College of Medicine
Second course
Stage 2

The spleen and 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 afferent vessels and directs it to cortical sinuses. For lymph filtration

Cortex: The outer cortex region containing B-lymphocyte follicles.
The Primary follicles are inactive, while secondary follicles contain germinal centers (lighter-stained area in their center) is (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

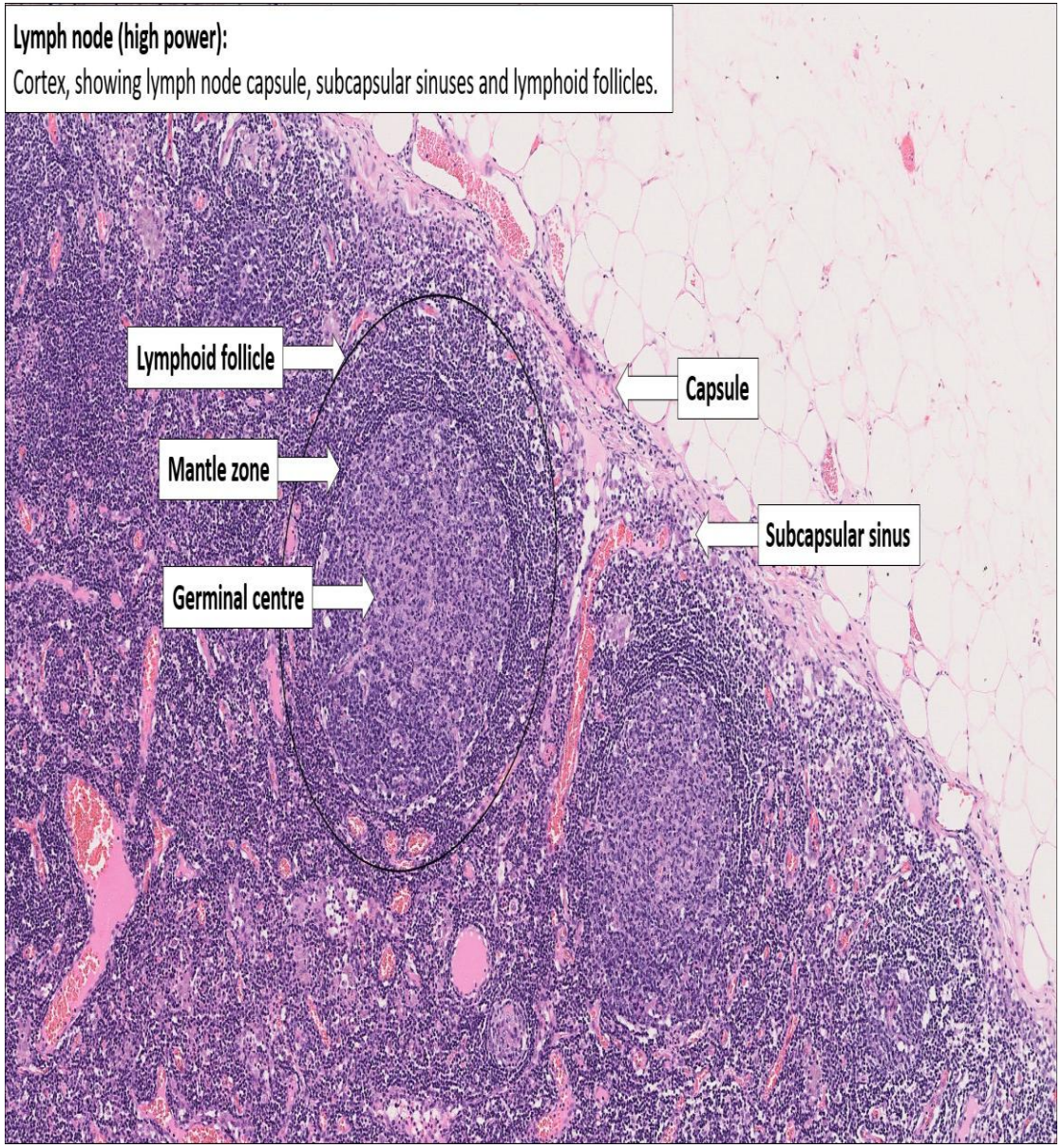
B. medullary sinuses (lymphatic channels carrying filtered lymph toward the efferent vessel).

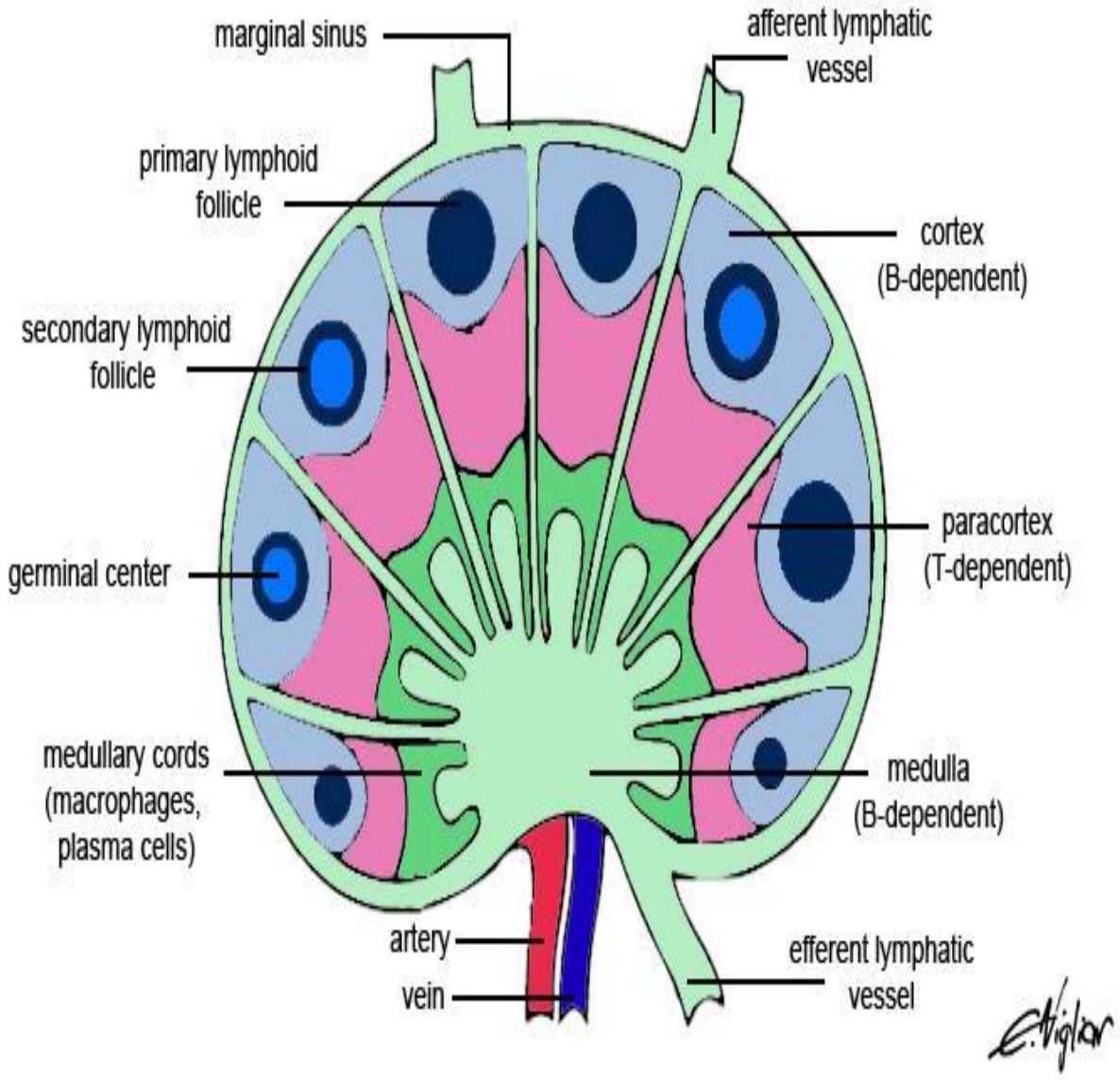
Lymph circulation:

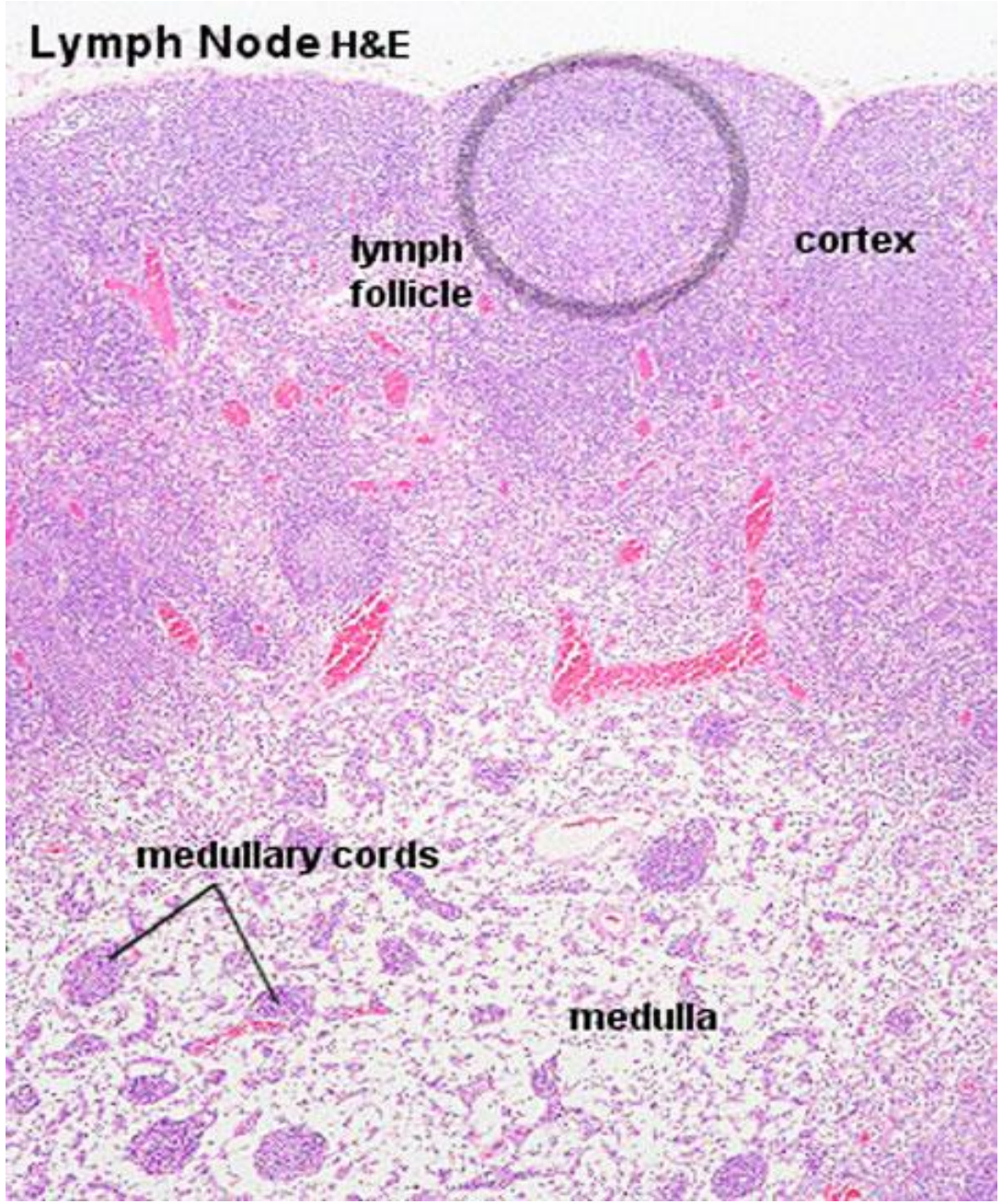
The lymph enters through the convex side of the node and leaves through the hilum.

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

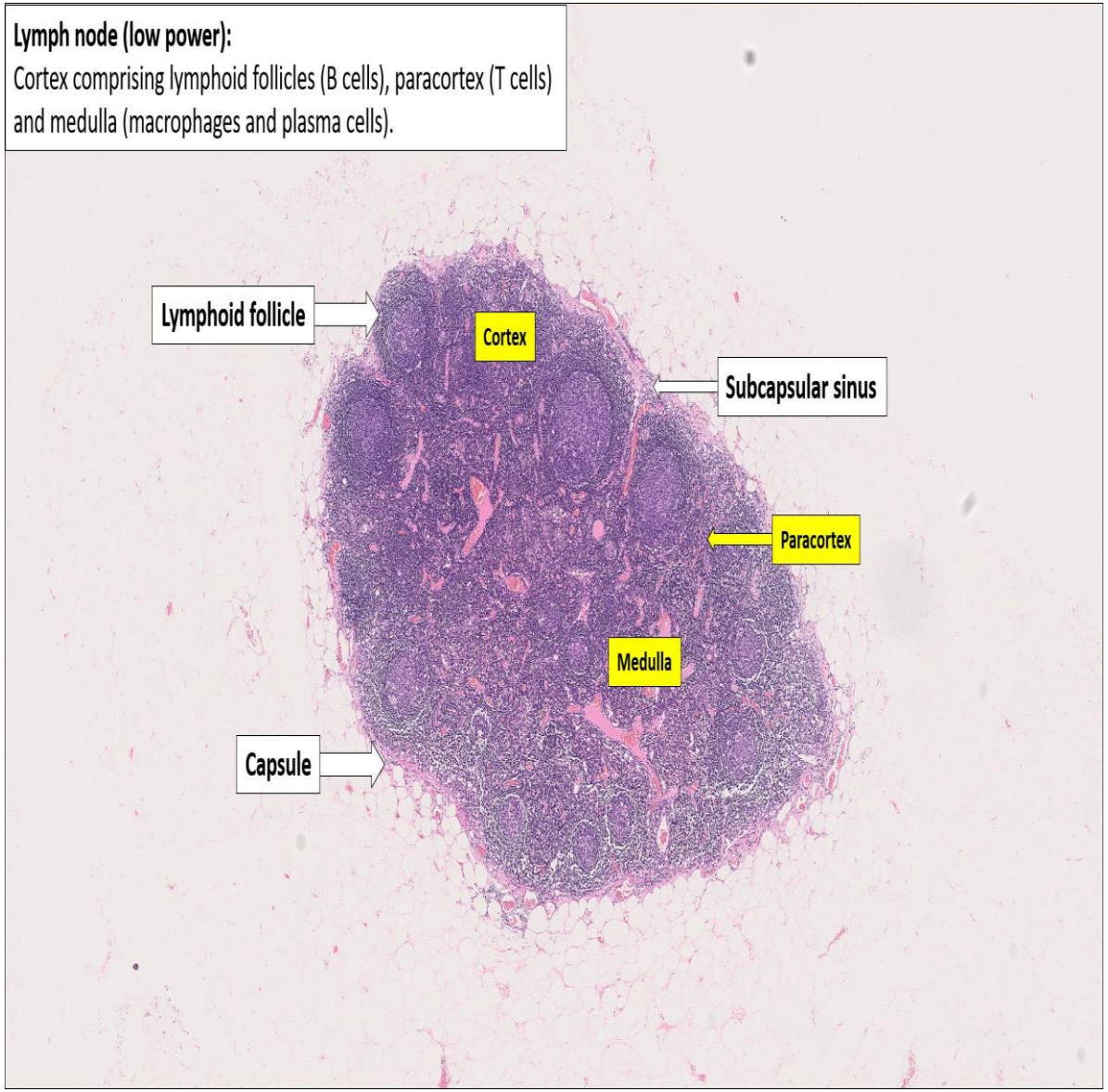
Lymph Node: Histological Structures







Lymph node (low power):
Cortex comprising lymphoid follicles (B cells), paracortex (T cells) and medulla (macrophages and plasma cells).

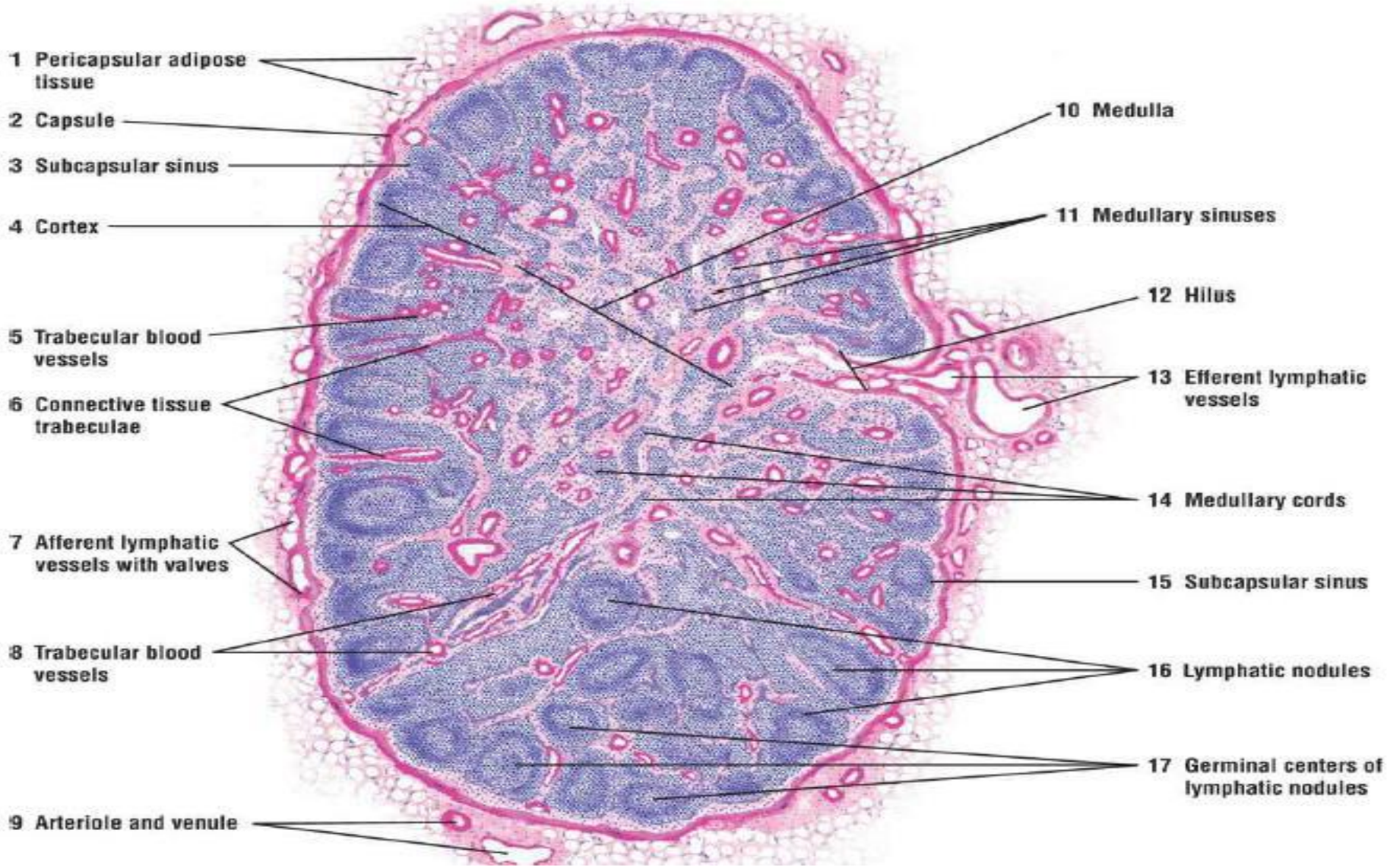


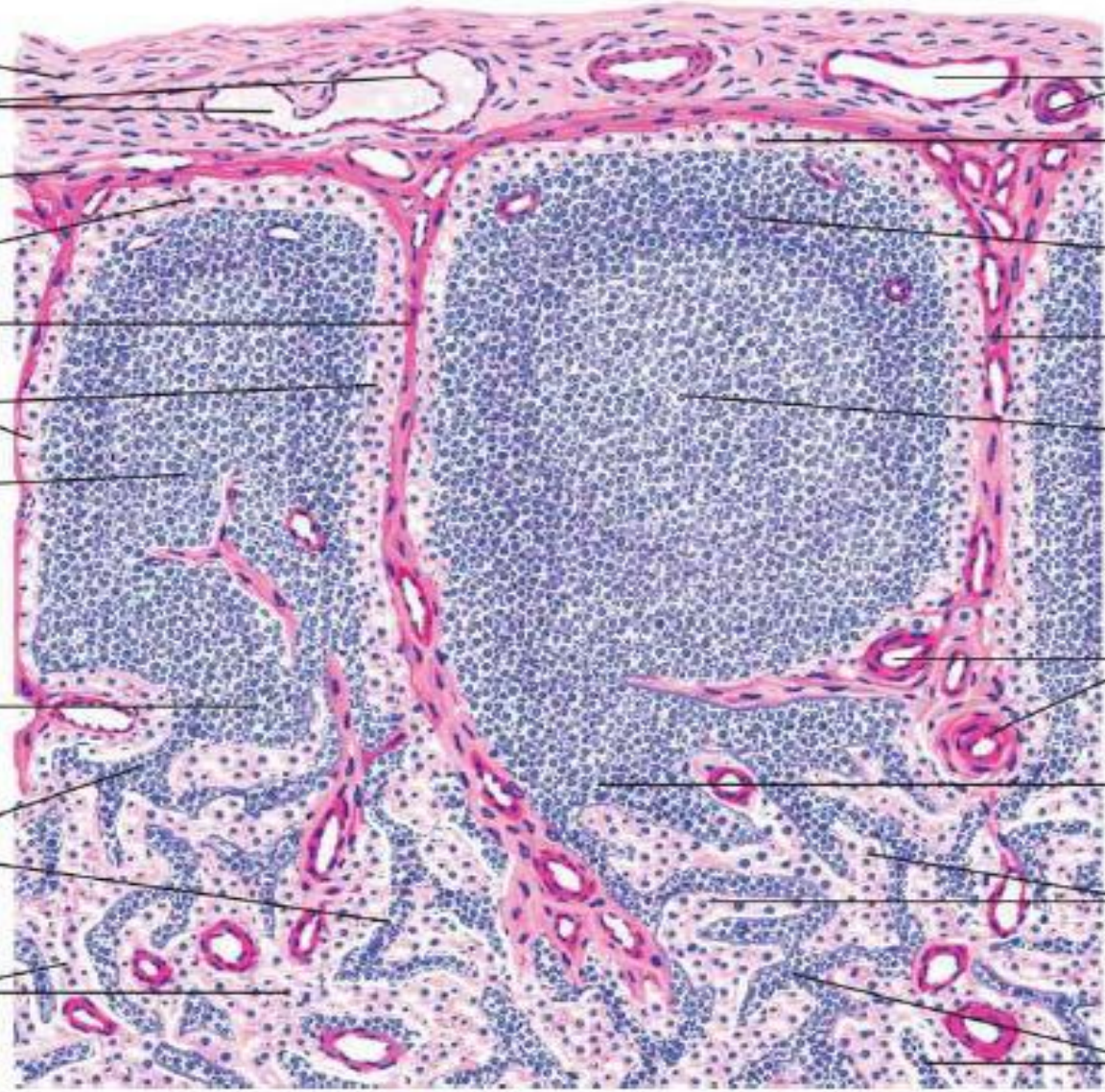
Microscopic Appearance (H&E Stain):

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


1 Pericapsular adipose tissue
2 Capsule
3 Subcapsular sinus
4 Cortex
5 Trabecular blood vessels
6 Connective tissue trabeculae
7 Afferent lymphatic vessels with valves
8 Trabecular blood vessels
9 Arteriole and venule
10 Medulla
11 Medullary sinuses
12 Hilus
13 Efferent lymphatic vessels
14 Medullary cords
15 Subcapsular sinus
16 Lymphatic nodules
17 Germinal centers of lymphatic nodules


1 Connective tissue
2 Afferent lymphatic vessel with valve
3 Capsule
4 Subcapsular (marginal) sinus
5 Connective tissue trabeculae
6 Trabecular (cortical) sinuses
7 Germinal center of lymphatic nodule
8 Paracortex (deep cortex)
9 Medullary cords
10 Medullary sinuses
11 Venule and arteriole
12 Subcapsular (marginal) sinus
13 Lymphatic nodule
14 Connective tissue trabeculae
15 Germinal center of lymphatic nodule
16 Trabecular blood vessels
17 Paracortex (deep cortex)
18 Medullary sinuses
19 Medullary cords

Spleen Histology

The spleen is an encapsulated organ that filters blood and immunologically monitors .

Capsule: dense connective tissue enclosing the organ.

Trabeculae: connective tissue that extends inward from the capsule through out the spleen and which blood vessels(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 primarily T-cells

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

.

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.

.

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

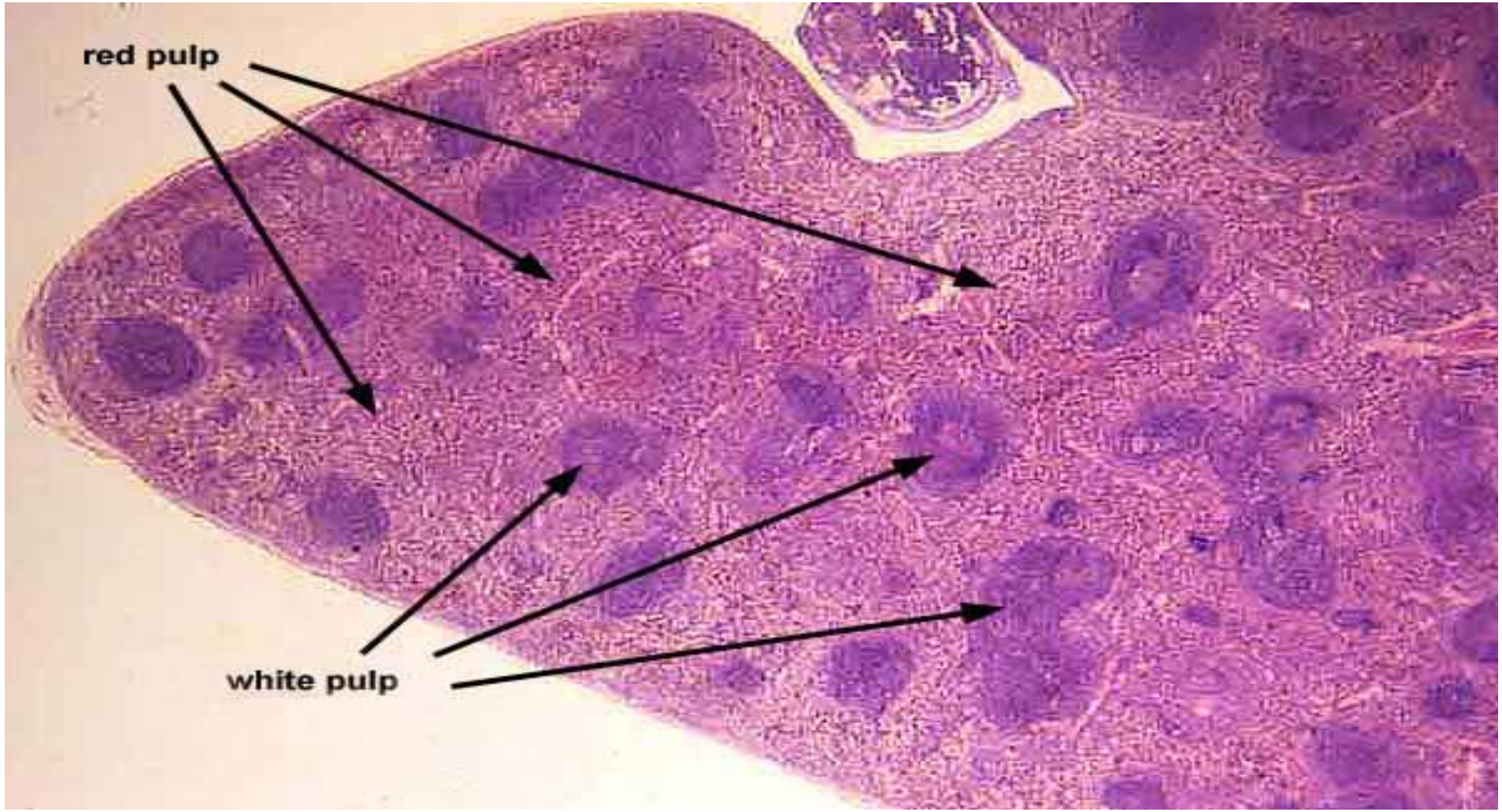
The spleen does not exhibit a cortex and a medulla, as seen in lymph nodes; however, lymphatic nodules are found throughout the organ.

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

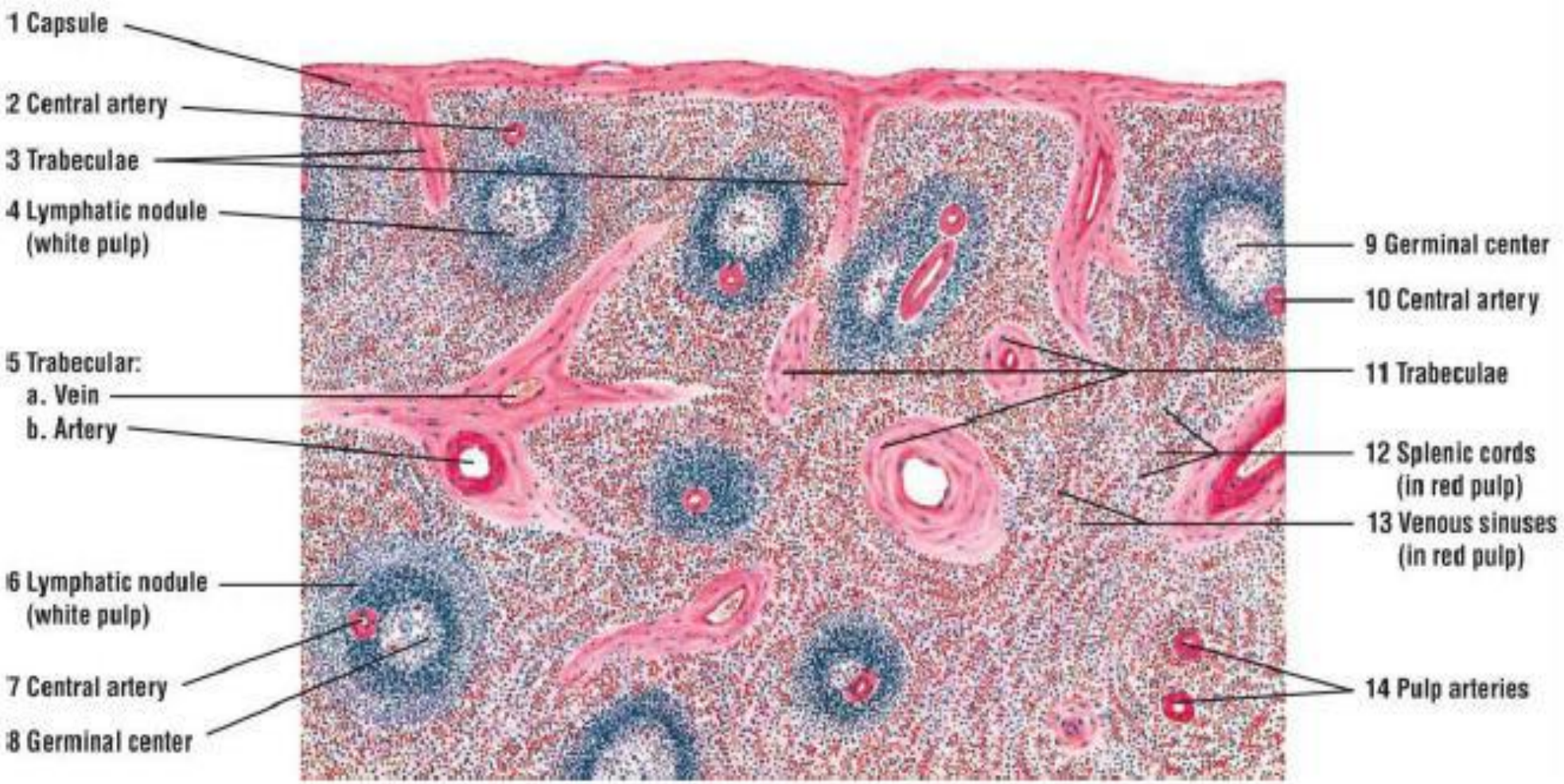
The spleen also does not exhibit subcapsular or trabecular sinuses.

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

Spleen Histology

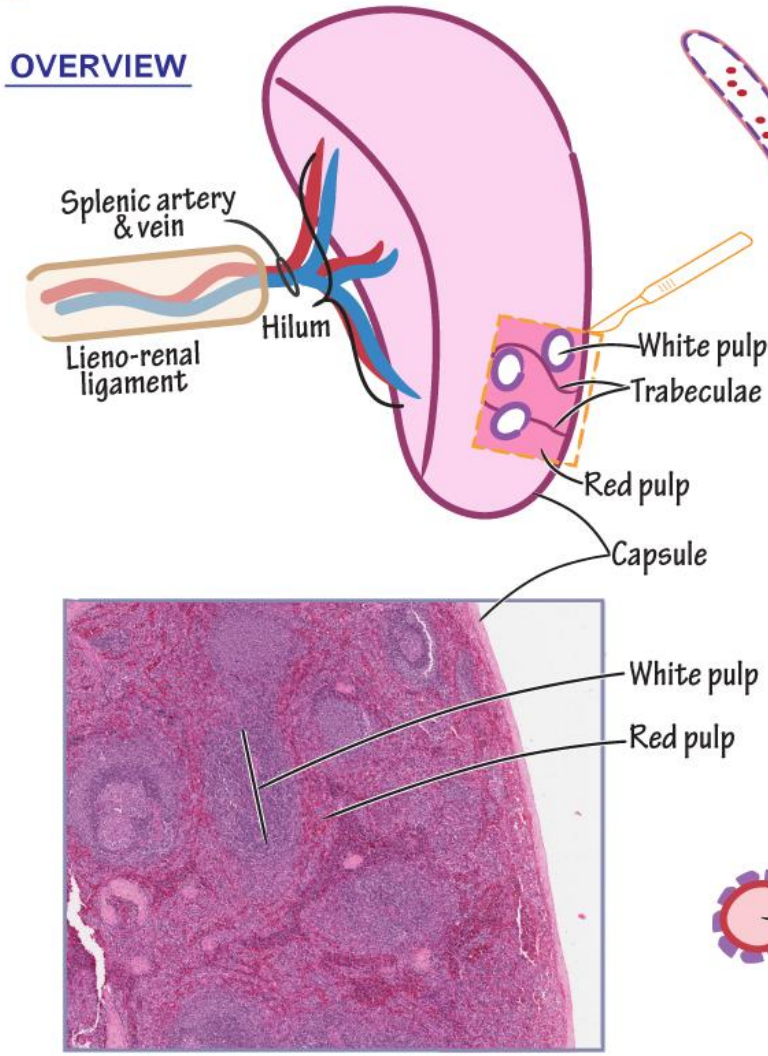


Spleen Histology

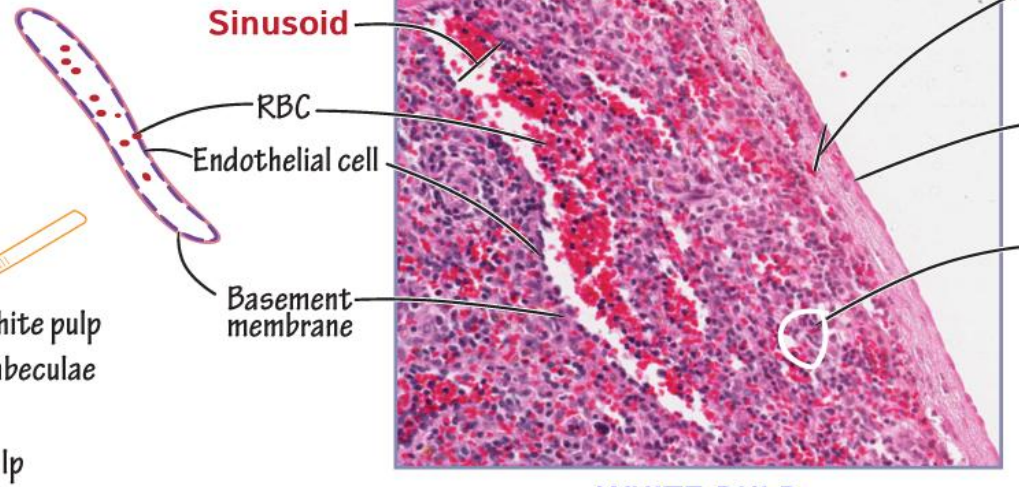


SPLEEN

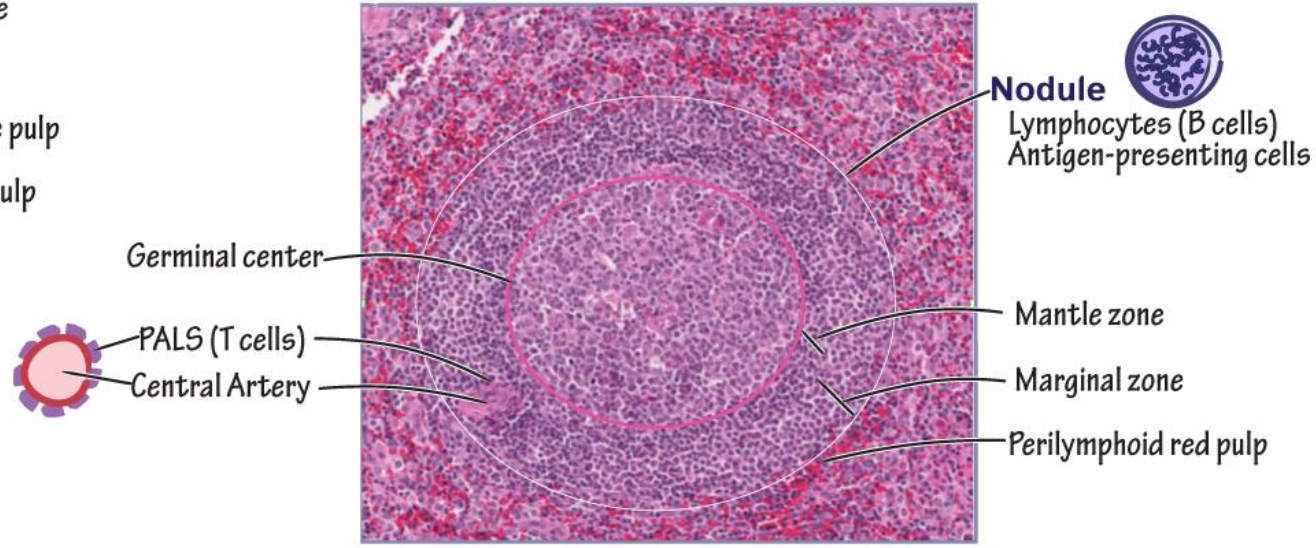
OVERVIEW

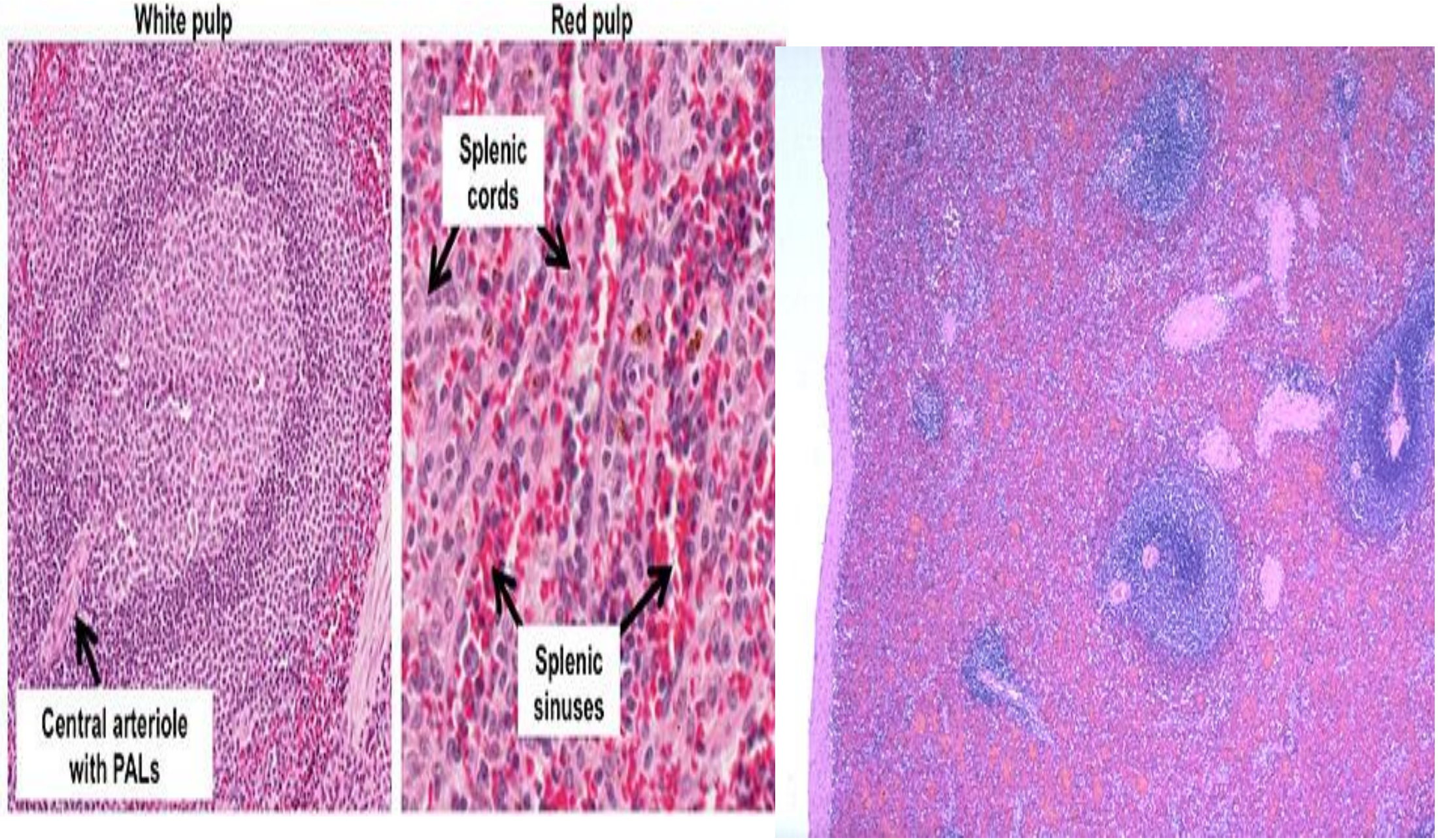


CAPSULE & RED PULP



WHITE PULP




White pulp
Red pulp
Splenic cords
Splenic sinuses
Central arteriole with PALs