BODY DEFENCES AGAINST INFECTION

NON-SPECIFIC RESPONSE MECHANISMS

- Non-specific defence mechanisms are those which operate against a range of pathogens and foreign particles such as dust and cigarette smoke.
- There are several non-specific defence mechanisms:
  1. **Intact skin** - The intact skin provides a barrier to invading pathogens. Also damaged blood vessels rapidly contract to reduce blood loss, and platelets accumulate to create a ________ to prevent further blood loss and invasion of foreign particles.
  2. **Mucus-secreting membranes** - Mucus of the ______ traps dust and smoke.
  3. **Ciliated membranes** - Hairs of the ____________ tract also trap dust and smoke.
  4. **Tears containing lysosyme enzymes and lactic acid** - These chemicals are very effective in destroying bacterial cell walls.
  5. **Phagocytes** - The inflammatory response involves an increase in blood flow to the area, and ________ blood cells called phagocytes engulf and digest foreign particles that enter the body tissues.
  6. **Complement system** - The inflammatory response also involves transporting large blood proteins that break open or lyse the bacterial cell walls, and attracts phagocytes to the area.
  7. **Interferon** - Viral-infected body cells secrete interferon against viruses.

---

xceleratescience.com
SPECIFIC DEFENCE MECHANISMS

- The specific defence mechanisms involve 2 factors:
  1. the ability to 'recognise' and respond specifically against an antigen (a molecule on the ________ of an invading bacterium, a toxin produced by the bacteria, or a foreign ____________)
  2. the ability to 'remember' the chemical structure of the ________ so the immune response is more rapid at the next encounter

![Specific Defence Mechanisms Diagram]

**Humoral Immunity**

- B-lymphocytes (B cells) produce specific antibodies that can bind to antigens. Most antibodies are large globular ________ called immunoglobulins that are released into blood. Antibodies also coat foreign particles so that they are recognised and ____________ by white blood cells called macrophages.
- B cells are formed in bone marrow and the spleen, and when they become active, they form 2 types of daughter cells - plasma cells (which make antibodies) and memory cells (which remain in the body for some time and provide a ____________-term immunity after a person has encountered a disease).

**Cell-Mediated Immunity**

- T-lymphocytes (T cells) are produced in the thymus gland and act against infected or cancerous cells.
- There are 2 types of T cells - Cytotoxic T cells (directly ________ infected or foreign cells) and Helper T cells (assist in regulating the B cells and the cytotoxic T cells).

**REJECTION OF TRANSPLANTED ORGANS**

- All body cells have a group of antigens on their surface that distinguish them as unique ('self' recognising cells). Identical twins have ____________ antigens. These antigens are the result of linked genes called the major histocompatibility complex.
- After an organ such as a heart or kidney is ________ from one person to another person who is not an identical twin, the immune system is triggered. The recipient's immune system identifies the 'non-self' cells of the donor organ. The organ may be ________ by the body's immune system.
- To prevent this from happening, immuno-suppressant drugs (e.g. cyclosporin) are given for the rest of the transplant recipient's ________. Because these drugs reduce the effectiveness of the immune system, the transplant recipient is in danger of contracting other ____________.
PREVENTING AND TREATING DISEASE

HYGIENE
- Hygiene involves purification of water, sanitation of sewage and personal hygiene practices (e.g. regular bathing, thorough hand-washing after going to the toilet).

IMMUNISATION
- Immunity may be natural (where a person has suffered and recovered from the disease and sufficient memory B cells to recognise, respond and remember the antigenic molecule) and rapidly set up a specific defence against the artificial (following the injection of a specific vaccine, made of altered or killed bacteria, or inactivated forms of the toxin released by some bacteria).
- Active Immunity occurs when an individual's own immune system 'recognises, responds and remembers' the invading pathogen. This is more lasting. For example, the triple antigen injections given to young children provide long-term immunity against diphtheria, tetanus and whooping cough.
- Passive Immunity occurs when an injection contains the actual antibodies or when a baby receives antibodies via the umbilical blood or breast milk. It is short-term only and requires injections. For example, the tetanus injection given immediately following a deep wound contains antibodies for immediate treatment.

MONOCLONAL ANTIBodies
- These are antibodies produced by cloning plasma B cells, and can be produced in large quantities for immunisation. They are also used in pregnancy tests.

ANTIBIOTICS
- An antibiotic is any chemical used to kill or inhibit the growth of a living microorganism. They are more toxic to the invading pathogen that they are to the host.
- Antibiotics are ineffective against viruses.

xceleratescience.com