

Spleen

(Lec.3)

Spleen is largest lymphatic organ located in abdominal cavity , beneath the diaphragm.

It is covered by the visceral layer of mesothelial cells (peritoneum)

below it thick capsule of dense irregular connective tissue contains some smooth muscle fibers are found.

Trabeculae (septa) are extended from capsule into splenic tissue.

Spleen is composed of:

White pulp , red pulp and marginal zone -

White Pulp Is composed of:

1- branches of arteries as (central arterioles)

2- Diffused lymphatic tissue, as irregular masses around central arterioles this area is called **periarterial lymphatic sheath**(PALS) its lymphocytes are T-lymphocytes, so it is called (thymus-dependent area) .

3-White pulp is also composed of (dense aggregation of lymphocytes) as lymphatic nodules some with germinal center.

marginal zone:

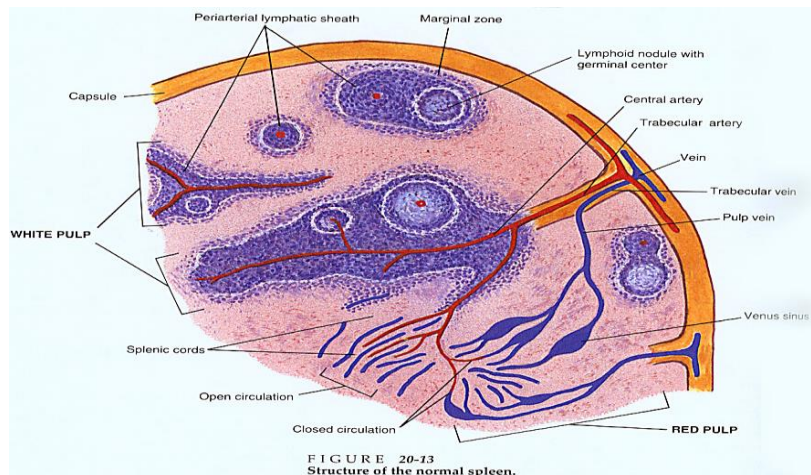
The white pulp is enclosed within a layer called marginal zone.

Which is an area between the red and white pulp. The periphery of the lymphatic sheath and nodules is surrounded by a marginal zone.

It contains mainly B lymphocytes, plasma cells macrophages and Interdigitating, dendritic cells, marginal blood sinuses .

This area plays role in (immune response & filter the blood).

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Red pulp Is located between white pulp and trabeculae.

• The red pulp is composed of two components :

1• Splenic cords of Billroth, and

2• Venous sinuses.

Splenic cords: Are composed of a spongy cellular mass supported by reticular fibers. The collagen trabeculae are continuous with the reticular fibers of the pulp. The lymphatic tissue is organized as cords or strands, contains large No. of RBC ; lymphocytes; granular leukocytes, macrophages Embedded in meshwork of reticular tissue.

Venous sinuses

Have large wide irregular lumen, 12-40 μ m wide. Sinuses occupy more space than the splenic cords. The walls of sinuses lack a muscular coat and display a unique arrangement of endothelium and basal lamina.

They have:

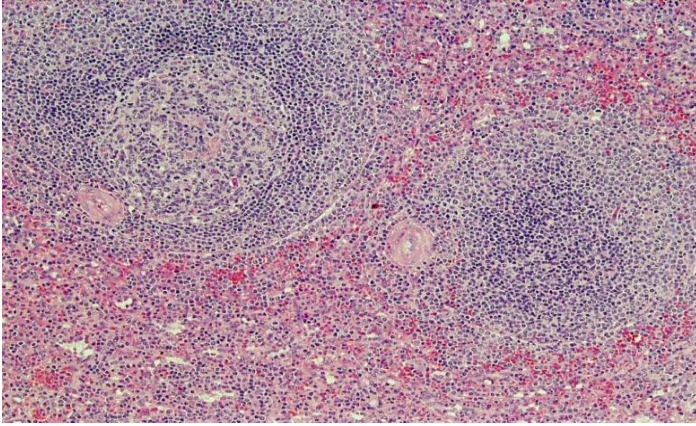
1-Elongated fusiform flattened endothelial cells called

stave cells line these sinusoids, oriented parallel to the blood flow and sparsely wrapped in reticular fibers .

2-Discontinuous basal lamina, supported by (thick reticular fiber).

There are spaces between endothelial cells permit exchange between sinusoids and adjacent tissue.

Processes of macrophages extend between endothelial cells into the lumen to monitor passing blood foreign antigens.



— Splenic blood circulation

Spleen is inserted in blood circulation, has special vascular channels in order to filter the blood and special types of blood circulation:

1-Closed blood circulation 2-Opened blood circulation (in human).

The splenic arteries enter spleen through hilum, follow the trabeculae as trabecular artery, then infiltrated by a sheath of lymphocytes in white pulp as central artery it terminate into penicillar arteries in red pulp and sub divided into 3 segments .

Pulp arterioles

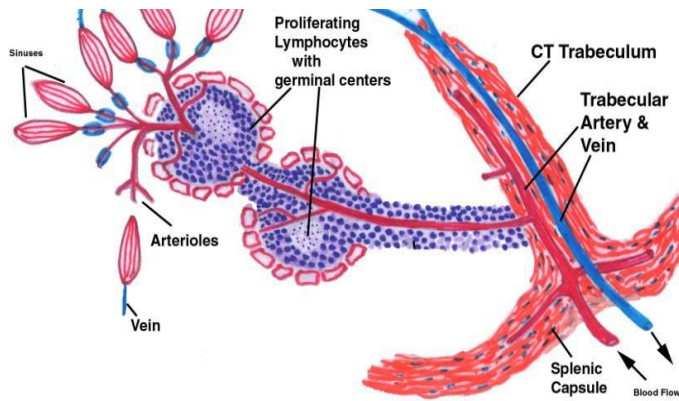
Sheathed arterioles (ensheathed by macrophages).

Terminal arterial capillary

Then the blood is carried to red pulp directly then to venous sinuses. This circulation is opened circulation .

when terminal arterial capillaries opened in venous sinuses then to veins (trabecular vein) and o leave spleen by splenic vein through hilum, this circulation is closed circulation.

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Some functions of spleen:

- **Filtration of blood - removal of antigenic material and cellular debris by macrophages and dendritic cells, concentrated and presented to lymphocytes in the white pulp.**
- **Lymphocyte activation - both T and B lymphocytes are activated in the spleen.**
Plasma cells migrate from the white pulp into the red where they secrete Igs into the venous blood.
- **Destruction of old/damaged RBCs - phagocytosed by macrophages and the hemoglobin is broken down .**