Ask Weber session ?

Immunity

THE UNIVERSITY OF SYDNEY

Immune system anatomy

- **Describe the physical barriers of the immune system**
  - Epithelium (skin, gut, respiratory)
  - Secretions (sweat, wax, tears)
  - Mucus (nose, trachea, gut)
  - Urine
  - Stomach pH and proteolytic enzymes
  - Gut flora

- **How do cells of the immune system travel across the body?**
  - Blood vessels (e.g. White blood cells)
  - Lymphatic vessels (Lymphocytes, Antigen presenting cells)

- **Where do immune cells COME FROM? i.e. what produces them?**
  - Bone marrow stem cells
  - Remember that bone marrow stem cells also produce red blood cells in response to EPO!

- **What are the primary lymphoid organs**
  - Bone marrow, thymus
- **What are the secondary lymphoid organs?**
  - Spleen, lymph notes, mucosal (MALTs) and cutaneous associated lymphoid tissue
- **What sites in the body can you FIND immune cells?**
  - Pretty much everywhere – they circulate around and are present where-ever blood is (which is everywhere)

- **Which white blood cells fall under the innate immune system?**
  - Neutrophils
  - Basophils
  - Eosinophils
  - Monocytes
- **Name the progenitor responsible for innate immune cells**
  - The common myeloid progenitor
- **What are the hallmarks of the innate immune system?**
  - Speed
  - Duration
  - Repetitive
  - Interactive
  - Non-reactivity to host

- **How do immune cells ensure non-reactivity to self?**
  - They can respond to MAMPs (microbe-associated molecular patterns) which are present on microbes but not self-cells
  - Receptors on the surface of endothelial, epithelial and resident immune cells can detect these patterns
  - 'Anergy'

- **What are the hallmarks of the adaptive immune system?**
  - Slow
  - High impact and targeted (specific)
  - Memory (expansion of immune cells and production of memory cells)

Innate immunity

Name the components of innate immunity

1. Epithelial barriers
2. Cells
3. Molecules (cytokines, proteins)

- **Name the phagocytic white cells**
  - Neutrophils
  - Macrophages
- **Name the exocytic white cells**
  - Eosinophils
  - Mast cells
  - Basophils

- **What signalling mechanisms are used by cytokines?**
  - Autocrine signalling – acting on self
  - Paracrine signalling – acting on neighbouring cells
  - Endocrine signalling – acting on distant cells

- **How do tissue resident cells enhance the activity of the innate immune system in response to a microbe/external organism?**
  - Releases histamine/inflammatory cytokine
  - Dilates blood vessel through degranulation, allowing innate immune cells to enter
  - Induces adhesion molecule expression on endothelial cells (e.g. ICAM, VCAM) – mainly attracts neutrophils

- **Describe how neutrophils extravasate and reach the infected/inflamed tissue (4 steps)**
  - Roll
  - Adhere
  - Extravasate
  - Migrate

- **Name the 2 main types of lymphocytes**
  - B-lymphocytes
  - T-lymphocytes
- **Name the function of the thymus**
  - Maturation of the T-cells

- **Name the 2 types of immunity**
  - Innate immunity
  - Adaptive immunity
- **Name the 2 types of adaptive immunity**
  - Humoral immunity (mediated by B-cells)
  - Cell-mediated immunity (mediated by T-cells)
- **Name the 2 main types of T-cells and their functions**
  - Helper T-cells
    - Help activate other immune cells
    - T(h) cells (Helper T-cells) regulate immune responses so they don't get out of hand
  - Cytotoxic T-cells
    - Killer T-cells (CTLs) kill target T-cells, and are important for viral infections and anti-tumor immunity

- **What are the 2 types of immunological tolerance?**
  - Central – involved in the generative/primary lymphoid organs
  - Peripheral – mediated by regulatory cells

- **What inherited issues might cause autoimmune diseases?**
  - T cell activation
  - Maintaining immunological tolerance
    - finding and destroying self-reactive lymphocytes
    - activity of regulatory cells
  - Many of these genes are inherited

- **What are common factors in autoimmune disorders?**
  - Female gender (Young females have higher risk) - reason is unknown
  - Local trauma (?release of antigens that the immune system newly responds to)
    - E.g. SLE
  - Lack of UV radiation (e.g. MS)

- **What are the symptoms of multiple sclerosis?**
  - Loss of motor control
    - Muscle spasm, weakness, loss of coordination, balance
  - Fatigue
  - Heat sensitivity
  - Neurological Sx
    - Vertigo, pins and needles, neuralgia, visual disturbance
  - Incontinence, constipation
  - Neuropsychological symptoms
    - Memory loss
    - Depression
    - Cognition