A DEADLY BACTERIA ARRIVES IN THE LUNG

Macrophage cell and dendritic cell (yellow) are in conversation. They notice an unusual organism.

Macrophage: Who is that? I don’t think they belong here.
MTB: Hi I’m Mycobacterium Tuberculosis (MTB).

BACTERIA FORMS COLONY IN LUNG

MTB celebrates as they have gained victory over macrophage.
MTB: Now we bring all our friends here.

ACTIVATION OF INNATE IMMUNE RESPONSE

MTB’s mission is to infect the lungs. To get rid of this deadly bacteria macrophage swallows MTB in a process called phagocytosis.
Dendritic cell: Get her friend!

BACTERIAL REPLICATION RESULTS IN CELL DEATH

Macrophage has been defeated, the dendritic cell observes as MTB multiplies inside the macrophages lungs.

NEUTROPHIL RECRUITMENT IN LUNG

Neutrophils respond to commotion and mourn the death of their friend macrophage.
Neuts: Who could have done this?

MACROPHAGE RECRUITMENT IN LUNG

Other macrophages carry their friend to the lymph node where she will be recycled into a new macrophage.
Macrophage1: We’ll take care of her.
Macrophage2: You find and destroy the culprit.
**NEUTROPHIL ACTIVATION AND RESPONSE TO BACTERIAL INFECTION**

The neutrophils locate the MTB and using an arsenal of weapons attempts to kill it. The bacteria fight back. MTB: You won't get me that easily.

**TB ASSOCIATED LUNG PATHOLOGY**

The fight between the neutrophils and MTB damages the lungs. This can result in chronic coughing or bleeding of the lung.

**ANTIGEN PRESENTATION BY DENDRITIC CELLS**

Dendritic cell travels to the lymph node. At the lymph node the dendritic cells meet B and T cells. Dendritic cell: Guys we need your help! T cell (black): What’s wrong?

**ACTIVATION OF ADAPTIVE IMMUNE RESPONSE**

The cells devise a plan to attack the enemy. B cells produce antibodies similar to bullets in a gun and T cells mature and become weaponised. Both are specific for an MTB infection. T cell: Let's get them! ATTACK!

**GRANULOMA FORMATION**

Immune cells swallow or surround free bacteria and infected cells trapping the bacteria within. T and B cells coordinate this formation. The infection is controlled when one takes their TB treatment consistently.

**BACTERIAL MUTATION AND REPLICATION**

Inconsistent use of medication can lead to MTB changing into a drug resistant bacteria which is more deadly.
BACTERIAL ESCAPE AND GRANULOMA DISINTERGRATION

The area where the infection is active, can cause damage to the lungs. Killing both the immune system cells and the lung tissue.

B cell (grey): Oh no! MTB has escaped. We must get them before they do anymore damage.

INSIDE THE LUNG

The lungs recovery process.

BACTERIAL CONTROL

The immune system, with the help of second line TB drugs, wins!

Macrophage2: We won! MTB is dead!

B cell: But at what cost?

IMMUNE REGULATION AND SUPPRESSION

Regulatory T cells play a vital role towards the end of the fight against MTB. They help regulate the immune response. This prevents cells from continuing to respond to a nonexistent enemy and causing more damage to the lung.

T reg: Calm down now. the enemy is gone.

The End!