

Unit 4 Immunology and public health

1. The immune system

Non-specific defences

- Describe the physical and chemical defences of the non-specific immune system.
- Describe the human inflammatory response, including the roles of histamine, mast cells and cytokines.
- State that as a result on inflammation there is an accumulation of phagocytes and delivery of antimicrobial proteins and clotting elements to the site of infection.
- Describe the role of phagocytes and natural killer (NK) cells.
- State that a variety of specialised white blood cells provide protection against pathogens.

Specific cellular defences

- State that a range of white blood cells constantly circulate monitoring the tissues.
- Explain what cytokines do when a cell is damaged or invaded.
- Describe the role of lymphocytes in the immune system.
- Describe the clonal selection theory with reference to lymphocytes.
- State that lymphocytes respond specifically to antigens on foreign cells, cells infected by pathogens and toxins released by pathogens.
- Describe the structure and function of T-lymphocytes.
- State that immune system regulation failure leads to T-lymphocyte immune response to self-antigens (auto immune disease).
- State that allergy is a hypersensitive B- lymphocyte response to an antigen that is normally harmless.
- State that when pathogens infect tissue, some phagocytes capture the pathogen and display fragments of its antigens on their surface.
- Describe the function of B-lymphocytes.
- Describe the role of antibodies in the immune system and explain how they carry out their function.
- Explain what is meant by the term cell lysis.
- Explain how antibodies reach infected areas.
- State that some T- and B-lymphocytes produced in response to antigens by clonal selection survive long-term as memory cells.
- Explain how the secondary exposure to an antigen differs from the primary exposure.

2. Infectious diseases and immunity

The transmission and control of infectious diseases

- Describe the causes of infectious diseases.
- Explain how infectious diseases can be transmitted.
- Explain how infectious diseases can be controlled.
- Explain what epidemiologists do.
- Explain what is meant by the terms sporadic, endemic, epidemic, and pandemic with regards to the spread of an infectious disease.
- Explain how preventing transmission, drug therapy, immunisation or a combination of these approaches can help to control a disease.

Active immunisation and vaccination

- Describe how active immunity is brought about.
- Explain what an antigen is.
- Describe the process which is followed to produce a vaccine, including randomised, double-blind and placebo-controlled protocols.
- Explain the importance of group size to reduce experimental error and statistical significance.
- Explain what is meant by the term herd immunity and explain the importance of herd immunity in infectious disease control.
- Describe the factors upon which herd immunity threshold depends.
- Explain what is meant by the term public health immunisation program.
- Describe the circumstances which can make establishing herd immunity difficult.

The evasion of specific immune responses by pathogens.

- Explain how pathogens have evolved mechanisms that evade the specific immune system and the implications of this for vaccination strategies.
- Explain the term antigenic variation.
- Describe the role and impact of antigenic variation in diseases like malaria, trypanosomiasis and influenza.
- Explain how HIV attacks the immune system and state that it is the major cause of AIDs.
- Explain how TB survives within phagocytes and avoids immune detection.
- State that the absence or failure of some component of the immune system results in increased susceptibility to infection.