**PROJECT NAME:** Science To Society

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## 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).

## 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.

## BACTERIA FORMS COLONY IN LUNG

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

## NEUTROPHIL RECRUITMENT IN LUNG

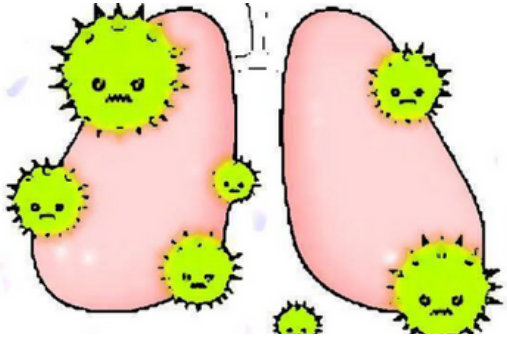
Neutrophils respond to commotion and mourn the death of their friend macrophage.
Neuts: Who could have done this?

## MACROPHAGE RECUITMENT IN LUNG

Other macrophages carry their friend to the lymp 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

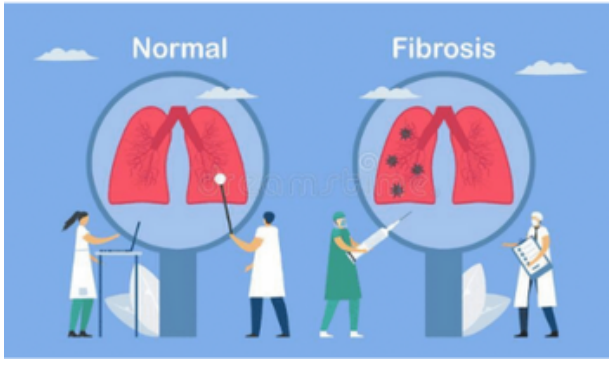
The area where the infection is active, can cause damage to the lungs. Killing both the immune system cells and the lung tissue.
B cell (grey): Oh no! MTB has escaped. We must get them before they do anymore damage.

## BACTERIAL CONTROL

The immune system, with the help of second line TB drugs, wins the fight against MTB.
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.




## INSIDE THE LUNG

The lungs recovery process.

# The End!