

## Q9 Describe how the body defends against infection (Sept 2010)

### Non immune defences →

- Physical barriers to infection →
  - Skin (prevents bacterial entry and growth)
  - Normal flora (prevent transient pathogenic organisms from colonizing the skin surface by competing for nutrients or secreting protective enzymes)
  - Mucous (traps bacteria and foreign particles)
  - Cilia (removes mucous and trapped particles)
  - Hydrochloric acid secreted in stomach (bactericidal)

### Immune defences →

- **INNATE IMMUNITY**
  - Phagocytes → digest and destroy microorganisms via IFN; also contribute to cell mediated immunity by presenting antigens to lymphocytes
  - Natural killer cells → lymphocytes which are not B or T cells; recognize virus-infected cells and destroy them by releasing proteins that induce apoptosis
  - Complement system → a collection of circulating and membrane associated proteins that, when triggered (by the alternative classical or lectin pathways), results in the formation of a Membrane Attack Complex and cell apoptosis
  - Acute phase proteins → A collection of proteins which play various roles (eg, CRP activates the classical complement pathway, fibronectin binds bacteria and macrophages)
  - Lysosomes → present in saliva, mucous and tears → destroy bonds in bacteria wall, causing lysis
- **CELL MEDIATED (ACQUIRED) IMMUNITY**
  - T cells → activated by the presentation of a microorganisms via the Major Histocompatibility complex MHC of an Antigen Presenting Cell. Several subtypes:
    - CD4 T cell
      - CD4 Th1 → activated by the presentation of an antigen on an MHC II molecule. Th1 cells are proinflammatory, activate macrophages and stimulate antibody production by B cells. Major cytokines involved are IFN $\gamma$  and IL12
      - CD4 Th2 → also activated by MHC II molecules but produce IL4 and IL5 to stimulate eosinophils and IgE, and maturation of B cells into antibody producing and memory B cells.
    - CD8 T cell → activated by the presentation of an antigen on an MHC I molecule. Utilises IFN $\gamma$  and IL15 to induce apoptosis of infected cell and the proliferation of memory T cells.
  - B cells – in the presence of costimulatory molecules from T cells and other immune cells, differentiate into either plasma cells (capable of producing specific antibodies, which coat or opsonize microorganisms for phagocytosis) or memory cells