

LYMPHOID SYSTEM

Lymphoid tissue occurs as non-encapsulated aggregates of lymphocytes (diffuse lymphoid tissue) of varying densities under the "wet" epithelia of the G.I., Respiratory and Urogenital tracts. It also occurs as encapsulated organs, the lymph nodes, thymus and spleen.

LABORATORY 15 - DIFFUSE LYMPHOID TISSUE - (first of two laboratory sessions)

OBJECTIVES: LIGHT MICROSCOPY: Identify small to large aggregates of lymphoid tissue mainly associated with connective tissue of mucosa (under "wet" epithelia). Recognize components of diffuse lymphoid tissue including lymphocytes and other leukocytes and their derivatives, macrophages and primary and secondary nodules and germinal centers. Identify palatine and pharyngeal tonsils and the distribution of T and B lymphocytes

ASSIGNMENT FOR TODAY'S LABORATORY

GLASS SLIDES

- [SL 16](#) (Esophagus) Diffuse lymphoid tissue
- [SL 11](#) (Ileum) Diffuse lymphoid tissue - Peyer's patches
- [SL 75](#) Palatine tonsil
- [SL 76](#) Pharyngeal tonsil

POSTED ELECTRON MICROGRAPHS

- S-48 Megakaryocyte
- S-50 Neutrophil

[Lab 15 Posted EMs](#)

HISTOLOGY IMAGE REVIEW - available on computers in HSL

Chapter 10. Lymphoid System

Frames: 642-645, 677-680, 694-700

SUPPLEMENTARY ELECTRON MICROGRAPHS

Rhodin, J. A.G., An Atlas of Histology

Copies of this text are on reserve in the HSL.

Lymphoid tissue pp. 212 - 222

The entire digestive, respiratory and urogenital systems are lined by epithelium that is moistened under which is found loose connective tissue that is called lamina propria. These two layers together (and sometimes a third layer that consists of either smooth muscle or elastic fibers) comprise the layer called a mucosa or mucous membrane. The lamina propria contains lymphocytes that are randomly dispersed or aggregated into nodules as well as other blood-derived cells involved in the body's defense mechanisms, e.g., neutrophils, eosinophils, macrophages. The slides that follow demonstrate a variety of concentrations of diffuse lymphoid tissue in the lamina propria and lymphoid tissue in a more aggregated organization as seen in the tonsils.

I. SUBEPITHELIAL LYMPHOID TISSUE

- A. [SL 16](#) - (Esophagus) – Just below the stratified epithelium that forms the inner lining of the esophagus there is a sparse distribution of lymphocytes. In addition, a few small aggregations of cells may be included ([scan](#), [lamina propria, region between tips of red arrows](#)) ([med](#), [lymphocytes, blue arrows](#); [aggregate in red circle](#)) ([high](#)).
- B. [SL 11](#) - (Ileum) - Diffuse lymphoid tissue is more prevalent below the simple columnar epithelium that lines the lumen of the intestine compared to the esophagus. In one region of the small intestine (ileum) a large accumulation of several nodules (called Peyer's Patches) is present W. 11.17 ([scan](#), [within red line](#), [low](#), [nodule within red circle](#), [high](#)).
- C. [SL 75](#) - PALATINE TONSIL.- (W. 11.16). In the [palatine tonsil](#) there are large accumulations of nodules. The nodules are associated with [stratified squamous](#) ([red arrow](#)) epithelium on one side and an underlying dense layer of connective tissue (c.t.) on the other. The c.t. projects into the lymphoid tissue in some places as [c.t. septa](#). Scattered among the nodules note patches of epithelium infiltrated with lymphocytes. These represent portions of [crypts](#) ([blue arrows](#)) that connect with the surface in another plane.

This tonsil was infected, therefore most of the nodules contain a large lighter staining area, the [germinal center](#). Such nodules are referred to as [secondary nodules](#) ([within red circles](#)) as opposed to primary nodules, that lack germinal centers ([early stage of primary nodule](#), [esophagus](#)). The germinal centers of the secondary nodules represent sites of secondary lymphopoiesis, where the production of B lymphocytes and B memory cells is occurring. In this region observe the following:

1. A few cells contain a large, round nucleus that is stained lightly and in which a nucleolus is evident. These cells are most likely [blast forms](#) ([within red circles](#), [macrophage in blue circle](#)).
2. The majority of developing cells in the germinal center are intermediate in size between the blast and typical small lymphocytes. Also, [mitotic figures](#) ([in green circle](#)) may be observed.
3. Small spaces are visible throughout the germinal center. Look carefully at several of these spaces and note nuclei and/or particulate matter. These are [macrophages](#) that have shrunk so the full extent of the cytoplasm cannot be seen. These are referred to as [tingible macrophages](#) ([in blue circles](#)) in pathology causing the so-called "Starry-sky" pattern or appearance.
4. Elongated nuclei throughout the germinal centers are nuclei of [reticular](#) or [dendritic](#) cells.

5. Note the corona of densely packed small lymphocytes outside the germinal centers ([corona, green arrows](#)). This area contains both [B & T lymphocytes](#) that cannot be differentiated from one another in routine preparations.
 6. Plasma cells are rarely, if ever, seen.
- D. PHARYNGEAL TONSIL (ADENOIDS) [SL 76](#). Note that the structure of the [pharyngeal tonsil](#) is similar to that of the palatine tonsil. The major difference that can be seen in histological sections is the presence on the surface of pseudostratified ciliated columnar epithelium ([low, med, red arrows](#)) instead of, or mixed with, stratified squamous epithelium. Small patches of pseudostratified epithelium should be located. Other general features not evident on slides are described (J. pp. 289-290).

OBJECTIVES FOR LABORATORY 15: LYMPHOID SYSTEM

1. Using the light microscope or digital slides, identify:

- Diffuse lymphoid tissue

- Palatine tonsil

 - Stratified squamous epithelium

 - Connective tissue septa

 - Crypts

 - Nodules

 - Primary

 - Secondary

 - Germinal center

 - Corona

 - Cell types

 - Blast forms

 - Mitotic figures

 - Macrophages (tingible macorphages)

 - Reticular or dendritic cells (not exactly the same, but hard to distinguish)

 - Plasma cells

- Pharyngeal tonsils (adenoids)

 - Same as palatine, but partially covered by pseudostratified ciliated epithelium

2. On electron micrographs, identify:

- Review appearance of blood cell types, including megakaryocyte