

# HISTOLOGY VIRTUAL LABORATORY

## LYMPHATIC TISSUE AND ORGANS

Purpose: Diffuse and nodular lymphatic tissue - to study the similarities and differences of these two types of lymphatic tissue and to distinguish one from the other.

Tonsils - to compare the organization of the tonsils to diffuse and nodular lymphatic tissue, and to learn the distinguishing features of the palatine tonsil.

Lymph nodes, spleen and thymus - to study the structure and organization of these definitive lymphatic organs.

Materials: **Slides GI 11, 14 & 17 from Gastrointestinal chapter, Lym 1-8 from Lymphatics chapter.**

Procedure: You are responsible for locating or visualizing all structures or concepts underlined. Read entire section on slide description before attempting to locate the underlined items.

\* The lymphatic tissue is most easily found in the digestive or respiratory systems. It should not be necessary to examine every slide listed above, but locate good examples and be able to clearly distinguish between diffuse and nodular lymphatic tissue.

### I. Diffuse and Nodular Lymphatic Tissue (Slides GI 11, 14 & 17 from Gastrointestinal chapter)

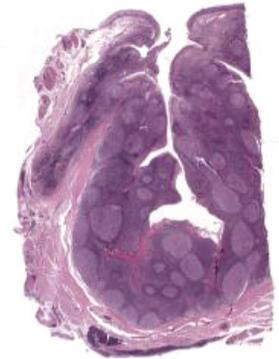
**Diffuse lymphatic tissue** consists of a reticular fiber and reticular cell framework that is diffusely infiltrated by small lymphocytes and other cell types, such as plasma cells and other leucocytes. The reticular framework is only seen in silver preparations, and all listed slides for lymphatic tissue are stained with H & E. In these preparations, diffuse lymphatic tissue is most easily identified by looking under low power for loosely organized accumulations of cells containing round, densely stained nuclei. The accumulations of cells are usually found in the lamina propria beneath the epithelium lining. Locate examples of diffuse lymphatic tissue on **Slides GI 11 & 14.**

**Nodular lymphatic tissue** is composed of the same reticular framework and contains the same kinds of cells. However, the lymphocytes are more numerous and closely packed, and a distinct peripheral boundary is usually present. In some cases, the nodular lymphatic tissue is embedded within and surrounded by diffuse lymphatic tissue. Lymphatic nodules may exhibit a lighter staining central region, a result of the presence of larger, lighter staining cell types, such as large lymphocytes and macrophages. This lighter central region is called a germinal center, which may appear and disappear in the same nodule depending on its functional state. Locate examples of nodular lymphatic tissues on **Slide GI 17.**



## II. TONSILS (Slides Lym 1 & 2)

The tonsils represent an intermediate stage of organization between nodular lymphatic tissue and lymphatic organs. All three tonsils are composed of numerous lymphatic nodules that are covered on the surface by epithelium and are restricted in the deeper regions by a connective tissue capsule. In the **palatine tonsil** (Slide Lym 1), the **surface epithelium** is **stratified squamous non-keratinized**, and often is infiltrated by lymphocytes. **Lymphatic nodules** and **diffuse lymphatic tissue** are found beneath the epithelium and fill the region between the surface and the **fibrous connective tissue capsule** that demarcates the deepest region of the tonsil. The pharyngeal tonsils (Slide Lym 2) have a similar morphology with **pseudostratified ciliated columnar epithelium** covering the surface.



## III. LYMPH NODES (Slide Lym 3)

Under low power, identify **lymphatic nodules**. These nodules comprise the **cortex** of the lymph node. The **medulla** of the node, containing **medullary cords** of lymphatic cells rather than nodules, may be difficult to distinguish, as is the case for a distinct hilum. At the periphery of the node, locate the thin but easily defined **connective tissue capsule**. **Trabeculae** originate from the capsule, penetrate between cortical nodules and form the framework for the medulla of the node. Immediately beneath the capsule, locate a space or sinus, referred to as the **subcapsular sinus**. These sinuses are also found around the trabeculae of the cortex and medullary cords where they are called **trabecular** and **medullary sinuses**, respectively. **Afferent lymphatic vessels** join the capsule and lymph gains access to the subcapsular sinus, and subsequently drains through the trabecular and medullary sinuses to exit the node via the **efferent lymphatic vessels** located at the hilum (not present on this slide).



## IV. SPLEEN (Slides Lym 4 & 5)

At the edge of one side of a section, locate the spleen **capsule**, composed of connective tissue elements and smooth muscle cells. **Trabeculae** originate from the capsule and penetrate into the substance of the gland. Portions of these trabeculae can be seen throughout the spleen, often associated with branches of the splenic artery, termed **trabecular arteries**. Locate an accumulation of lymphocytes that is similar in organization to a lymphatic nodule. These accumulations constitute the



**white pulp** or **splenic nodules** of the spleen. In the fresh state, these areas are lighter in color than the surrounding tissue that contains large quantities of blood. The white pulp is always associated with an eccentrically located branch of the trabecular arteries, termed the **central artery**. White pulp may also develop a germinal center, as is seen in other lymphatic nodules. The tissue surrounding the white pulp, containing large amounts of blood, is called the **red pulp**. Branches of the central artery enter the **red pulp** and are known as **arteries of the pulp**. 1-3 layers of smooth muscle cells surround these arteries. The blood in these arteries ultimately empty into **venous sinuses**, which occupy most of the red pulp. The venous sinuses drain into venules, trabecular veins, and finally, splenic veins.

#### V. **THYMUS** (Slides Lym 6-8)

Lym 6 is a section from a young squirrel, Lym 7 is from a young human, and Lym8 is from an adult human. Locate the **connective tissue capsule** that covers the external surface of the organ (Lym 8). **Trabeculae** extend from the capsule into the gland forming incomplete lobules. Each lobule is composed of a **cortex** and **medulla**. The cortex contains numerous small lymphocytes (thymocytes) and is darker in appearance than the medulla because of the close packing of the cells. In addition, the medulla contains **thymic corpuscles** (of Hassall) that are large, oval, eosinophilic structures. The medulla of each lobule is continuous with adjacent lobules, but it may be difficult to appreciate this continuity because of the plane of section. Lymphatic nodules are normally absent in the thymus. Notice the regression of the thymus in the adult. Much of the thymic tissue has been replaced with fat.

