

## Histology practical No. 10

- Topics:*
- 1- STRUCTURAL AND FUNCTIONAL FEATURES OF CELLULAR ELEMENTS OF THE LYMPHOID TISSUE AND THEIR ORGANIZATION IN SPECIFIC LOCATIONS / ORGANS. (Pre-lab rev.ppt).
  - 2- IDENTIFICATION OF LYMPHOID ORGANS (LYMPH NODE, SPLEEN, THYMUS, TONSILS) AND THEIR COMPONENTS IN STAINED HISTOLOGY AND PC-MONITORED SLIDES OR PRINTED IMAGES.

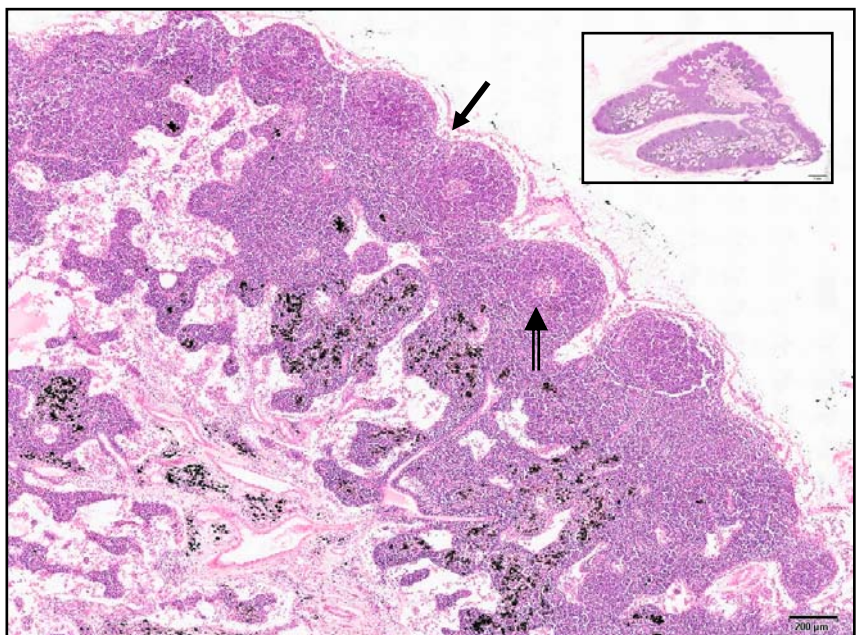
*Introduction note:*

By now, we have finished all subjects of the General Histology part of this course. Starting from this practical, the slides in practical sessions will contain sections of organs composed of various tissues that you will have to identify correctly in order to understand microscopic anatomy of the studied organ. Start your observations always at the lowest magnification of the light microscope and locate the basic tissues like epithelia, connective tissue, muscles or nerves. Follow their organization into layers, formation of capsules and septa of the connective tissue, and arrangement of the cellular parenchyma into glandular lobules or solid cords. Use your knowledge of Gross Anatomy to assess the microscopic distribution of structures within the section, be it a solid kind of organ completely filled up with cells, or a hollow kind of organ with a lumen inside (tube-like structure).

*Slides:*

1. Lymph node (lymfatická uzlina, sl.n. 7) section, H&E stain.

Observe the general shape of the lymph node. Locate the connective tissue **capsule** and note the presence of **subcapsular lymph sinuses** (arrow). In this staining, the lymphoid tissue appears in dark purple to blue color, whereas, the lymph sinuses appear empty with some nucleated cells and pink structures of the reticular connective tissue. Look at the lymphoid parenchyma composed of aggregations of lymphocytes mostly. The parenchyma is found in two zones – the **cortex** (the thin solid-looking layer



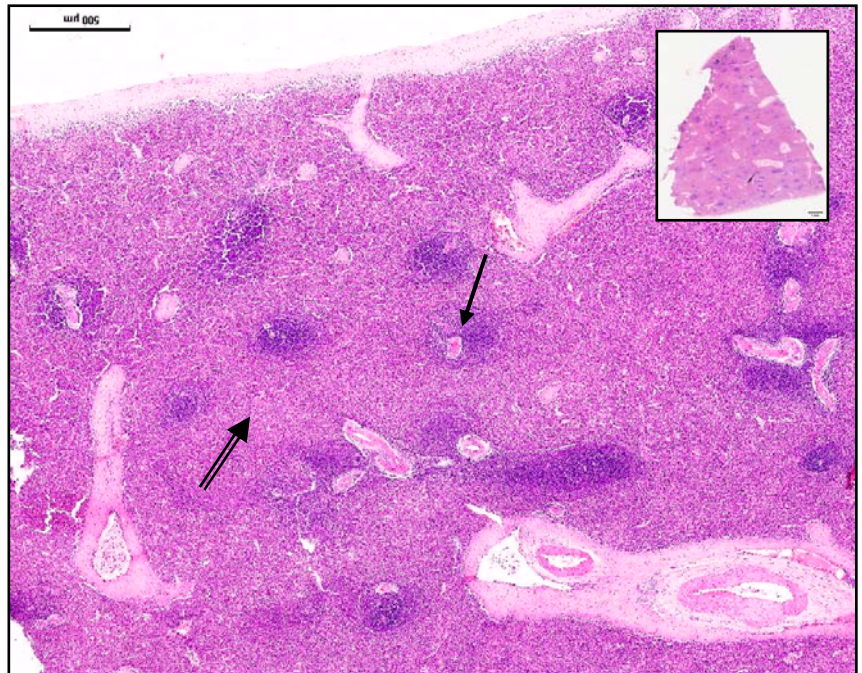
located right under the capsule, with a paracortex layer as a part of it) and the loose appearing **medulla**. What is the difference in arrangement of lymphocytes in these two major zones? Find some **lymphoid nodules with germinal centers** in the cortex (double arrow).

In the medulla, the lymphoid tissue forms cords which are separated by **medullary sinuses**. Several blood vessels can also be found in the medulla. Note, the special feature of this slide – the presence of many **macrophages** filled with dark dust particles, scattered anywhere in the parenchyma.

Explain why the germinal centers of lymphoid nodules appear in lighter color there. What is the location, structure and function of postcapillary high endothelial venules? Can you find some?

## 2. Spleen (slezina, sl.n. 8) section, H&E stain.

This slide shows a small part of the spleen that is covered (incompletely) by a connective tissue **capsule** sending several c.t. septa (**trabeculi**) deep into the parenchyma of this organ. You can recognize them by their pale pink color. The cellular parenchyma is present in two forms there – the **white pulp** and the **red pulp**. Locate the white pulp first; it shows the accumulation of dark blue-stained lymphocytes around a small blood vessel – the **central arteriole** (arrow). The closely related periarterial lymphatic sheath contains mostly T-lymphocytes. Some more peripheral accumulations of lymphocytes with occasional germinal centers contain B-lymphocytes.

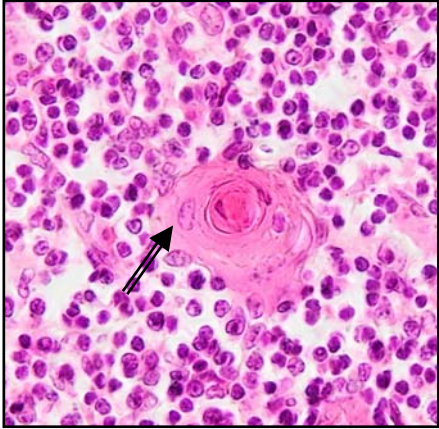


Examine also the red pulp (**splenic cords**, double arrow) that is reddish in color due to the lower concentration of lymphocytes and higher amount of blood sinusoid capillaries. Use the highest magnifications to see many RBCs in capillaries and possibly some plasma cells and macrophages too. Note the presence of blood vessels in c.t. trabeculi and the absence of subcapsular sinuses (as compared to the lymph node).

## 3. Thymus (thymus, sl.n. 9) section., H&E stain.

This sample of the organ contains lymphoid parenchyma surrounded with a c.t. **capsule** and divided by c.t. **septa** into a few lobes. In these lobes, identify their outer darker **cortex** and the inner light-looking **medulla** (arrow). Note that only the cortex is subdivided again by thinner c.t. septa into lobules, while the medulla remains united in all lobules (incomplete lobulation). The darker-looking cortex contains small, densely packed **lymphocytes** located within the network of **epithelial reticular cells**. These reticular cells are difficult to observe in your microscopes (as they are completely masked by numerous lymphocytes) but they can be

identified by to their large, oval-shaped and euchromatic nuclei and distinct nucleoli). In the medulla, note the lower accumulation of lymphocytes and numerous **Hassal's corpuscles** (double arrow) with

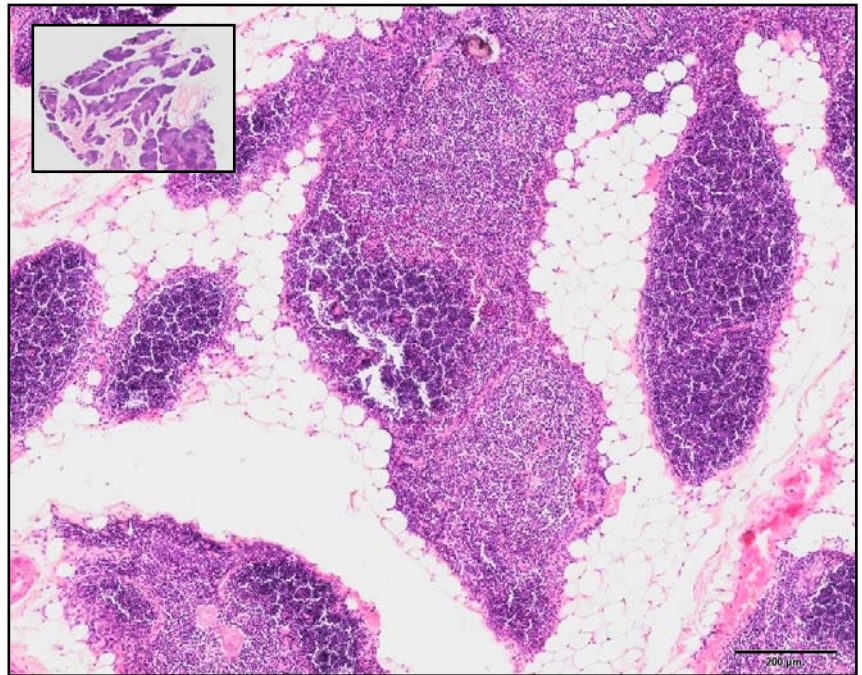
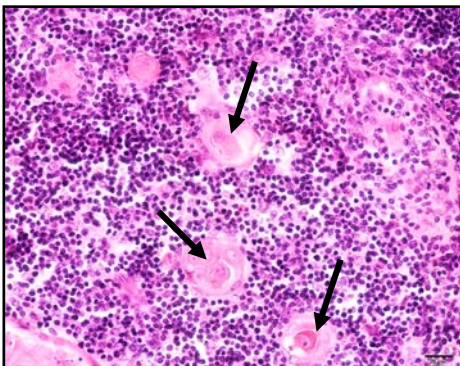


central hyalinizing pink masses of degenerated epithelial reticular cells (small picture).



#### 4. Thymus under involution (thymus involuce, sl.n. 9A) section., H&E stain.

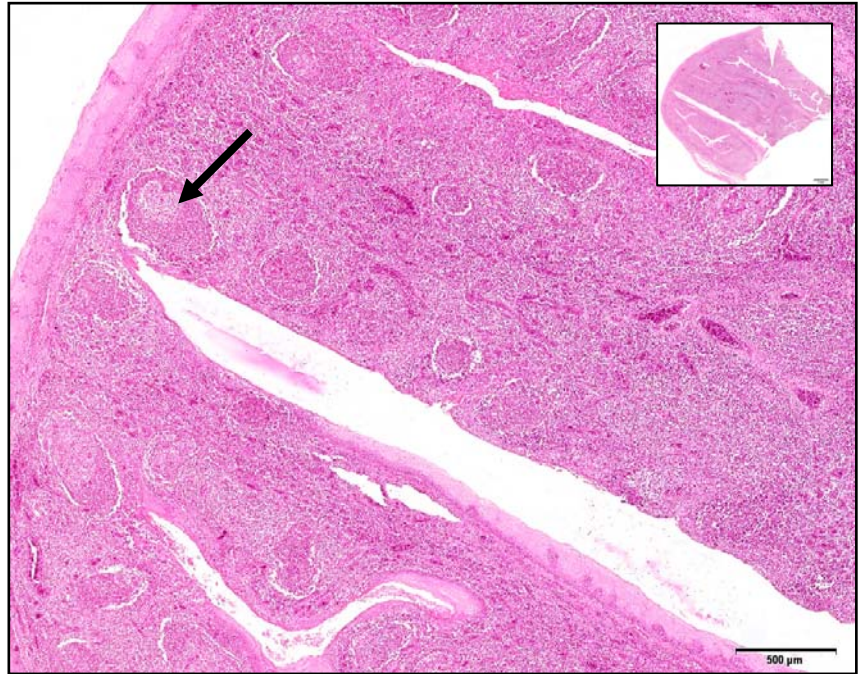
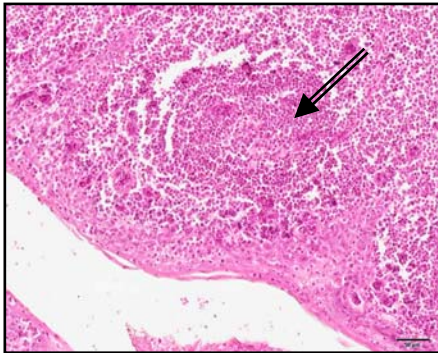
This slide shows thymus of an elderly person that is undergoing **initial phase of its involution**. Accumulations of the adipose tissue within the c.t. septa make the septa thicker, reducing the volume of the parenchyma in lobules. Both, the cortex and medulla can still be recognized in this specimen, but the volume of the cortex is reduced by atrophy. The number of **Hassal's corpuscles** in medulla is increased here (arrows), compared to the young thymus.



Answer these questions: What kind of lymphocytes is located in the cortex of thymus? Why the thymus is also called “lymphoepithelial organ”? Do all lymphocytes in the cortex mature? What is the function of the blood-thymic barrier?

5. Palatine tonsil (tonsilla palatina, sl.n. 10) section, H&E stain.

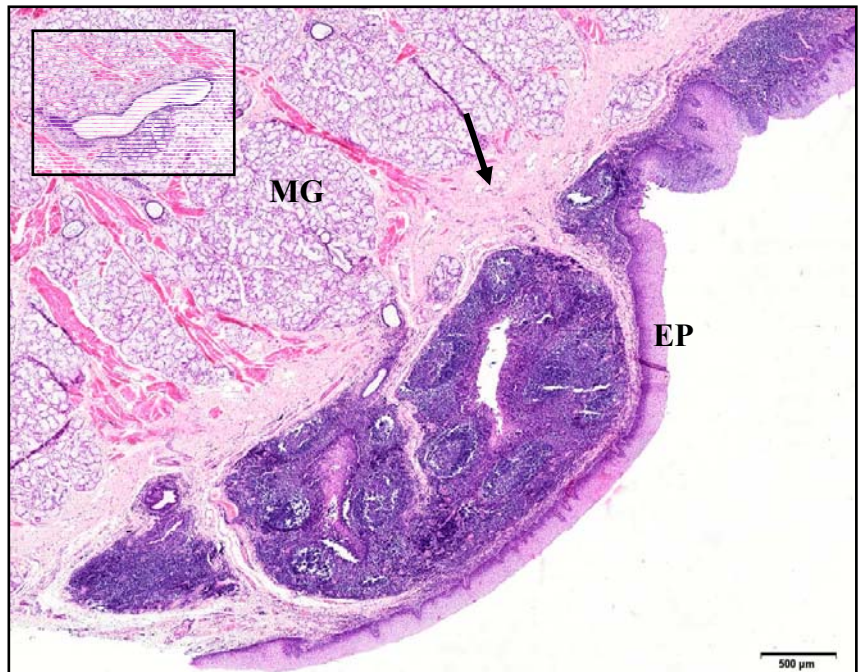
Surface of this tonsil is covered in part with a **stratified squamous nonkeratinized epithelium** that lines the entire oral cavity. Follow the epithelium into the deep **crypts** where it becomes thinner when located close to the **lymphatic follicles (nodules, arrow)**. With high



magnification lens, observe the dense lymphatic tissue that is accumulated in the connective tissue underlying the epithelium. Note the arrangement of lymphoid nodules and **germinal centers** (double arrow).

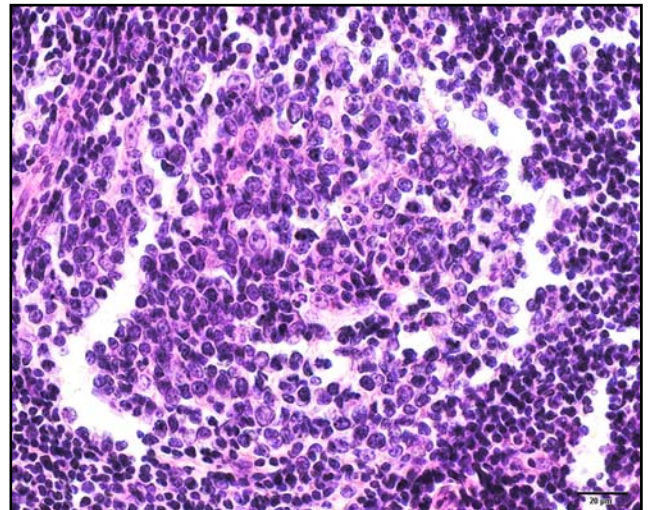
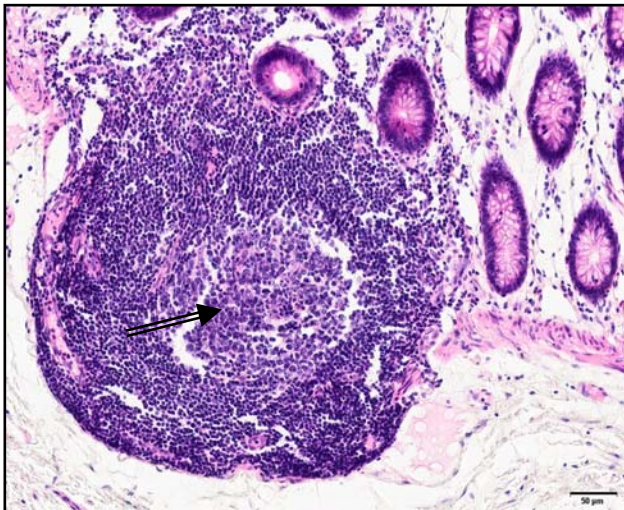
6. Lingual tonsil – Tongue root (kořen jazyka, sl.n. 17) section, H&E stain.

The lingual tonsil is situated at the base of the tongue and it is partially with a **stratified squamous nonkeratinized epithelium, (EP)**. It has similar microarchitecture to the palatine tonsil with **fewer crypts** and lower accumulation of the lymphatic nodules. A c.t. capsule (arrow) separates the layer of lymphoid tissue from the deeper layers of the tongue where are located lobules of the mucous lingual glands (MG) and some bundles of skeletal muscle fibres.

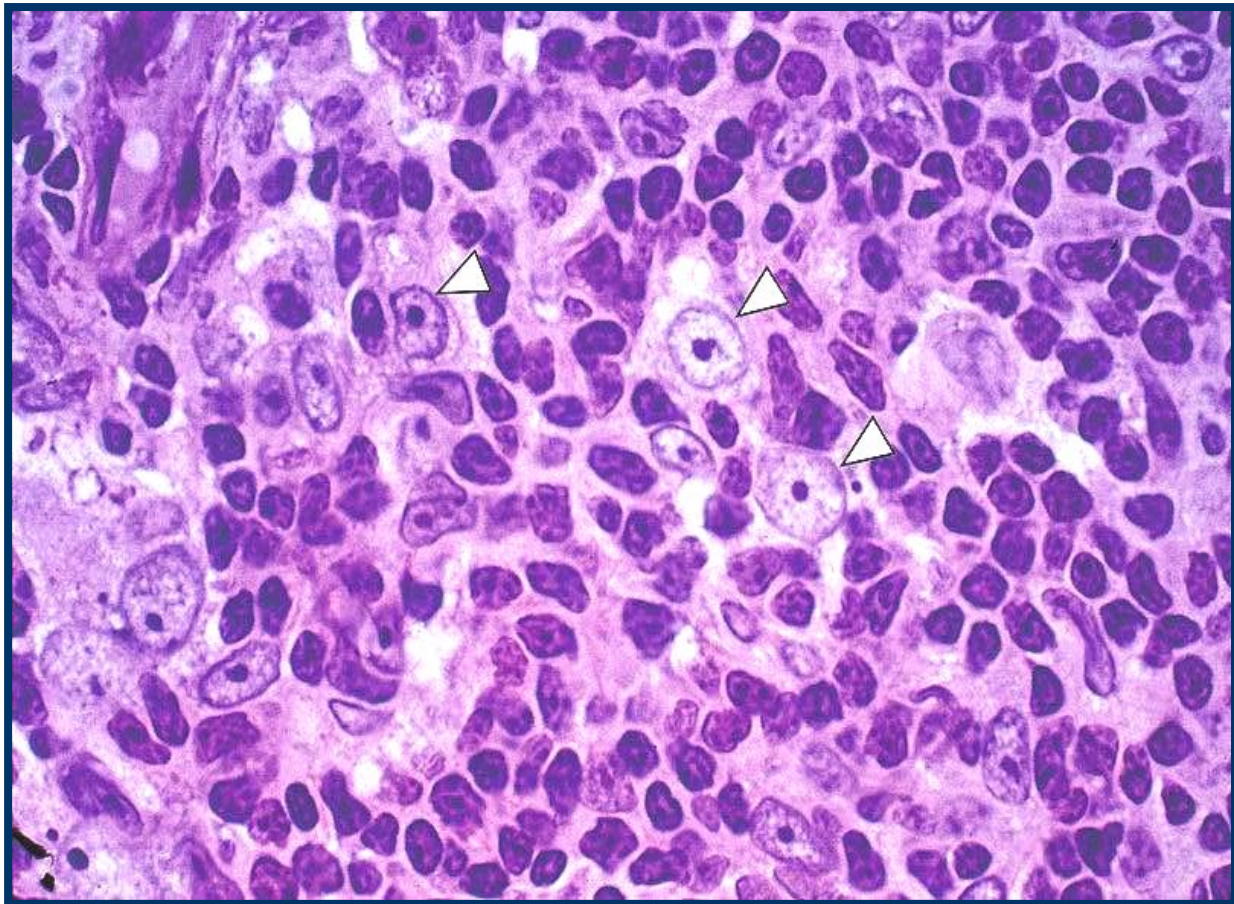


7. Large intestine – lymphatic nodules (tlusté střevo, sl.n. 28) section, H&E stain.

**Mucosa associated lymphoid tissue (MALT)** can be found in various locations of digestive or respiratory systems. **Lymphatic nodules** (arrow) are always located within the connective tissue right under the lining epithelium (lamina propria). At low magnification of your microscope, find one or two large accumulations of lymphocytes. The nodules are prominent here by their size and deep blue staining of nuclei of lymphocytes. Study **the germinal (reactive) centers** of these nodules (double arrow) and try to identify some developing plasma cells (immunoblasts) and supporting c.t. cells.



8. In this picture taken from cortex of the thymus, identify the cells indicated with arrowheads.



The cells, pointed out in this picture are: .....because they have  
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Websites:

- <http://histology-world.com/contents/contents.htm#lymphatic>
- [http://visualhistology.net/Visual\\_Histology\\_Atlas/VHA\\_Chpt16\\_Organs\\_Of\\_The\\_Immune\\_System.html](http://visualhistology.net/Visual_Histology_Atlas/VHA_Chpt16_Organs_Of_The_Immune_System.html)
- <http://www.med.uc.edu/medware2/microanatomy/car3p08.htm>
- <http://www.lab.anhb.uwa.edu.au/mb140/>
- <http://www.anatomyatlases.org/MicroscopicAnatomy/Section09/Section09.shtml>
- <http://www.udel.edu/biology/Wags/histopage/colorpage/cst/cst.htm>
- [http://www.path.uiowa.edu/cgi-bin-pub/vs/fpx\\_browse.cgi?cat=o\\_hemato&div.nlm](http://www.path.uiowa.edu/cgi-bin-pub/vs/fpx_browse.cgi?cat=o_hemato&div.nlm)
- <http://www.youtube.com/watch?v=K15L01BCYC8>
- <http://www.youtube.com/watch?v=38hw188Gb44>
- <http://www.youtube.com/watch?v=8ngnKIyBA20&feature=related>
- <http://www.youtube.com/watch?v=aZO9IAj-qq0&feature=channel>