

# TOPIC 6.3: INNATE IMMUNITY

## Innate Immunity

The innate immune responses share two key characteristics:

- They are **non-specific** (i.e. they do not differentiate between different types of pathogens)
- They are **non-adaptive** (i.e. they produce the same response to every infection – there is no immunological memory)

## Lymphatic System

The lymphatic system is a secondary transport system that protects the body by producing and filtering lymph

- Lymph is a clear fluid rich in white blood cells that arises from the drainage of interstitial fluid from the tissues
- Lymph is filtered at lymph nodes, whereby pathogens are removed and the fluid is returned to venous circulation

## Inflammation

Tissue damage causes mast cells to release histamine, which triggers vasodilation and increased capillary permeability

- This improves the recruitment of white blood cells

An inflammatory response, while necessary, has side effects:

- Vasodilation = localised redness & heat ( $\uparrow$  blood flow)
- Capillary permeability = swelling & tenderness ( $\uparrow$  fluid)

Inflammation can be short-term (*acute*) or long-term (*chronic*)

## Fever

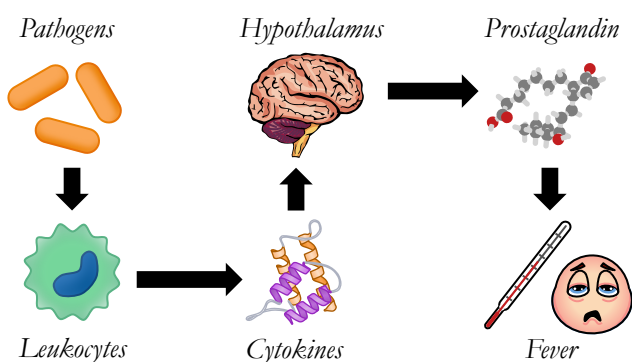
Fever is an abnormally high body temperature (*due to infection*)

- It increases metabolism and activates heat shock proteins
- It reduces the growth rate of infectious pathogens

Fever occurs when white blood cells release cytokines

- This causes the hypothalamus to produce prostaglandin
- Prostaglandin increases the temperature of the body

While a fever may initially strengthen an immune response, beyond tolerable limits it will cause damage to the body



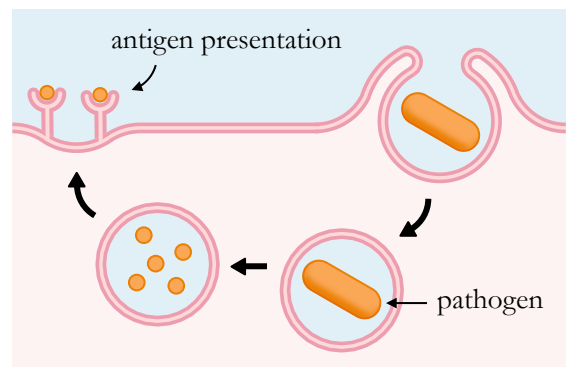
## Phagocytosis

Macrophages and dendritic cells migrate via the blood to sites of infection (damaged cells release chemotactic agents)

The pathogens are surrounded by extensions (pseudopodia) and are then internalised within a vesicle (via phagocytosis)

The vesicle may fuse with a lysosome to digest the pathogen

- Fragments (antigens) are presented on the surface of the cell in order to activate the third line of defense (*adaptive*)



## Complement System

Inactive complement proteins are produced by white blood cells and certain body cells (particularly the liver)

In response to immune activation, they trigger a cascade of reactions that help protect the body from infection:

- Opsonisation (increase pathogen recognition by phagocytes)
- Chemotaxis (recruitment of phagocytes to the infection site)
- Membrane attack (forms a complex that ruptures cell walls)

## Natural Killer Cells

Natural killer cells are a class of non-specific lymphocytes that can target and destroy infected body cells or tumor cells

- Infected cells release chemicals called interferons, which function to promote the activation of natural killer cell
- Natural killer cells induce apoptosis in the infected cell

Natural killer cells are part of the innate immune response because they do not rely on antigen recognition to function