BMS3031 Exam Revision Notes

Week 4 – Immunology

Adaptive immune system
Innate immune system

Overview

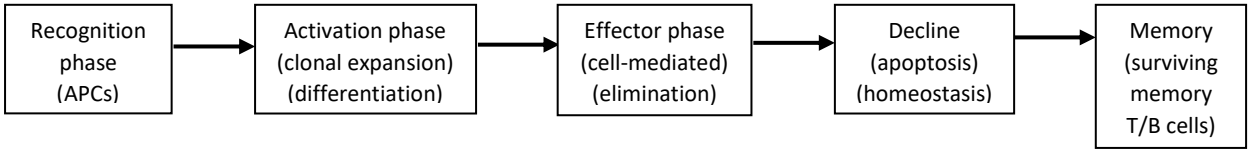
- Stem cells gives rise to
  → Lymphocytes (lymphoid stem cell)
    ➔ B cell progenitor = memory cells/plasma cells
    ➔ T cell progenitor = Th cell/Tc cell
    ➔ Natural killer cell
  → Granulocytes (myeloid progenitor)
    ➔ Basophil/Eosinophil/Neutrophil/Mast cell
    ➔ Monocytes = dendritic cell/macrophages

- Innate Immune System

1. Initial exposure = pathogen sends chemical signals to macrophage/dendritic cell
2. Local cellular response = blood clotting elements
3. Influx of phagocytic cells = blood clot
4. Clearing of pathogen = phagocytosis

- Adaptive Immune System

1. Initial exposure = pathogen sends chemical signals to macrophage/dendritic cell
2. Uptake and processing of antigen
3. Migration of Antigen presenting cells (APCs) to lymph node
4. Activation of T cells
5. Generation of effector T cells (Helper Th/Cytotoxic Tc)
6. Activation of B cells
7. Generation of plasma B cells and secretion of antibodies



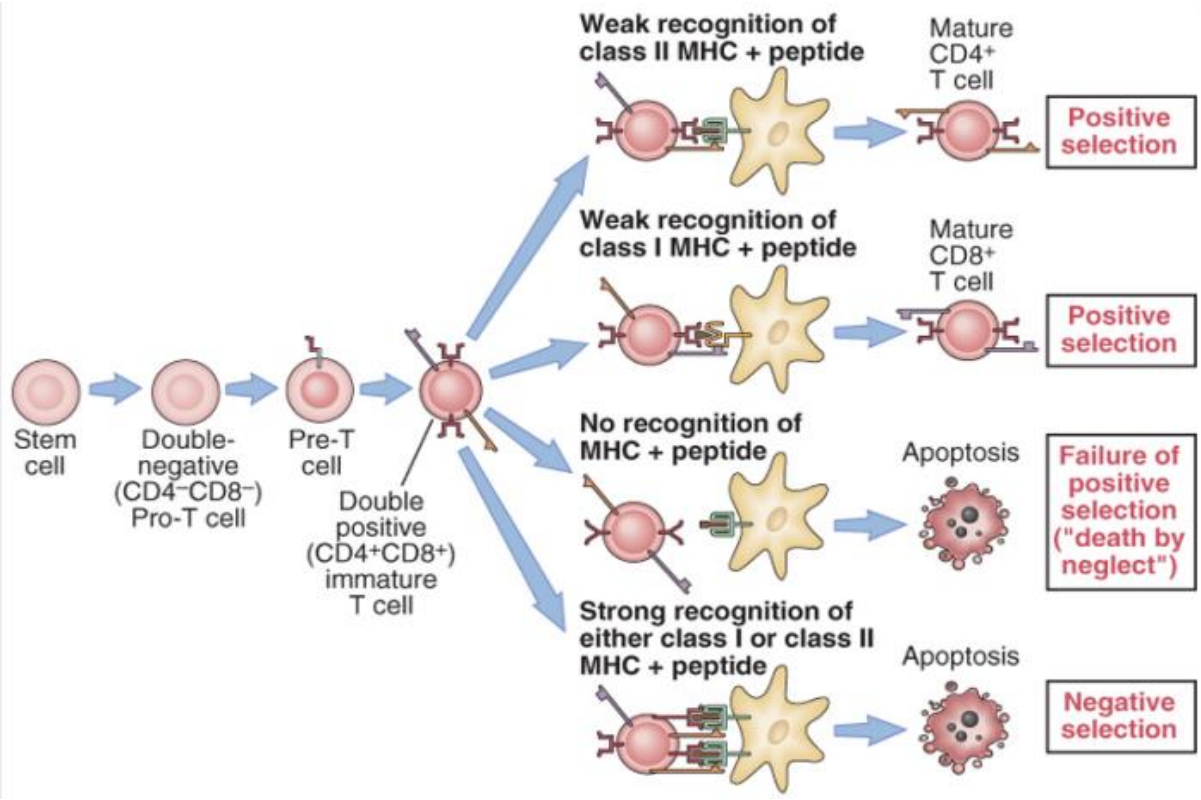
- Tolerance
  → Central tolerance: T cell = Thymus, B cell = Bone-marrow
  → Peripheral tolerance = human DQβ gene binding expresses protective MHC II on Dendritic cell responsible for converting autoreactive T cells

- T cells develop in the thymus in absence of AIRE protein
  → AIRE regulates tissue-reactive T cells
  → T cells react to tissue-specific antigens

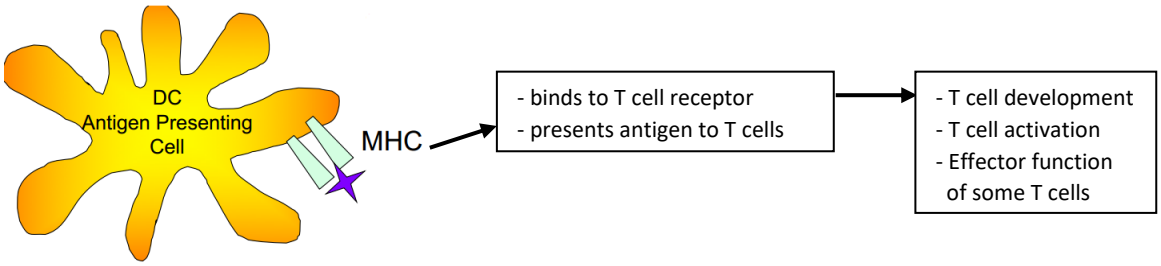
- T cell development

1. T cell progenitors develop in bone marrow and migrate to thymus
2. Precursor rearranges T cell receptor
3. Immature T cells recognise MHC = positive/negative selection
4. Migrate to peripheral lymphoid organs
5. Mature T cells encounter foreign antigens via Dendritic cells/APCs

6. Activation of T cells and migrate to sites of infection
   → CD8+ T cells = Tc (cytotoxic) = apoptosis
   → CD4+ T cells = Th (helper) = become activated killer T cells
   = help B cells become activated and make antibodies



- Major histocompatibility complex (MHC)
  → cell surface proteins that helps recognise foreign molecules
  → human leukocyte antigen (HLA) = human version of MHC



- MHC I = all nucleated cells
  → recognised by CD8+ T cells (cytotoxic)
  → kills virally infected cells/intracellular parasite/foreign cells/cancerous cells

- MHC II = APCs
  → recognised by CD4+ T cells (helper)
    ➔ provides help for CD8+ T cells and B cells
  → forms regulatory T cells for B cell antibody
    ➔ IFN-γ = IgG
    ➔ IL-4 = IgE
    ➔ TGF-β = IgA