



Immune System Practical - I

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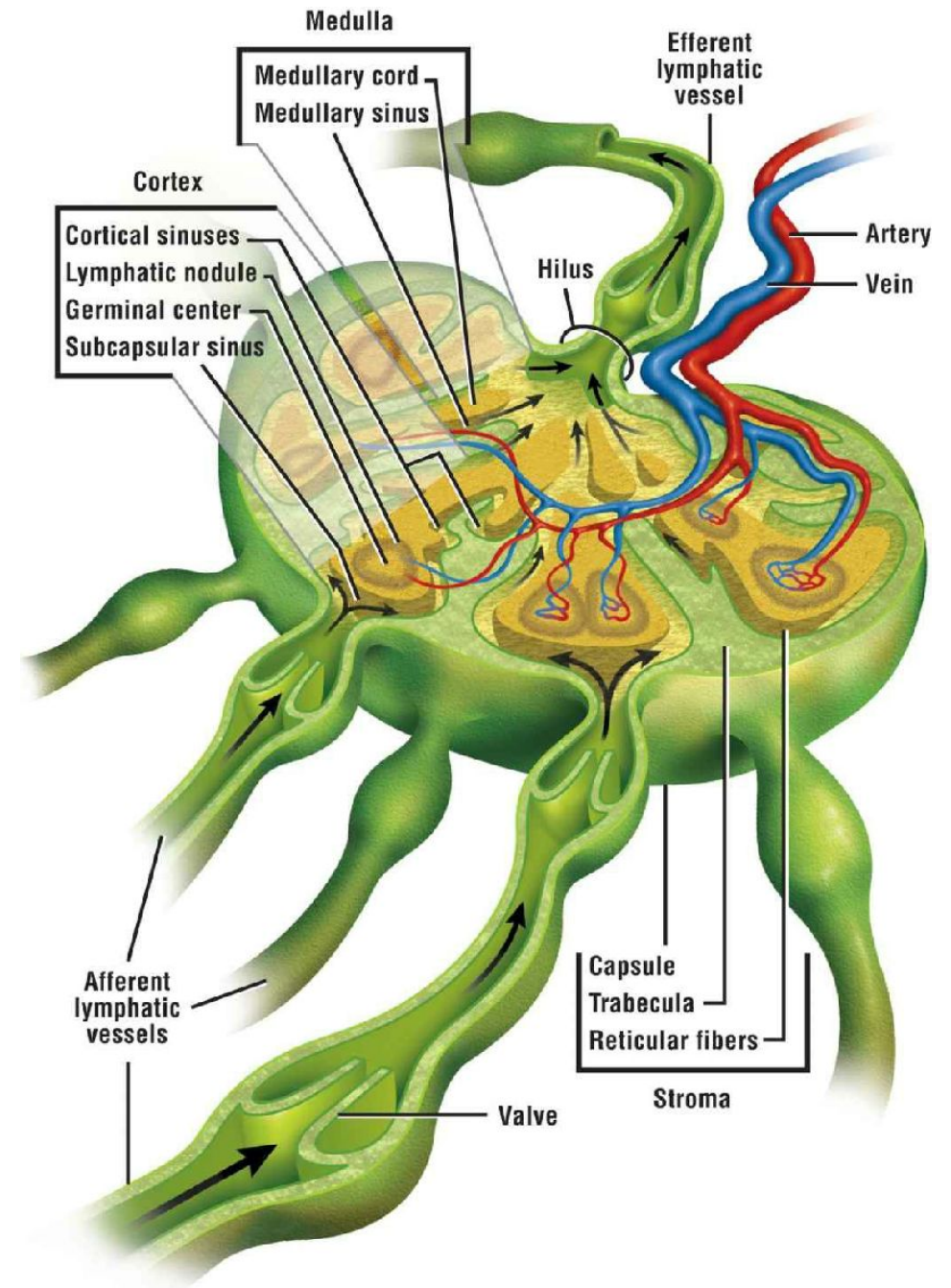
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ORGANS OF IMMUNE SYSTEM:

- LYMPH NODES**
- THYMUS**
- SPLEEN**
- PALATINE TONSILS**

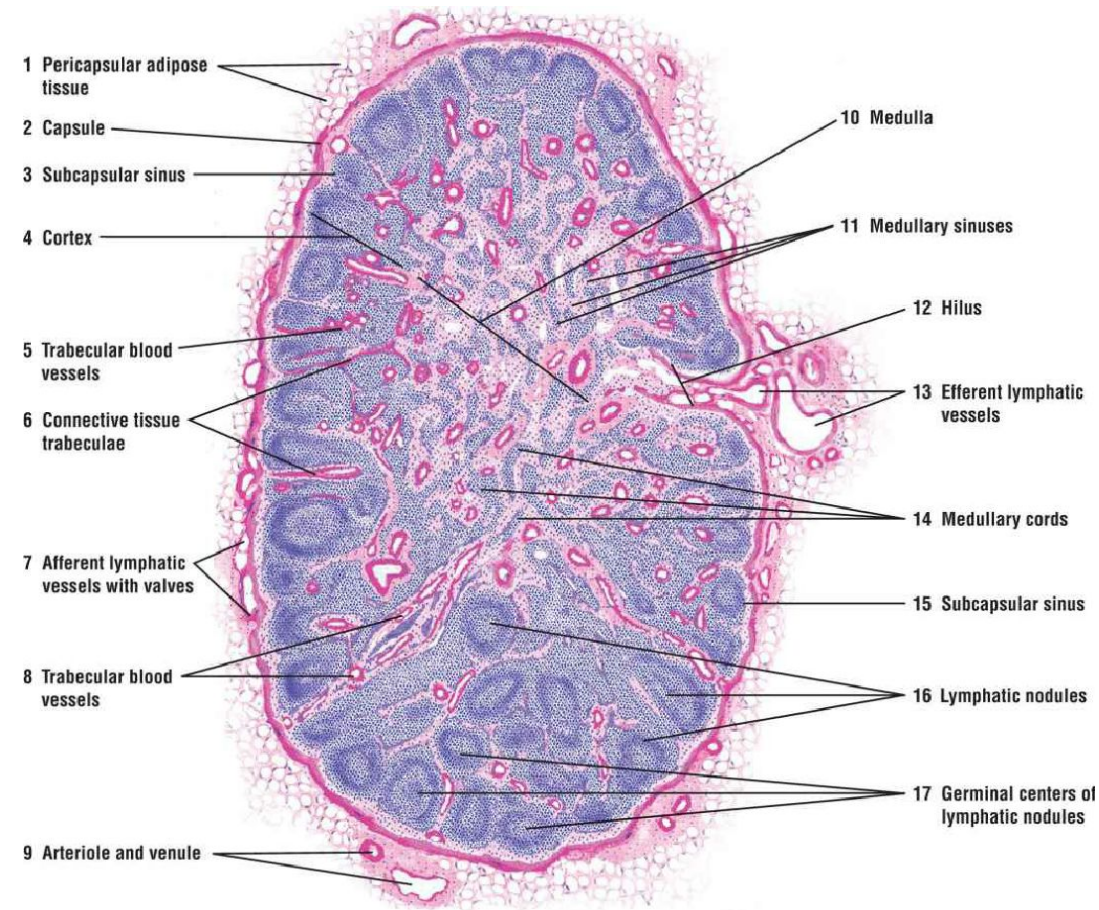
Lymph Nodes

- The **lymph nodes** are widely distributed and are primarily found along the paths of lymphatic vessels that are prominent in inguinal and axillary regions.
- **Afferent lymphatic vessels with valves** course in the connective tissue capsule of the lymph node and, at intervals, penetrate the capsule to enter a narrow **subcapsular sinus**.
- From here, the sinuses (cortical sinuses) extend along the trabeculae into the **medullary sinuses**.
- Lymph exit the lymph node on the opposite side via the **efferent lymphatic vessels**.

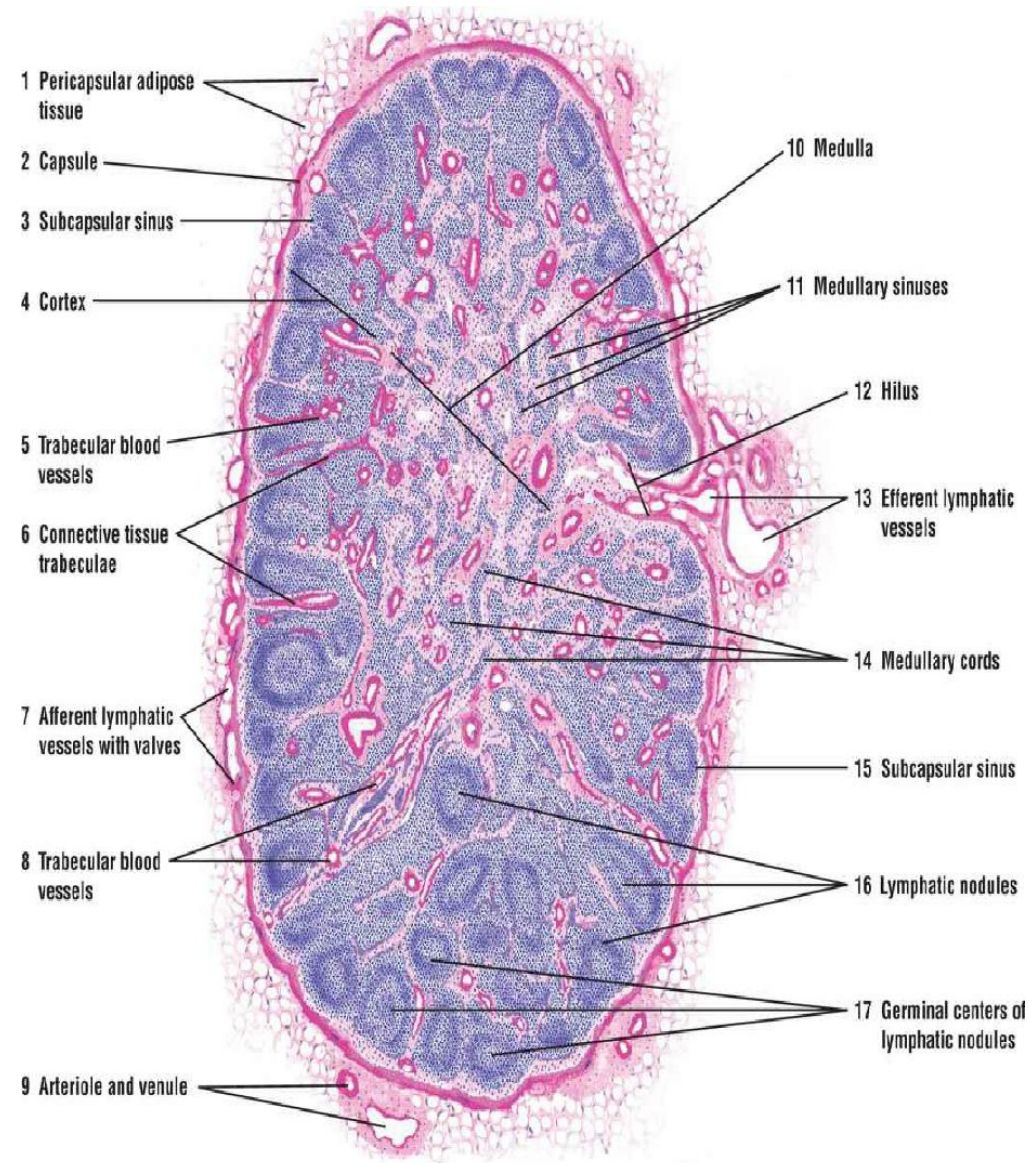


Lymph node (panoramic view). Stain: hematoxylin and eosin. Medium magnification.

- The lymph node is surrounded by a **pericapsular adipose tissue** with numerous blood vessels.
- A connective tissue **capsule** surrounds the lymph node and sends its **trabeculae** into its interior.
- From the capsule, **connective tissue trabeculae** extend into the node, initially between the lymphatic nodules and then throughout the medulla.
- The trabecular connective tissue also exhibits the major **blood vessels**.



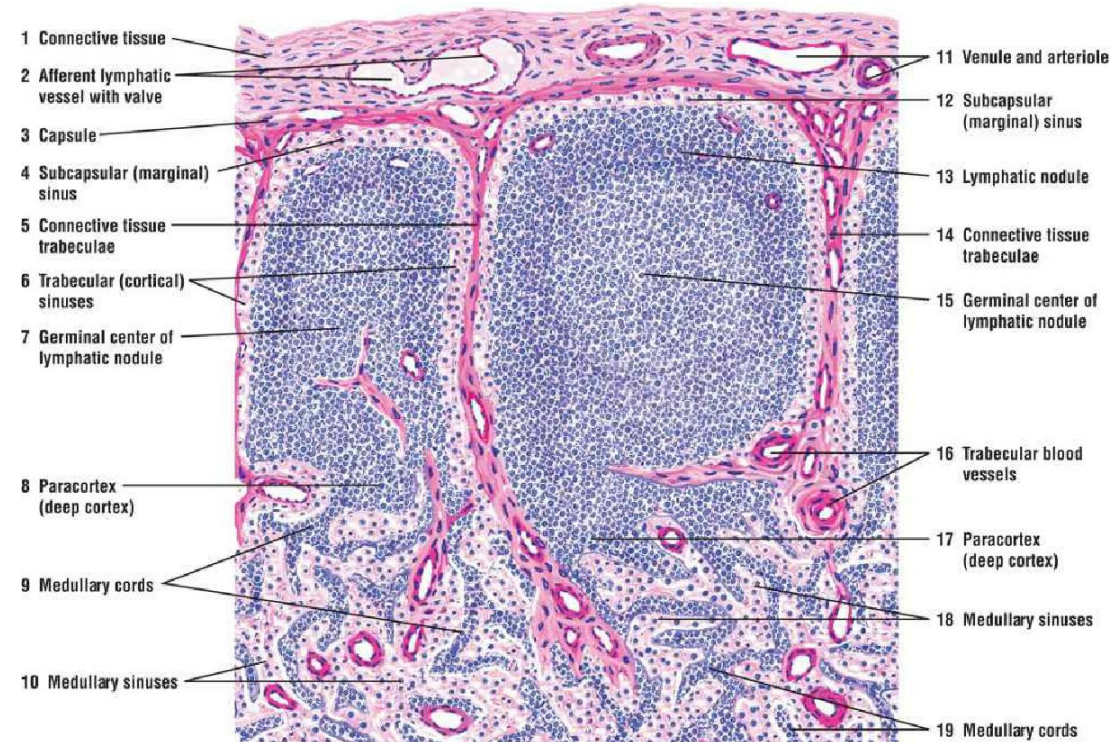
- The lymph node consists of lymphocyte aggregations intermixed with dilated lymphatic sinuses that contain lymph and are supported by a framework of fine reticular fibers.
- A lymph node cut in half shows the outer dark-staining **cortex** and the inner light-staining **medulla**.
- The lymph node cortex contains numerous lymphocyte aggregations called **lymphatic nodules**.
- In the medulla of the lymph node, the lymphocytes are arranged as irregular cords of lymphatic tissue called **medullary cords** that contain macrophages, plasma cells, and small lymphocytes.
- The dilated **medullary sinuses** drain the lymph from the cortical region of the lymph node and course between the medullary cords toward the concavity of the lymph node, the **hilus**.



Lymph node: capsule, cortex, and medulla (sectional view).

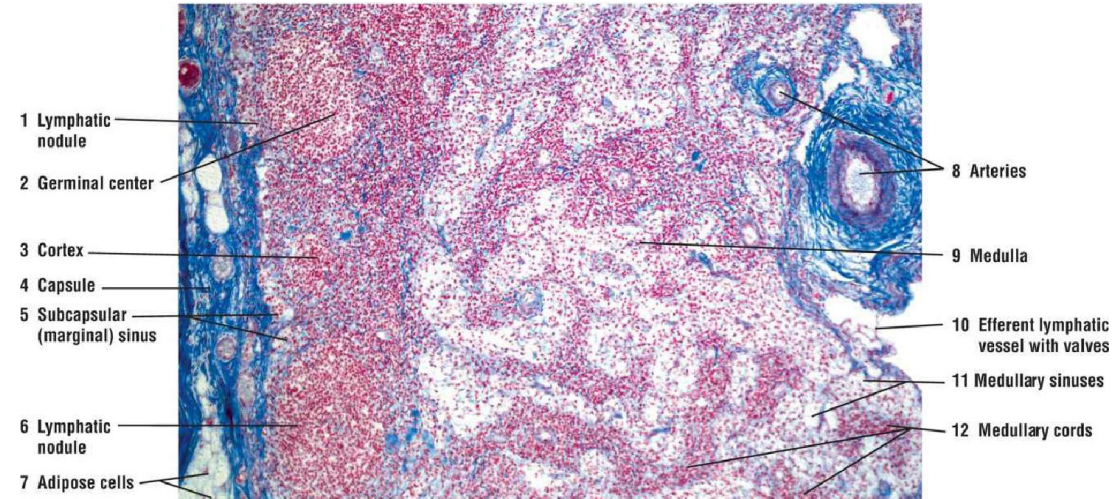
Stain: hematoxylin and eosin. Medium magnification.

- A layer of **connective tissue** with a **venule** and an **arteriole** surrounds the lymph node **capsule**.
- The cortex consists of B cell–rich **lymphatic nodules**.
- Some lymphatic nodules exhibit a central, light-staining **germinal center** surrounded by a denser-staining peripheral portion.
- The deeper portion of the lymph node cortex is the **paracortex**, a thymus-dependent zone primarily occupied by T cells.
- The medulla consists of anastomosing cords of lymphatic tissue, the medullary cords, interspersed with **medullary sinuses** that drain the lymph from the node into the efferent lymphatic vessels in the hilus.



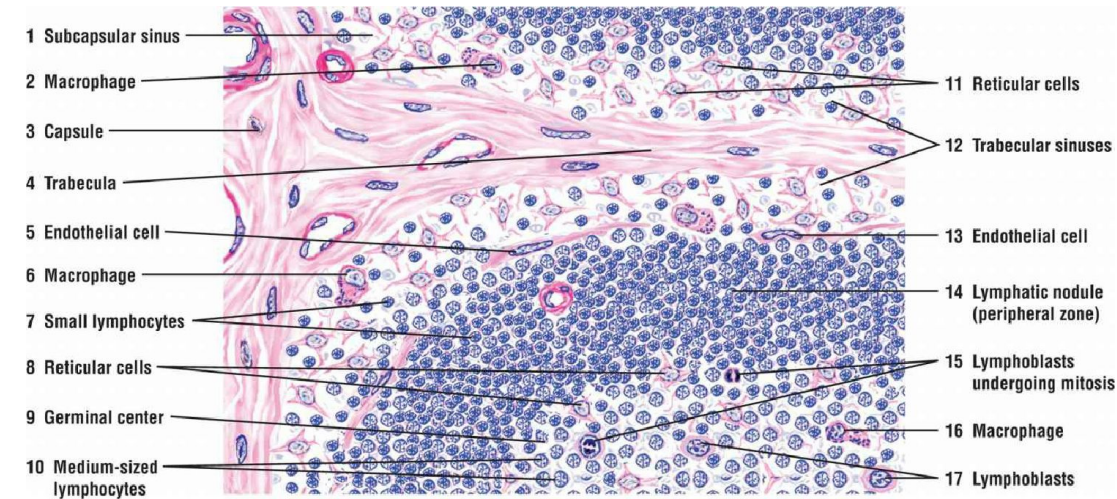
Cortex and medulla of a lymph node. Stain: Mallory-Azan.

- A loose connective tissue **capsule** with blood vessels and **adipose cells** covers the lymph node.
- The cortex exhibits numerous **lymphatic nodules**, some with a lighter-staining **germinal center**.
- The central region of the lymph node is the lighter-staining **medulla**, characterized by the dark-staining **medullary cords** and the light-staining lymphatic channels, the **medullary sinuses**.



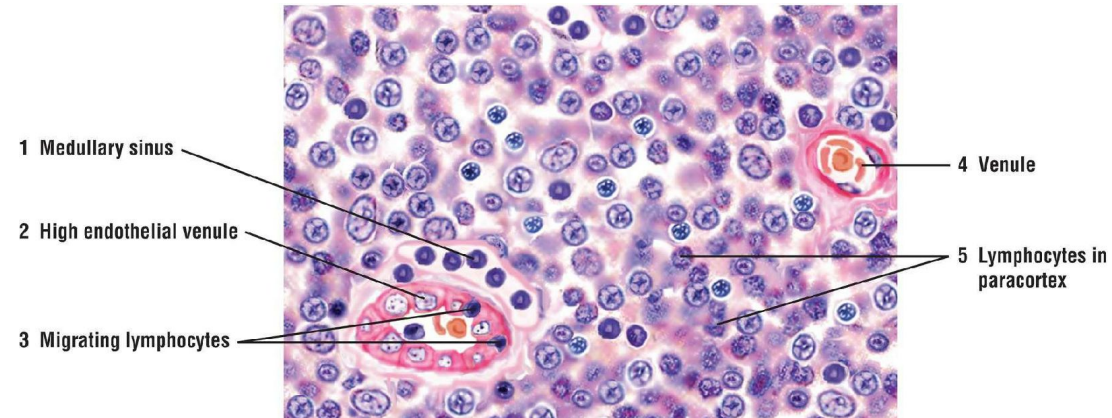
Lymph node: subcapsular sinus, trabecular sinus, reticular cells, and lymphatic nodule. Stain: hematoxylin and eosin. High magnification.

- The **reticular cells**, is seen in different regions of the node. They are visible in the subcapsular sinus, trabecular sinuses, and the germinal center of the lymphatic nodule.
- Numerous free **macrophages** are seen in the subcapsular sinus, trabecular sinuses, and the germinal center of the lymphatic nodule.
- **Endothelial cells** line the sinuses and form an incomplete cover over the surface of the lymphatic nodules.
- The dense peripheral zone of the lymphatic nodule contains an aggregation of **small lymphocytes**.
- The germinal center of the lymphatic nodule contains **medium-sized lymphocytes**.
- The largest cells, with less condensed chromatin, are the **lymphoblasts** visible in the germinal center as large cells with a broad band of cytoplasm and a large vesicular nucleus with one or more nucleoli.



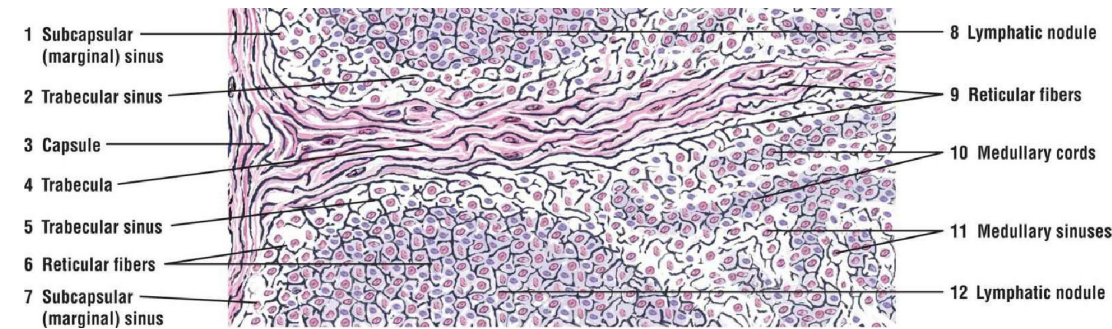
Lymph node: high endothelial venule in the paracortex (deep cortex) of a lymph node. Stain: hematoxylin and eosin. High magnification.

- The paracortex of lymph nodes contains postcapillary venules with an unusual morphology to facilitate the **migration of lymphocytes** from the blood into the lymph node.
- **high endothelial venule** lined by tall cuboidal endothelium, instead of the usual squamous endothelium.
- Several **migrating lymphocytes** are seen moving through the venule wall between the high endothelium into the **paracortex**.
- Surrounding the high endothelial venule are **lymphocytes** of the paracortex, a **medullary sinus**, and a **venule** with blood cells.



Lymph node: subcapsular sinus, trabecular sinus, and supporting reticular fibers. Stain: silver stain. Medium magnification.

- Both the capsule and the lymph node are supported by delicate reticular fibers that stain black and form a fine meshwork throughout the organ.
- A connective tissue **trabecula** from the capsule penetrates the interior of the lymph node between two **lymphatic nodules**.
- Inferior to the capsule are **subcapsular (marginal) sinuses** that continue on each side of the trabecula as **trabecular sinuses** into the medulla of the node and eventually to exit through the efferent lymph vessels in the hilum.
- **Medullary cords** and **medullary Sinuses** are visible



THANK YOU