Department of Pathology
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Haematolymphoid System

Introduction to Lymphocytes and Big Picture Video:
https://medicine.nus.edu.sg/pathweb/pathology-demystified/haematolymphoid-system-lymph-nodes/

Approach to Lymphoid Disorders
Where to start?

I. Consider the immune system organ by organ:
– Lymph nodes; Bone marrow; Spleen; Thymus; Mucosa Associated Lymphoid Tissue

II. For each organ, ask some questions:

1. What are the components of the lymphoid system?
- Cells (B, T, NK cells)
- Tissues / Organs
  - Primary lymphoid organs (bone marrow, thymus)
  - Secondary lymphoid organs (lymph nodes, MALT, spleen, etc…)
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2. What are the functions of the lymphoid immune system?
- The main functions of lymphoid cells are defensive – as part of the adaptive immune response (B and T cells) an innate immunity (NK cells). Revise the physiology of blood lectures.
- What happens if there is *over, under-* or *inappropriate* immune response?
- You will find some answers in your Immunology lecture notes
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3. What main pathologies occur in lymph nodes?
- **Reactive** – eg. Reactive lymphoid hyperplasia (lymph nodes, thymus, MALT)
- **Inflammatory/Infectious** - eg. Tuberculosis involving lymph nodes
- **Neoplastic**
  - Neoplasms of the lymphoid tissue are usually malignant
  - Simplest classification is: Primary vs Secondary
    - Lymphomas
    - Leukaemias
  - Some neoplasms can affect **BOTH** the lymph nodes and the bone marrow. You must have heard of the terms "Lymphoma" and "Leukaemia". Do you know the difference?
  - **Lymphomas** refer to haematopoietic malignancies that arise predominantly as masses, either in lymph nodes or in extranodal locations. **Leukaemias** refer to haematopoietic malignancies that present with widespread involvement of the bone marrow and often peripheral blood as well.
  - This distinction applies mainly to **lymphoid** malignancies. – because myeloid neoplasms usually do not involve lymph nodes.
  - Among the lymphoid neoplasms, many of them present mainly as lymphomas (i.e. nodal or extranodal masses). There are several lymphoid neoplasms, however, that also can present as leukaemias. Thus, these neoplasms are often given the name "…. lymphoma/leukaemia", and they are diagnosed as leukaemia if marrow and/or peripheral blood examination reveals the presence of neoplastic lymphoid cells in at least specific quantities.
  - Eg. Small lymphocytic lymphoma(SLL)/ Chronic lymphocytic leukaemia. This is diagnosed as SLL if the main clinical presentation is lymphadenopathy without significant marrow disease, while it is diagnosed as CLL if the peripheral blood absolute lymphocyte count exceeds a certain value

- **What is a simple classification system for lymphomas?**

1. First step: Hodgkin vs Non-Hodgkin Lymphoma
2. Second step: NHL –> WHO Classification – B vs T cell; Immature vs Mature
3. Your lecture notes provide a good overview of the classification system

4. How do these main lymphoid pathologies manifest themselves clinically?
Mindmap on clinical manifestations of lymphoid diseases and approach to lymphadenopathy:

https://medicine.nus.edu.sg/pathweb/pathology-demystified/haematolymphoid-system-lymph-nodes/lymphoid-disorders-clinicopathologic-correlation/

Some question to ask in a patient with lymphadenopathy
- Nature of lymphadenopathy - Localised vs generalised?
- Local signs/symptoms of inflammation – Pain, tenderness, redness, warmth
- Systemic symptoms – fever, malaise, night sweats (associated with TB and some lymphomas)
- Any regional pathology is draining sites – ulcers, masses, eczem
- Past history and Systems review
- Past history – immunocompromised state (predispose to lymphoma), known malignancy?
- Systems review – history of known malignancy presenting with metastatic nodal disease

Here are some general points regarding the Other haematolymphoid organs:

I. Bone Marrow

1. What are the main **cellular components** of the bone marrow?
- 3 major cell lines:
- Myeloid: neutrophils, monocytes, eosinophils etc.
- Erythroid: red blood cells
- Megakaryocytic: platelets
- You can work out the functions of these cells; and what may happen if the marrow is unable to produce functioning cells –> this leads to specific **clinical manifestations of disease**

2. What are the **Major Diseases** in the Bone Marrow?
- Leukopaenia: Decreased circulating white blood cells (eg. caused by drug related bone marrow suppression – chemotherapy)
- Leukaemia:
- Malignancy of the haematopietic system which are primarily disorders of the bone marrow
- Present with widespread involvement of the bone marrow and usually with large numbers of tumour cells circulating in peripheral blood

3. Whoa! There are so many types of leukaemia…. how to remember?!? **–> Classify!! … it's not too bad, there are only 4 main types:**
1. Myeloid or Lymphoid
2. Acute (usually precursor cells – Myeloid or lymphoid) or Chronic (usually mature cells – Myeloid or lymphoid

eg. Acute myelogenous leukaemia; Chronic myelogenous leukaemia
How do we know what type of leukaemia we are looking at?
– Clinical presentation
– Examining the tissue (eg. bone marrow, peripheral blood)
4. How do these **manifest clinically (symptoms)?**
- Acute leukaemias: Suppression of marrow function –> work it out based on the cells produced!
  Need **fast** detection and treatment or else rapidly fatal
- Chronic leukaemias: Non-specific systemic symptoms

II. Other organs
Apply similar principles to the other organs in the lymphoreticular system; asking specific questions on components; function; major diseases and clinical manifestations.
Spleen
Thymus
Mucosa Associated Lymphoid Tissue

Exercises and Talking POTS
https://medicine.nus.edu.sg/pathweb/pathology-demystified/haematolymphoid-system-lymph-nodes/ii-haematolymphoid-system-exercises-and-talking-pots/

Haematolymphoid System Quiz
https://medicine.nus.edu.sg/pathweb/pathology-demystified/haematolymphoid-system-lymph-nodes/haematolymphoid-system-quizzes/