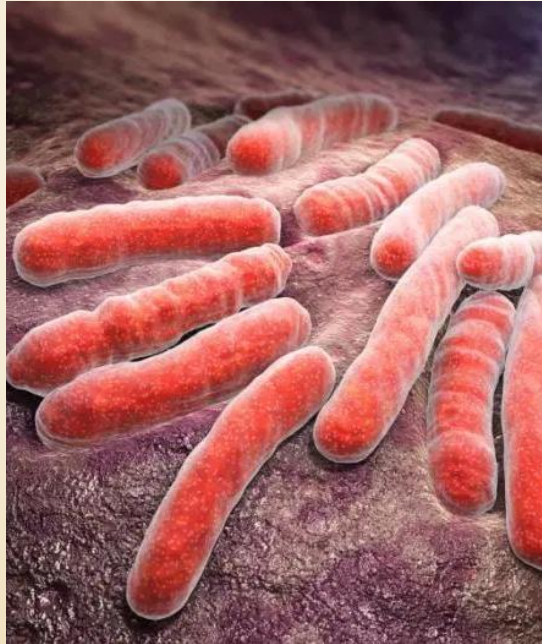


Discovered in 1882 by Robert Koch



Named tuberculosis in 1839 by J.L. Schonlein

Tuberculosis



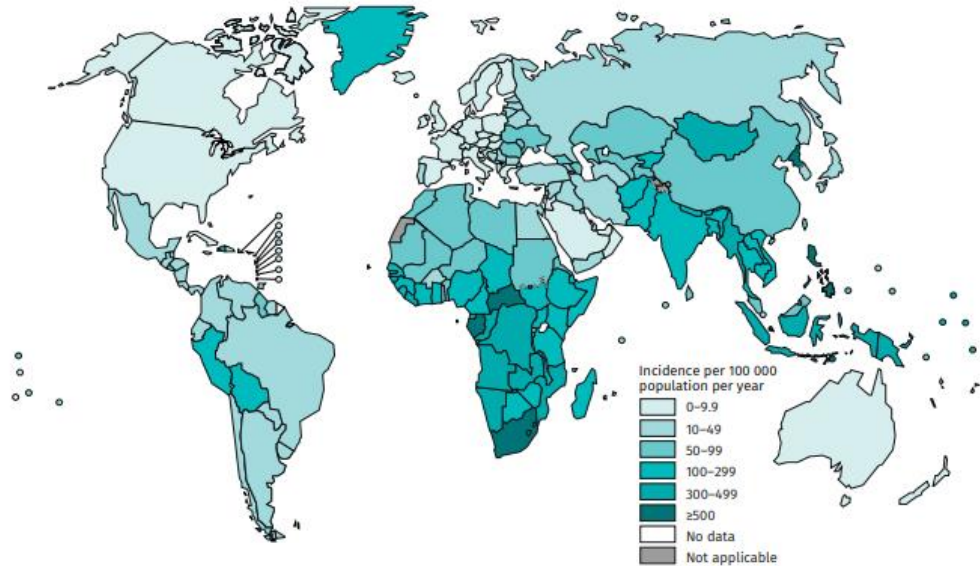
Pathogen:

- *Mycobacterium tuberculosis*
- Acid fast Bacteria
- Very slow growing

- 3000 BC Egypt,
- Europe, Americas, Africa, Asia

- 1800s - almost all Europeans infected

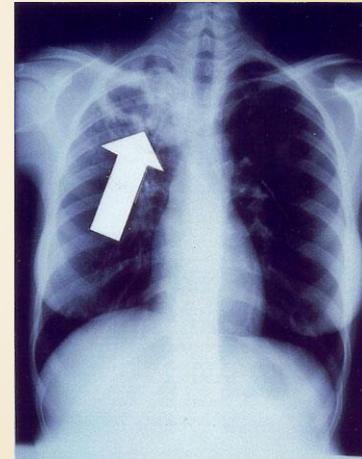
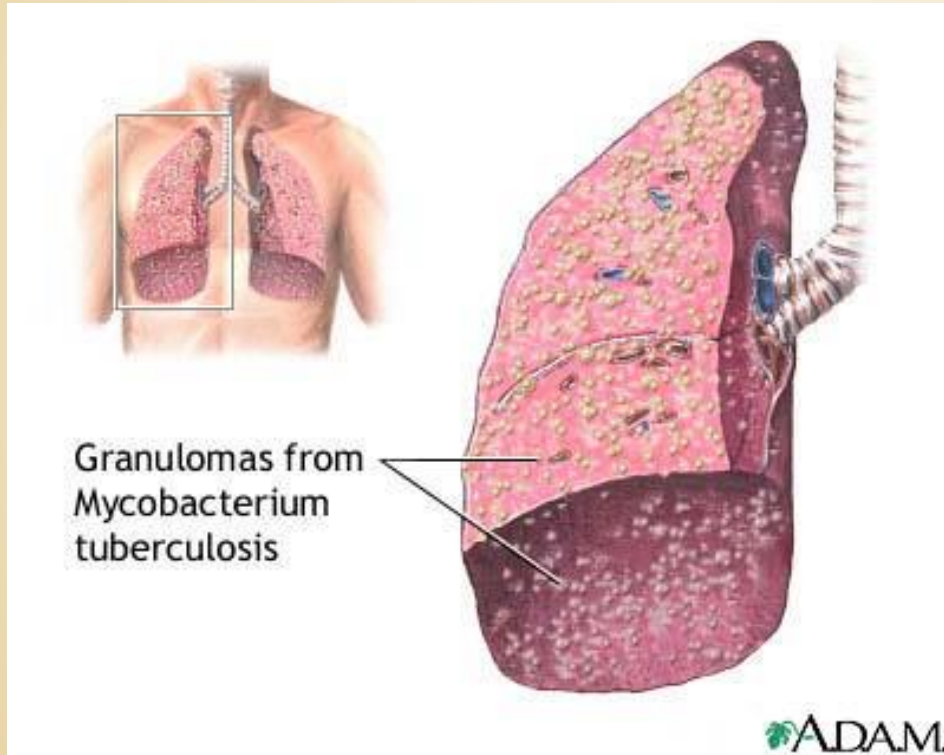
Estimated TB incidence rates, 2020



WHO 2020/2021 Global TB Report

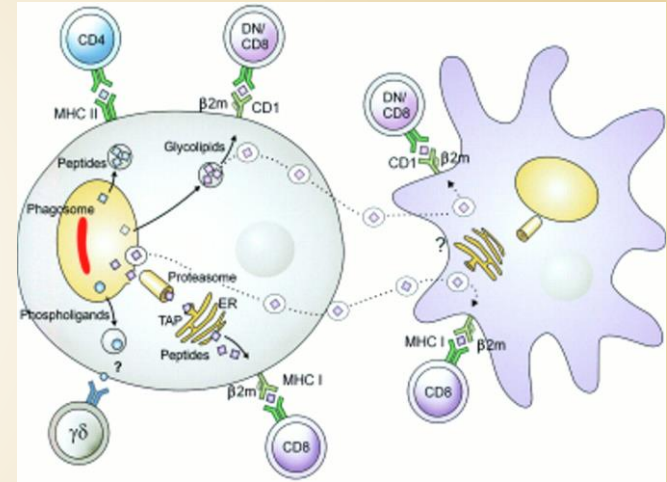
- Chronic respiratory disease caused by *Mycobacterium tuberculosis* (Mtb)
- WHO reported more than 10 million cases of TB in 2020
- Estimated that a 1/4 of the world is infected with TB
- TB estimated deaths increased in 2019 to 2020

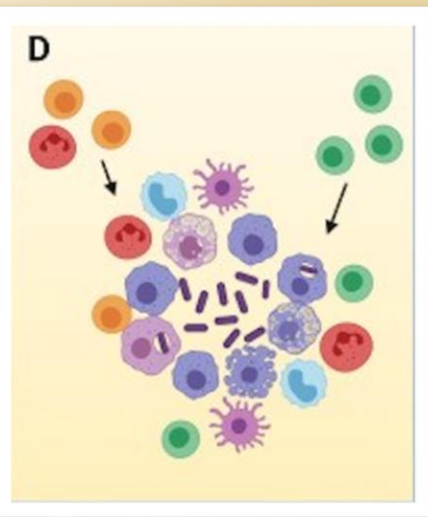
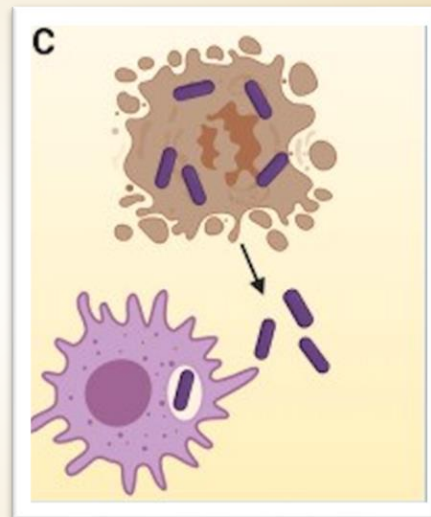
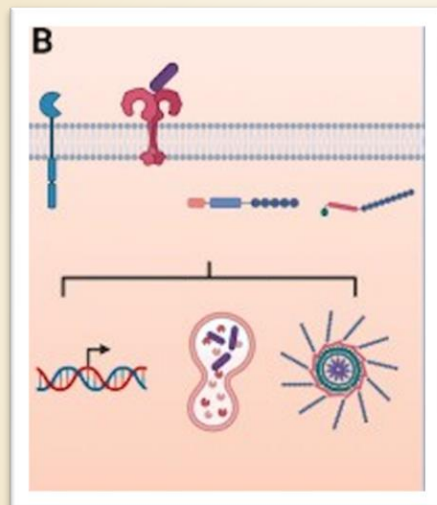
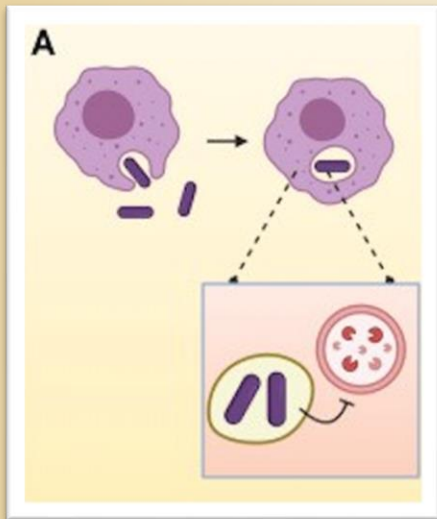
Granulomas in lung



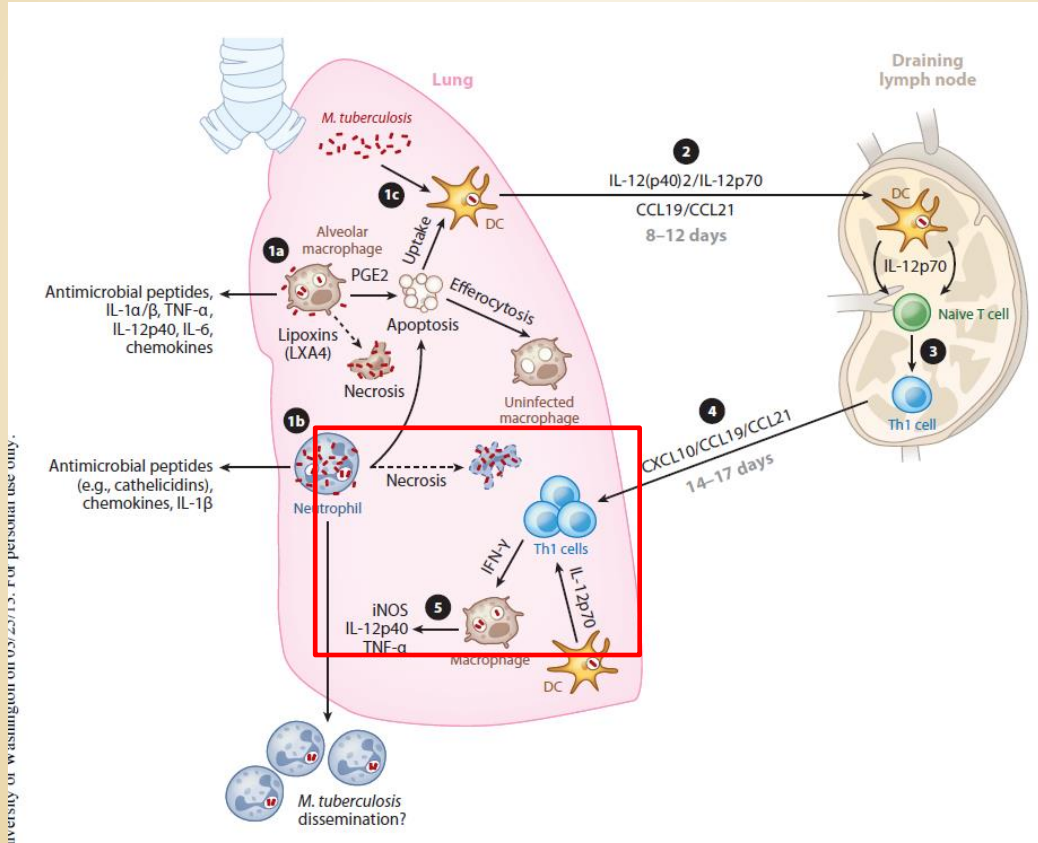
Immunity to Tuberculosis

- Role of CD4+ T cells, Th17 CD4+ T cells
 - Production of cytokines (IFN- γ , TNF- α , IL-17 etc)
 - Activation of macrophages
 - Lyses of infected cells?
 - *Recruitment and initiation of the Th1 response in the lungs, containment of disease during acute infection*
- Role of CD8+ T cells
 - Lyses of infected cells? (granulysin? Perforin?)
 - Production of cytokines (IFN- γ and TNF- α)
 - *Maintenance of latent/chronic infection?*
- Role of antibodies uncertain
- Conconventional cell types like mucosa-associated invariant T cells (MAIT cells), CD1 and γ/δ T cells have also been implicated in protective immunity



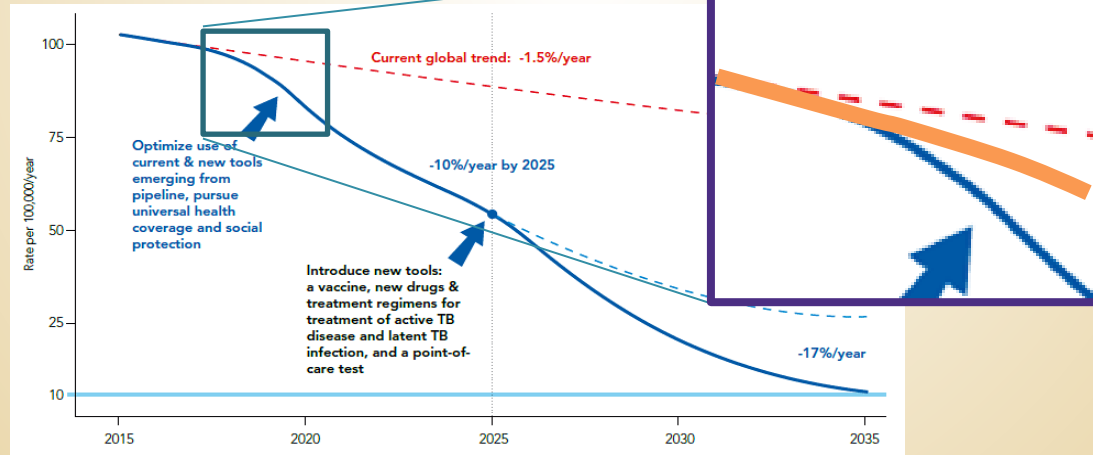
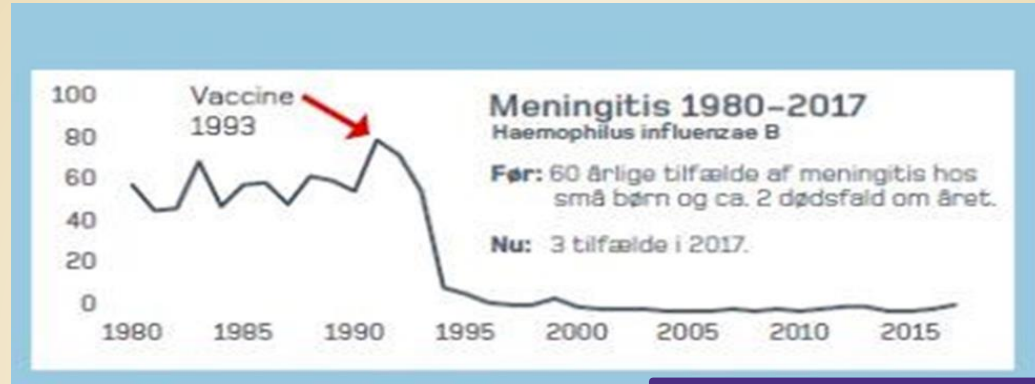


T_H1 responses are essential for control of *Mycobacterium tuberculosis*



University of Washington on 03/23/13. For personal use only.

Imagine a world with an effective TB vaccine





Rhea Coler
Professor/
Senior. Investigator

Translational and systems analysis of vaccine efficacy



Susan Baldwin
Senior Research
Scientist



Sasha Akins
Research Scientist IV



Bryan Berube
Research Scientist IV



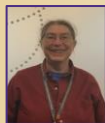
Zhiyi Zhu
Research Scientist II



Bryan Brown
Principal Investigator



Alison Wald
Scientific Project
Manager I



Valerie Reese
Research Associate III



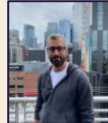
Tiffany Pecor
Research Associate III



Brittany Williams
Grad Research Assistant



Emma Johnson
Research Tech II



Hazem Abdelal
Postdoctoral Scientist



Suhavi Kaur
Research Tech II



Thomas Smytheman
Research Tech I



Maham Rais
Postdoctoral Scientist



Dana Miller
Research Tech I



Rakhi Harne
Postdoctoral Scientist



Debora Ferede
TRTC Trainee

- Application of high throughput assay suites for vaccine clinical trials:
 - **SARS-CoV-2**
 - Tuberculosis
 - Schistosomiasis
 - RSV
- **IMPACTB**: A cross species mechanistic interrogation of mycobacterial and vaccine-induced immunity

TEAM = Together Everyone Achieves More




Seattle Children's®
HOSPITAL • RESEARCH • FOUNDATION

W

UNIVERSITY of
WASHINGTON

Questions?

Rhea Coler: rcoler@uw.edu

- 
- > **What defines the students and faculty of the University of Washington? Above all, it's our belief in possibility and our unshakable optimism. It's a connection to others, both near and far. It's a hunger that pushes us to tackle challenges and pursue progress. It's the conviction that together we can create a world of good. And it's our determination to Be Boundless. Join the journey at uw.edu.**