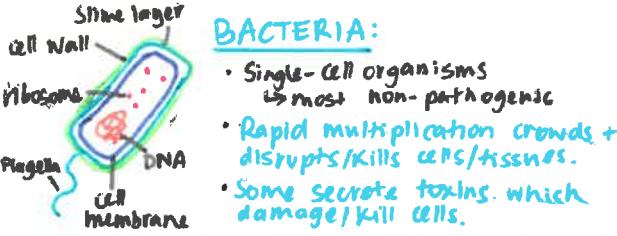


# RESPONSE TO INFECTION:

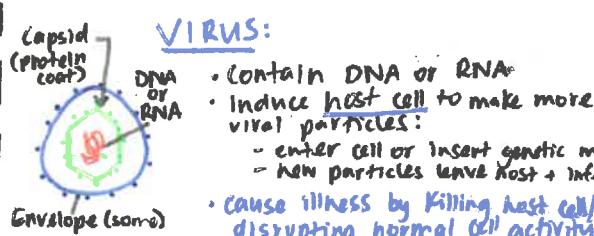
↳ Communicable (infectious) diseases are caused by foreign organisms (pathogens) invading the body + multiplying.

↳ PATHOGENS: Bacteria, Virus, Parasite + Fungi:



## BACTERIA:

- Single-cell organisms
  - ↳ most non-pathogenic
- Rapid multiplication crowds + disrupts/kills cells/tissues.
- Some secrete toxins which damage/kill cells.



## VIRUS:

- Contain DNA or RNA
- Induce host cell to make more viral particles:
  - enter cell or insert genetic material
  - new particles leave host + infect more.
- Cause illness by killing host cell/more disrupting normal cell activity.

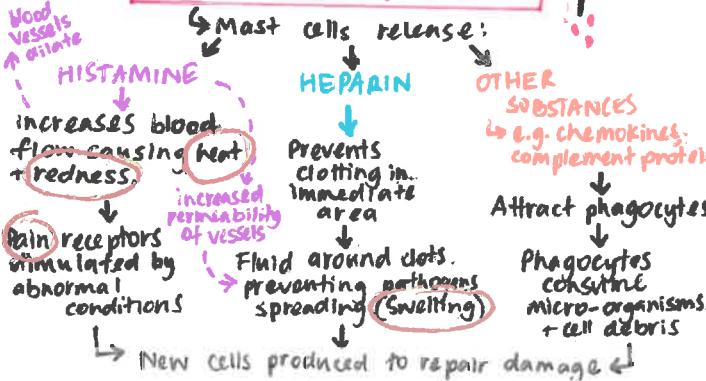
## NON-SPECIFIC DEFENCES: (Innate)

- ↳ Body's first line. Works against all pathogens
- EAR:** Cerumen (ear wax) acidic + has lysozyme
- EYE:** cleansed by tears (flush) which contain lysozyme
- MOUTH:** Mucous membrane. Saliva contains lysozyme
- STOMACH:** Acid kills micro-organisms
- SKIN:** Impenetrable barrier
- NOSE:** Hair + mucus trap micro-organisms.
- TRACHEA / BRONCHI:** Mucus layer traps pathogens. Cilia move mucus to throat to cough up
- URETHRA:** Urine flow (flushing) prevents bacteria reaching bladder/kidney
- ANUS:** Mucous membrane. Traps micro-organisms w/ mucus.
- Protective reflexes:**
  - ↳ sneezing, coughing, vomiting, diarrhoea.

## INFLAMMATION:

↳ response to any damage to tissue to reduce/ prevent spread of + destroy pathogens + begin repair

### Mechanical damage to tissue



## ANTIBODIES and ANTIGENS

↳ Specialised proteins (immunoglobulins)

↳ combine w/ antigen (one particular type only)

↳  $10^{10}$  possible. combo of variable region

## FEVER:

↳ body's normal 'thermostat' reset to higher temp - caused by pyrogens.

↳ Body feels cold ↳ vasoconstriction Shivering.

↳ Fever breaks @ crisis point ↳ vasodilation Sweat

↳ Inhibits pathogen growth + speeds body's chemical rx but death occurs @ ~44.5°C

## ANTIBIOTIC: Treat bacterial infection.

↳ Broad-spectrum (effective against many) or narrow-spectrum (effective against specific).

### Bactericidal

↳ changes cell wall/ membrane structure. Disrupting protein synthesis or disrupts enzymes.

### Bacteriostatic

↳ stops reproduction by disrupting protein synthesis.

## ANTIVIRALS: Treat viral infection

↳ more difficult to make due to viral DNA/RNA inducing host to replicate

## VACCINE: artificial introduction of antigen to stimulate antibody production

- Live attenuated - living but weakened
- Dead micro-organism
- Toxoid - made from inactivated toxins
- Sub-unit - fragments of organisms
- Ethical considerations - animals, testing, risk.

## ANTIBODY-MEDIATED (Humoral Response)

↳ resistance prior to antigen entering cells

1. B-cells in lymphoid tissue

↳ One type of B-cell sensitised by contact with antigen or antigen-presenting cell. Enlarges + divides

Macrophage becomes ANTIGEN PRESENTING CELL after engulfing antigen

Cytokines

3. Clones formed

4. Most B-cells become plasma cells + some B-cells become memory B-cells

## CELL-MEDIATED (Cellular Response)

↳ resistance to INTRACELLULAR pathogen.

1. T-cells in lymphoid tissue

2. One type of T-cell is sensitised when presented w/ antigen by B-cell or Antigen-presenting cell.

3. Clones formed

4. Some T-cells become Helper T-cells or Killer T-cells

Helper T-cells

- Secrete cytokines to sensitize more lymphocytes
- Secrete chemokines to attract phagocytes
- Secrete substances to enhance phagocytic activity

Killer T-cells

- Attach to antigens/infected cells + secrete substances to destroy before searching for more.

## TYPES OF IMMUNITY:

↳ Immunity (resistance to particular infection) can be acquired various ways.

### NATURAL

Normal exposure to antibody/antigen

Antibodies from placenta/breast milk

### ARTIFICIAL

Deliberately given antigen/antibody.

Antibodies injected into blood

### PASSIVE

- Receives antibodies

- Immediate but temporary

### ACTIVE

- Antibodies produced after antigen exposure

- slow but long-lasting

Natural exposure to Antigen

Vaccination