



College of Medicine  
Second course  
Stage 2

# lymph nodes

## Lab 9

## Immune tissue :Lymphoid tissue

The cells of the immune system are distributed throughout the body in form of:

1. The blood, lymph , epithelial and connective tissues.
2. Arranged in small spherical nodules called **lymphoid nodules** found inside the mucosa of the digestive system ( the tonsils, Peyer's patches, and appendix), the respiratory system, the reproductive system, and the urinary system
3. Or organized in larger **lymphoid organs** ,the lymph nodes, the spleen, the thymus, and the bone marrow.

# Lymph Node: Histological Structures

## Functional Organization:

1. Lymph nodes function as filters for lymph fluid,
2. site for antigen recognition
3. and immune response activation.

## L N Structure:

**Capsule and Trabeculae:** Dense fibrous tissue, outer covering that extends inward, dividing the node into compartments and carrying blood vessels.

**Subcapsular Sinus:** Located just beneath the capsule, this space receives lymph from the afferent vessels and directs it to the cortical sinuses.

For lymph filtration

**Cortex:** The **outer cortex** region containing B-lymphocyte follicles. The Primary follicles are inactive, while the secondary follicles are contain **germinal centers** ( lighter-stained area in their center) have active sites of B-cell proliferation and differentiation).

# Lymph Node: Histological Structures

**Paracortex (Inner Cortex):** The zone between the cortex and medulla, rich in **T-lymphocytes and dendritic cells**. It contains specialized high endothelial venules (HEVs), which allow lymphocytes to enter from the blood.

## **Medulla:**

The central region, consisting of

- A. **medullary cords** (plasma cells, macrophages, B-cells) and
- B. **medullary sinuses** (lymphatic channels carrying filtered lymph toward the efferent vessel).

## **Lymph circulation:**

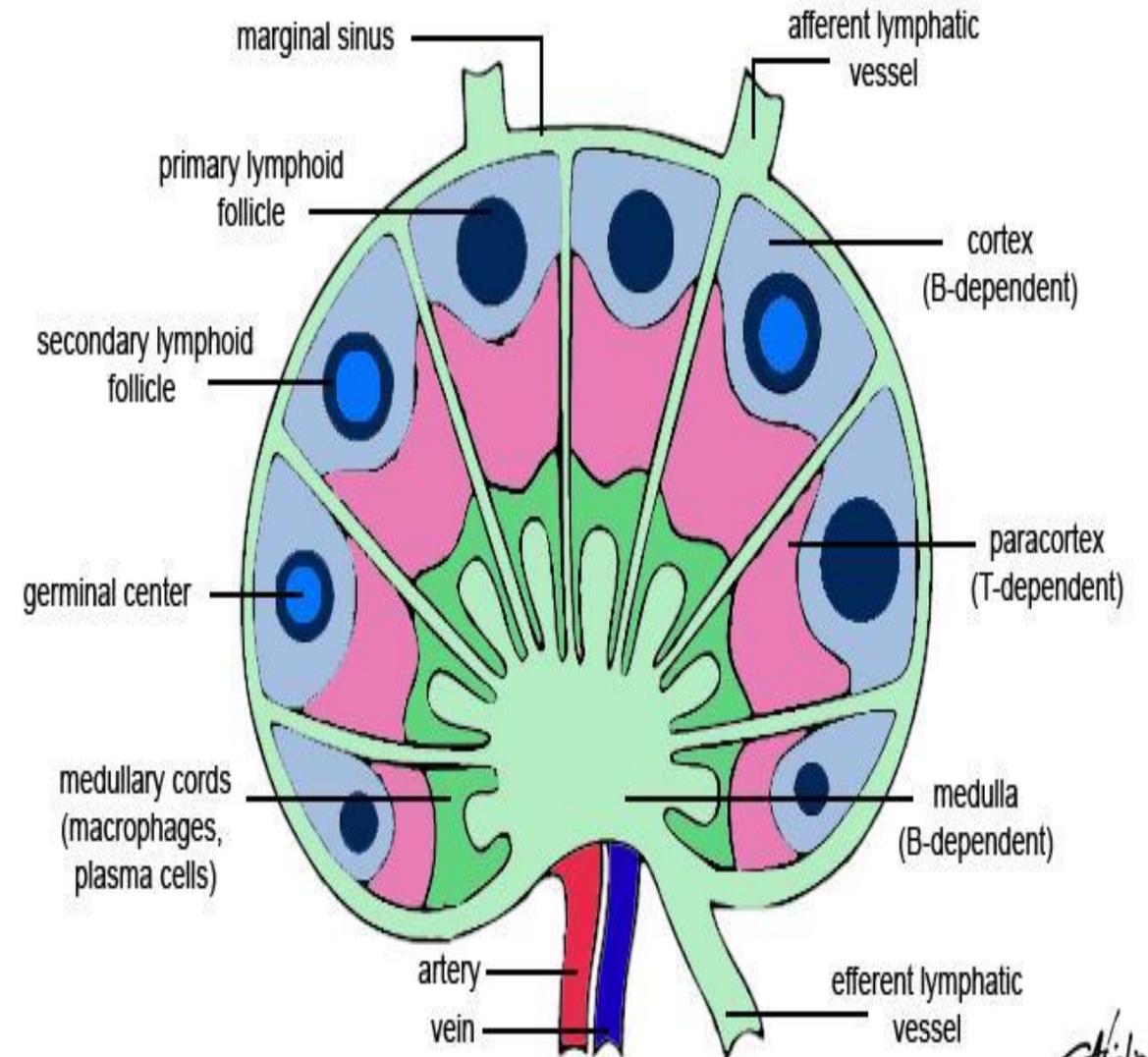
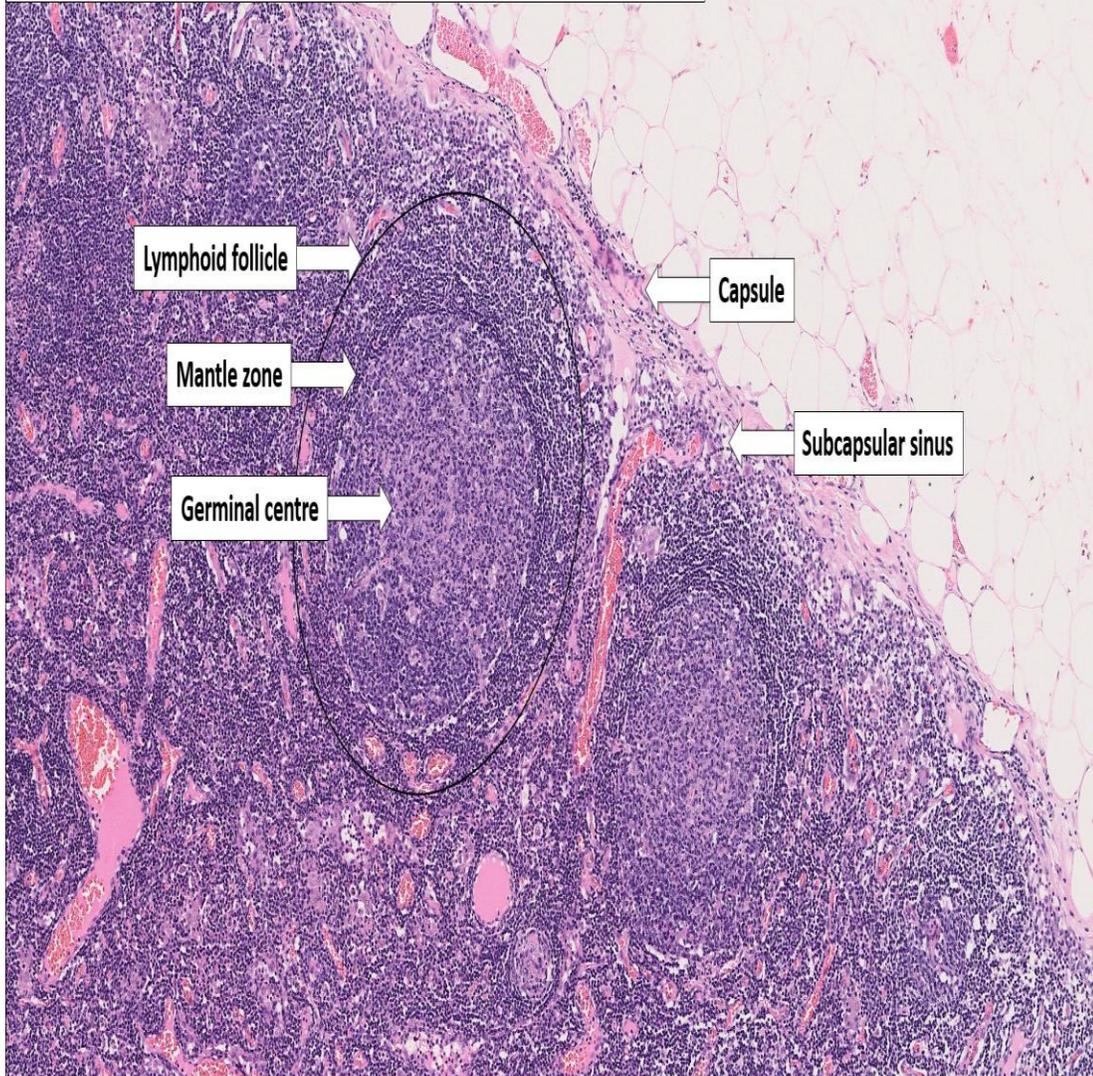
The lymph enters through the convex side of the node and leaves through the hilum.

The lymph infiltrates through the node, exposing its contents to the action of defensive cells (macrophages, lymphocytes, APCs).

# Lymph Node: Histological Structures

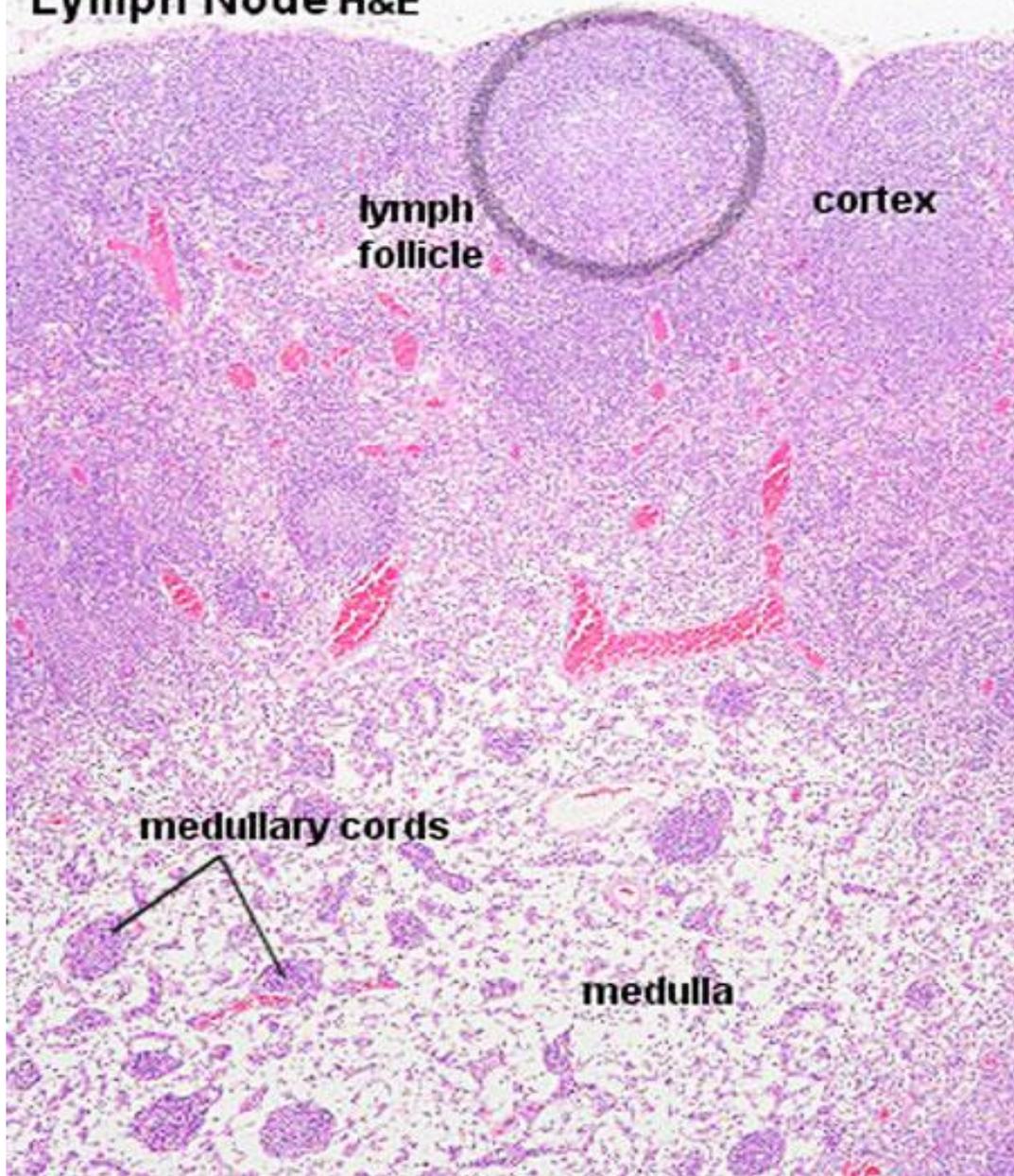
Lymph node (high power):

Cortex, showing lymph node capsule, subcapsular sinuses and lymphoid follicles.



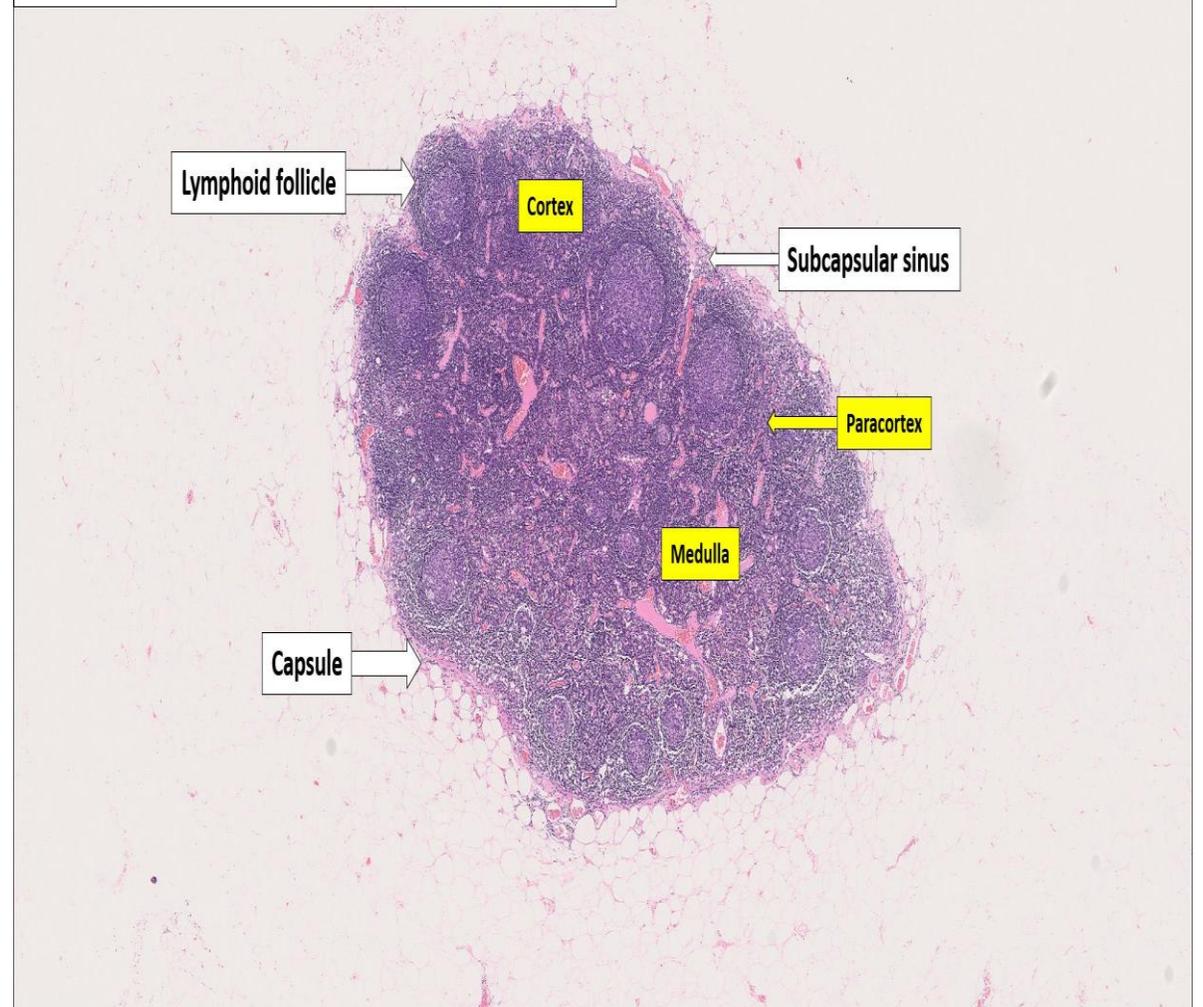
*E. Vignar*

## Lymph Node H&E



### Lymph node (low power):

Cortex comprising lymphoid follicles (B cells), paracortex (T cells) and medulla (macrophages and plasma cells).

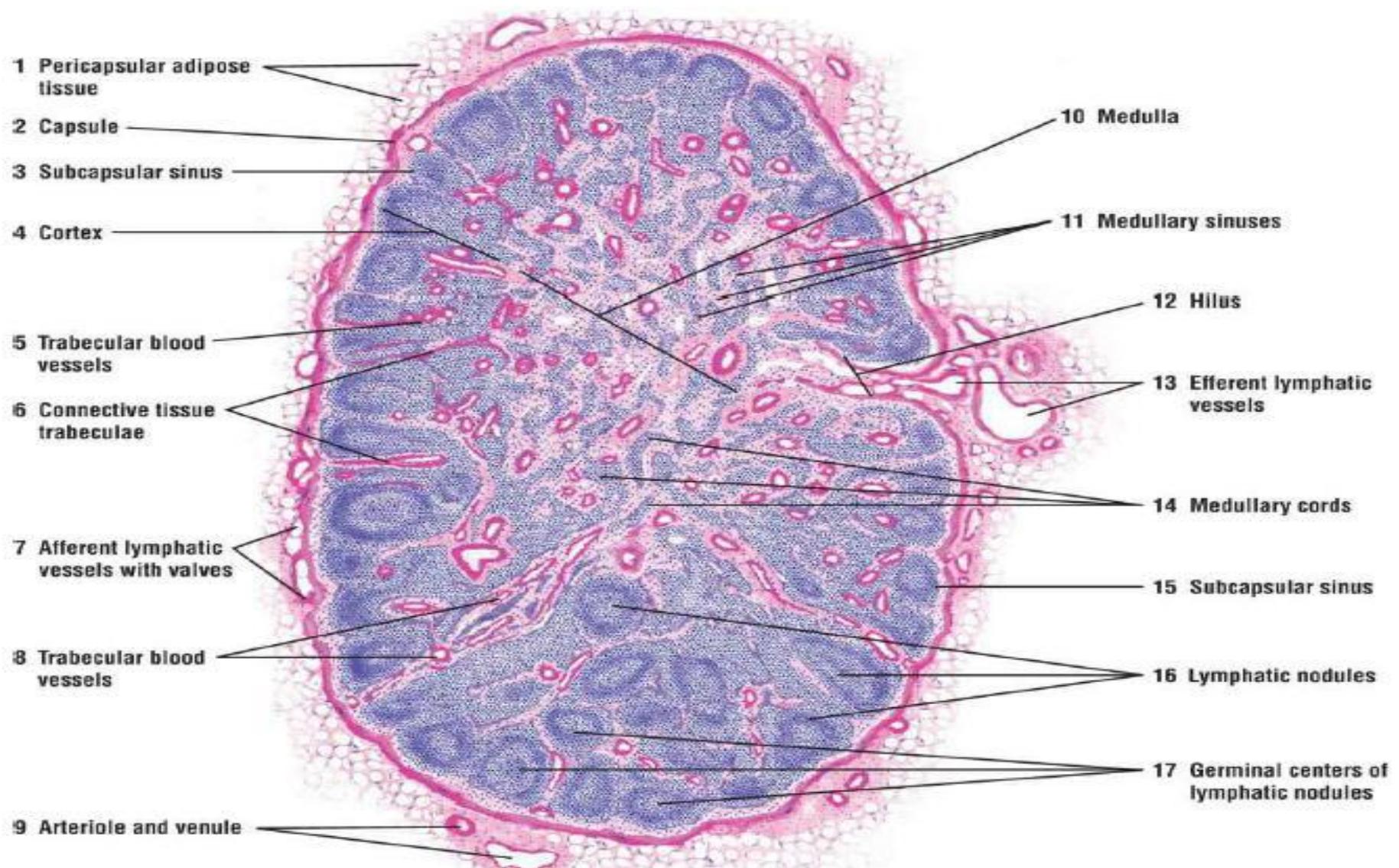


## **Microscopic Appearance (H&E Stain):**

**Cortex:** Darkly stained due to dense, small lymphocytes.

**Medulla:** Lighter, with a more open, lacy appearance compared to the dense cortex.

**Reticular Framework:** A fine, collagenous network (Type III collagen) supports the lymphoid cells, typically viewed with silver staining rather than H&E







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# The spleen

## Lab 10

# Spleen Histology

The spleen is an encapsulated organ that filters blood and provides immunological monitoring.

**Capsule:** dense connective tissue enclosing the organ.

**Trabeculae:** connective tissue that extends inward from the capsule throughout the spleen and with blood vessels (the splenic Vein and artery) enter the pulp.

**White Pulp:** composed of lymphatic tissue. It appears basophilic due to the large number of nuclei. **It contains T-cells primarily**

**Red Pulp: (Eosinophilic):** Consists of splenic cords (of Billroth) and splenic sinusoids. It filters blood by removing damaged red blood cells (RBCs) using macrophages

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# Spleen histology continue

**Splenic Nodules** : clusters of B lymphocytes located on central arterioles.  
They usually contain **Germinal center** of activated B lymphocytes.

**Central Arterioles** : branches of trabecular arteries adjacent to nodules.

**Periarteriolar Lymphatic Sheath (PALS)**; Mass of mature T lymphocytes that surrounds central arterioles.

**Marginal Zoon** : region between white and red pulp where macrophages, dendritic cells, and lymphocytes interact.

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**Splenic Sinusoids** : vascular spaces lined by specialized endothelial cells that filter RBCs.

**Splenic cord** : (of Billroth) - loose connective tissue that contains macrophages, plasma cells, and lymphocytes.

**Pulp Arterioles**: they are not surrounded by lymphocytes like central arterioles in white pulp

# Spleen and lymph node

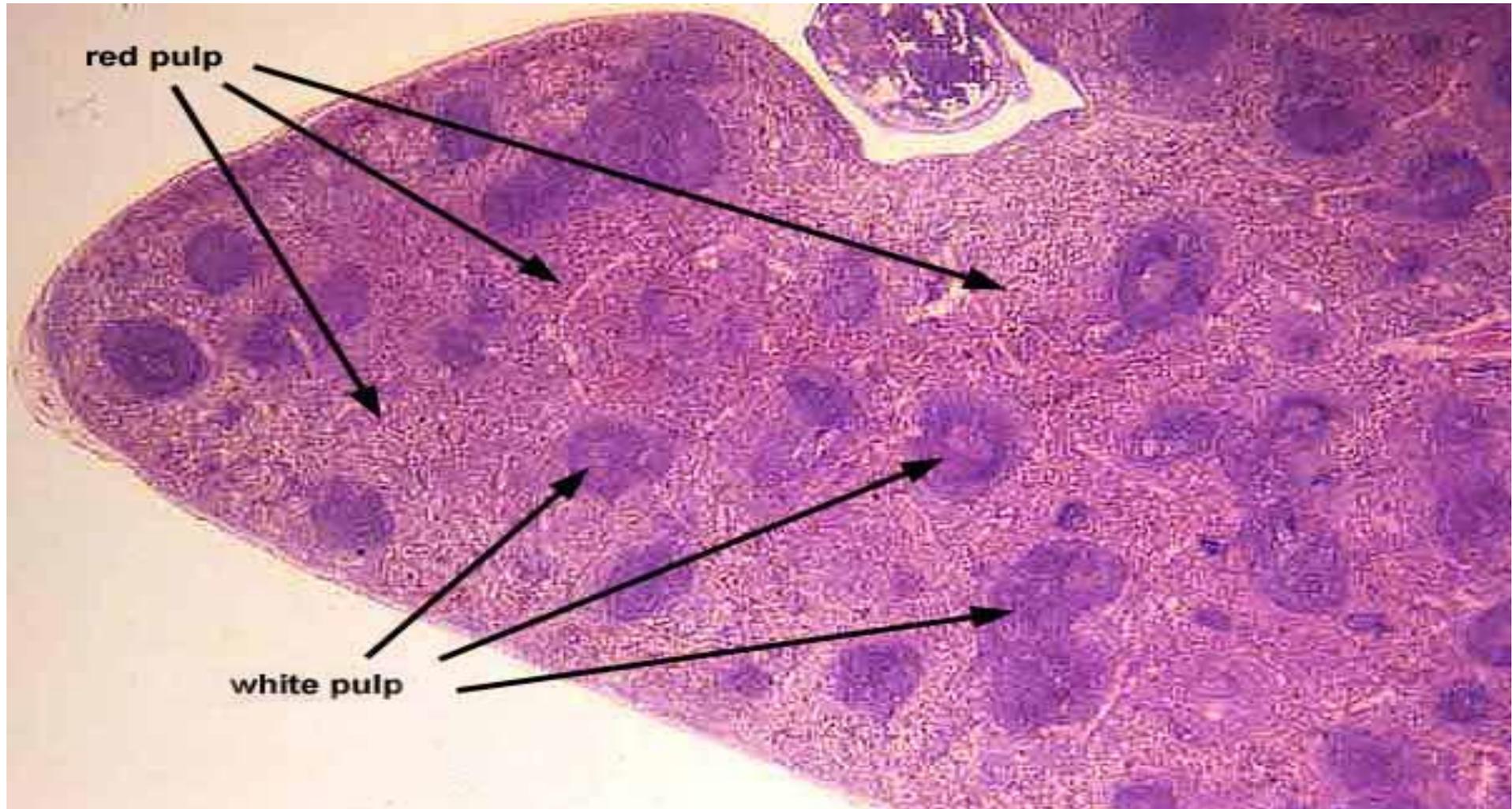
The spleen does not exhibit a cortex and a medulla, as seen in lymph nodes; however, lymphatic nodules are found throughout the organ.

In addition, the spleen contains venous sinuses in contrast to lymphatic sinuses of the lymph nodes.

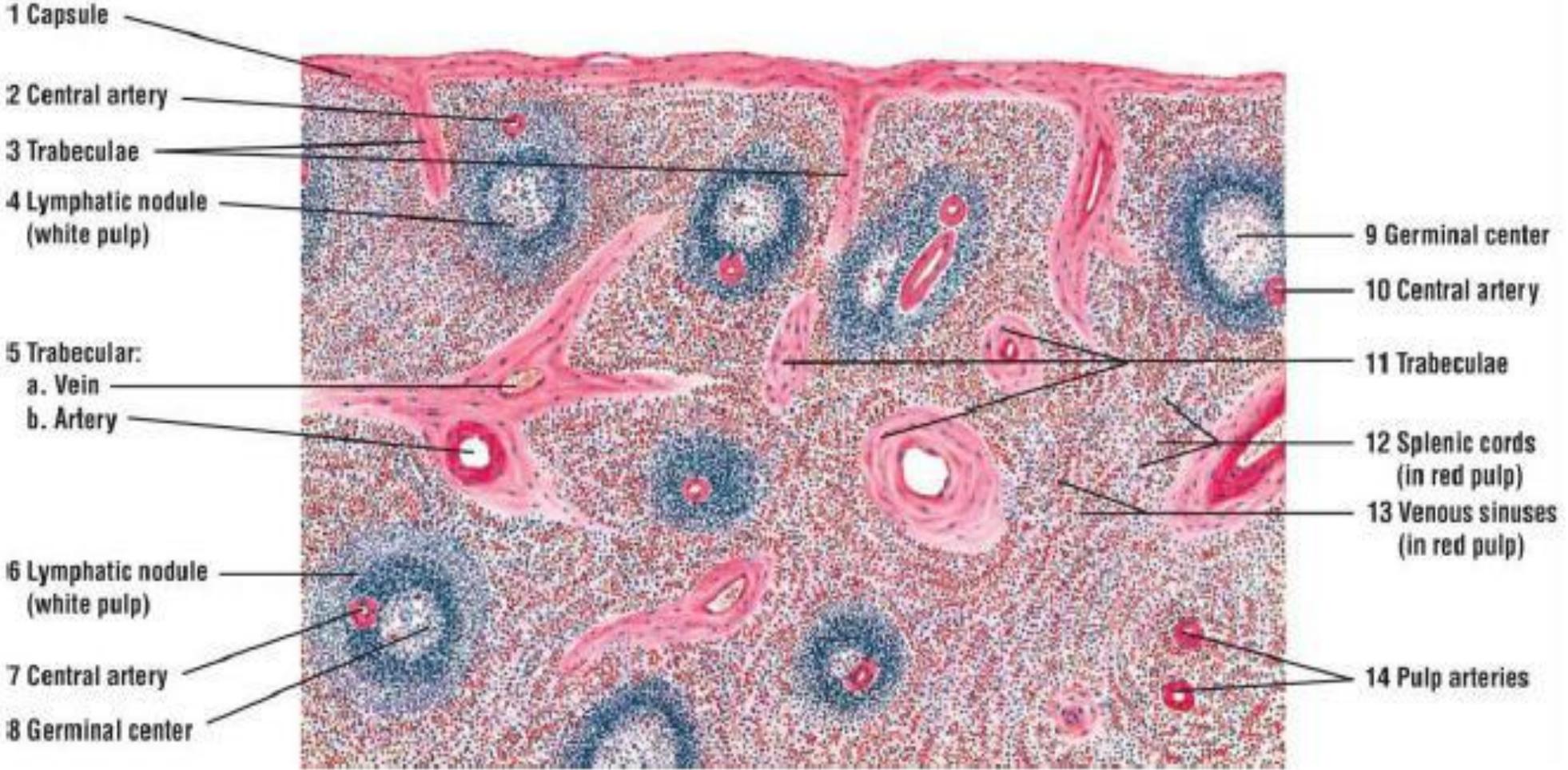
The spleen also does not exhibit subcapsular or trabecular sinuses.

The capsule and trabeculae in the spleen are thicker than those in the lymph nodes and with some smooth muscle fibers.

# Spleen Histology



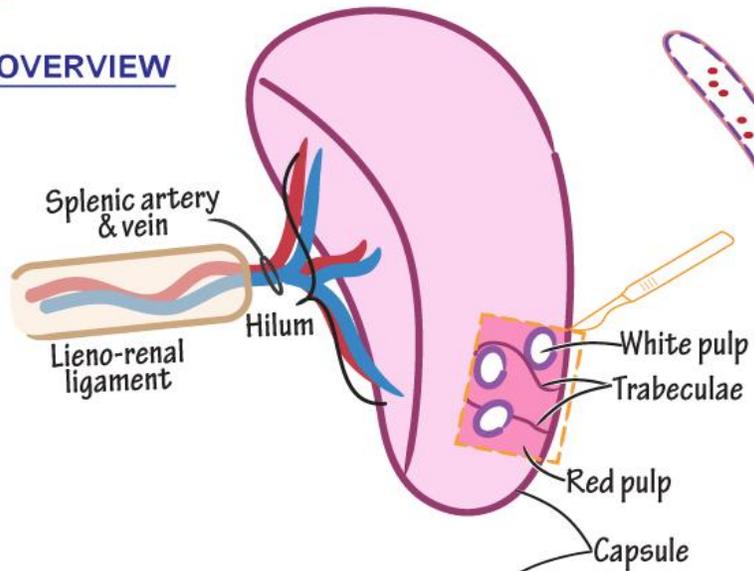
# Spleen Histology





# SPLEEN

## OVERVIEW



## CAPSULE & RED PULP

### Sinusoid

RBC

Endothelial cell

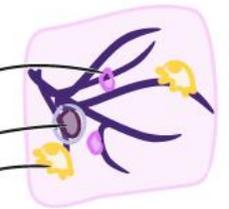
Basement membrane

### Capsule

Collagen  
Elastic  
Smooth muscle fibers  
Mesothelium

### Stroma

Reticular cells & fibers  
Plasma cells  
Macrophages



## WHITE PULP

### Nodule

Lymphocytes (B cells)  
Antigen-presenting cells



Germinal center

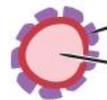
PALS (T cells)

Central Artery

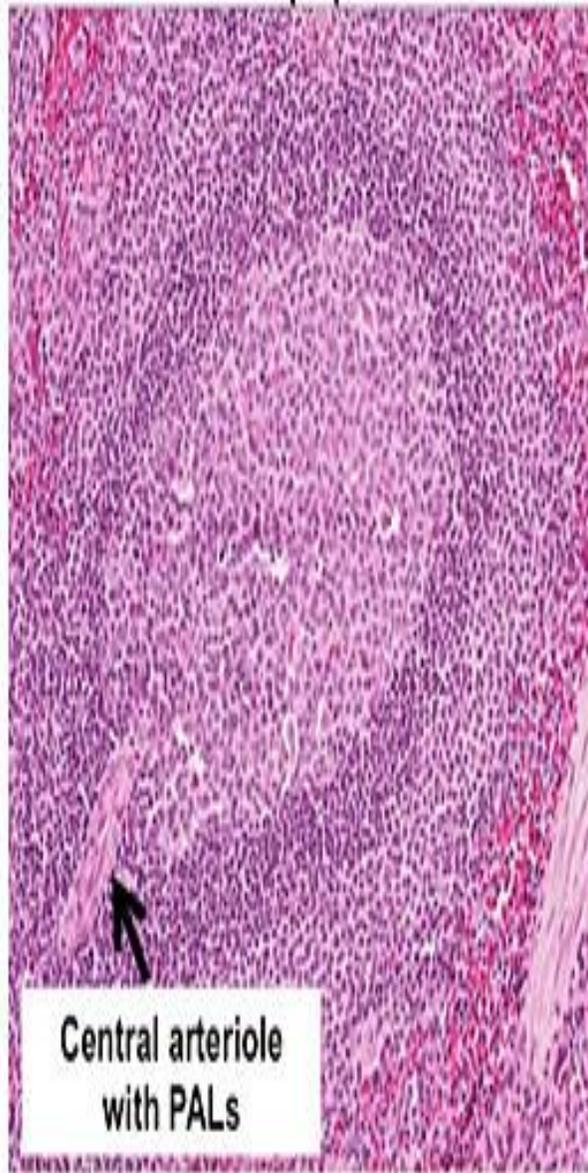
Mantle zone

Marginal zone

Perilymphoid red pulp



White pulp



Red pulp

