

body is a good env for other organisms to feed, to live in & to spread

Infection and immunity

- An animal must defend itself
 - From the pathogens it may encounter in the environment
 - viruses and mobile genetic elements (DNA, RNA)
 - bacteria (Tuberculosis)
 - parasites
- Two major kinds of defence have evolved that counter these threats
 - Innate immunity and acquired immunity

Innate immunity involves:

a) Defence against the external environment

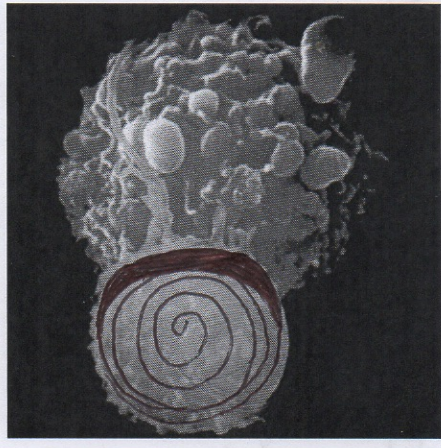
1.1 • Skin, mucous membranes, secretions
(eyes, nose, mouth)
antibacterial

b) Defence of the internal environment:

Internal defences: if sth gets in:

- 2.1 • Antimicrobial proteins
- 2.2 • Phagocytic cells - looking for invaders
- 2.3 • Inflammatory responses - ↑ limits ability of bacteria to proliferate
- 2.4 • Natural killer cells (release toxins) - cells accumulate near infection

Immunity and infection



- Innate immunity = mousetrap
 - Is present before any exposure to pathogens
(we are pre-prepared)
 - Involves nonspecific responses to pathogens
 - *fast*

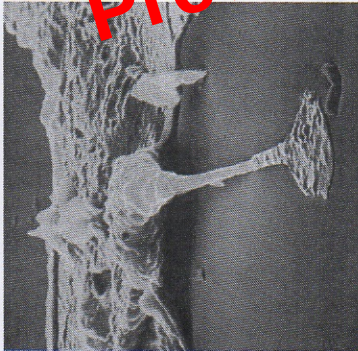
- Even the most evolutionarily ancient animals have defences against invaders:

- RNA interference and protection against *mechanism that recognises dsRNA and kill such viruses*
- RNA viruses and retroposons
 - ↑ *even parasites have it, not to be killed by virus*

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IN MAMMALS

In mammals, macrophages phagocytose pathogens



These recognise foreign cells using receptors like those of the insect system: Toll-like receptors (TLR)

Recognition of LPS by

Toll like receptors releases

→ cytokines (lipopolysaccharides)

Which promote inflammation.

→ release toxins to kill

→ or recruit other cells to start inflammation

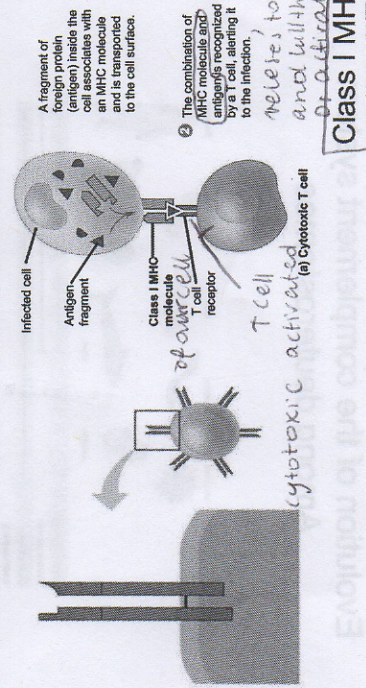
→ Inflammation promotes changes in blood vessels that allow more fluid, more phagocytes, and antimicrobial proteins to enter the tissues

WHEN WE GET INFECTED BY A VIRUS

• T cells bind to small fragments of antigens

– That are bound to normal cell-surface proteins called MHC molecules – antigen presentation

• MHC molecules are encoded by a family of genes called the major histocompatibility complex



A fragment of foreign protein (antigen) inside the cell associates with an MHC molecule and is transported to the cell surface.

The combination of MHC molecule and antigen is recognized by a T cell, alerting it to the infection.

release toxins and will kill infected cell or activate other type of response

Class I MHC

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Acquired immunity – specific, takes longer

– Is the body's second major kind of defence

– Involves the activity of lymphocytes

→ B lymphocytes (B cells) and T lymphocytes (T cells)

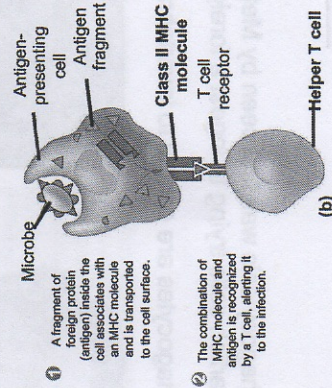
• The plasma membranes of both B cells and T cells have receptors to recognise foreign molecules:

→ These are called antigens or pathogens

used to let others know that the body was invaded so the body can kill others

• Class II MHC molecules are found mainly on cells of the immune system (dendritic cells, macrophages, and B cells) ← don't want to kill this cells

• They display antigens to helper T-cells



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The combination of MHC molecule and antigen is recognized by a T cell, alerting it to the infection.

This triggers further immune mechanisms to attack the invader: NOT THE IMMUNE CELL

cytokines are released from the antigen presenting cell to stimulate B cells and cytotoxic T cells

Amplification of the immune response