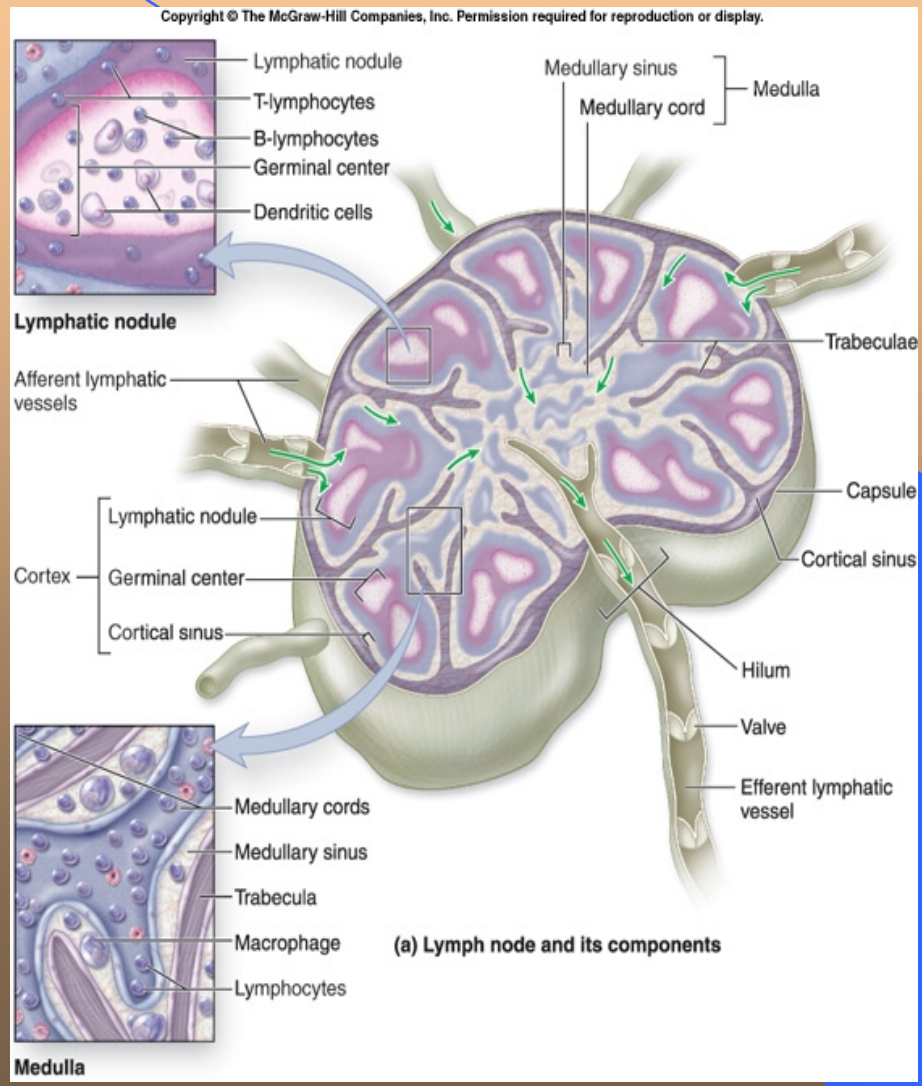
Lymphatic (Immune) system

- The lymphatic system comprises structures and cells that are mainly involved in the specific defense mechanism of the body known as immunity.
- Lymphocytes are the main immuno-competent cells giving the system its name.
- The lymphatic system includes:
- Free cells: T and B lymphocytes, antigen presenting cells (APCs), phagocytic cells that are present in blood, lymph and CT.
- Lymphoid organs: Encapsulated (lymph nodes, spleen and thymus).
- Non-encapsulated (tonsils, Payer's patches, lymphatic follicles in the wall of CIT, respiratory, urinary and genital tract)

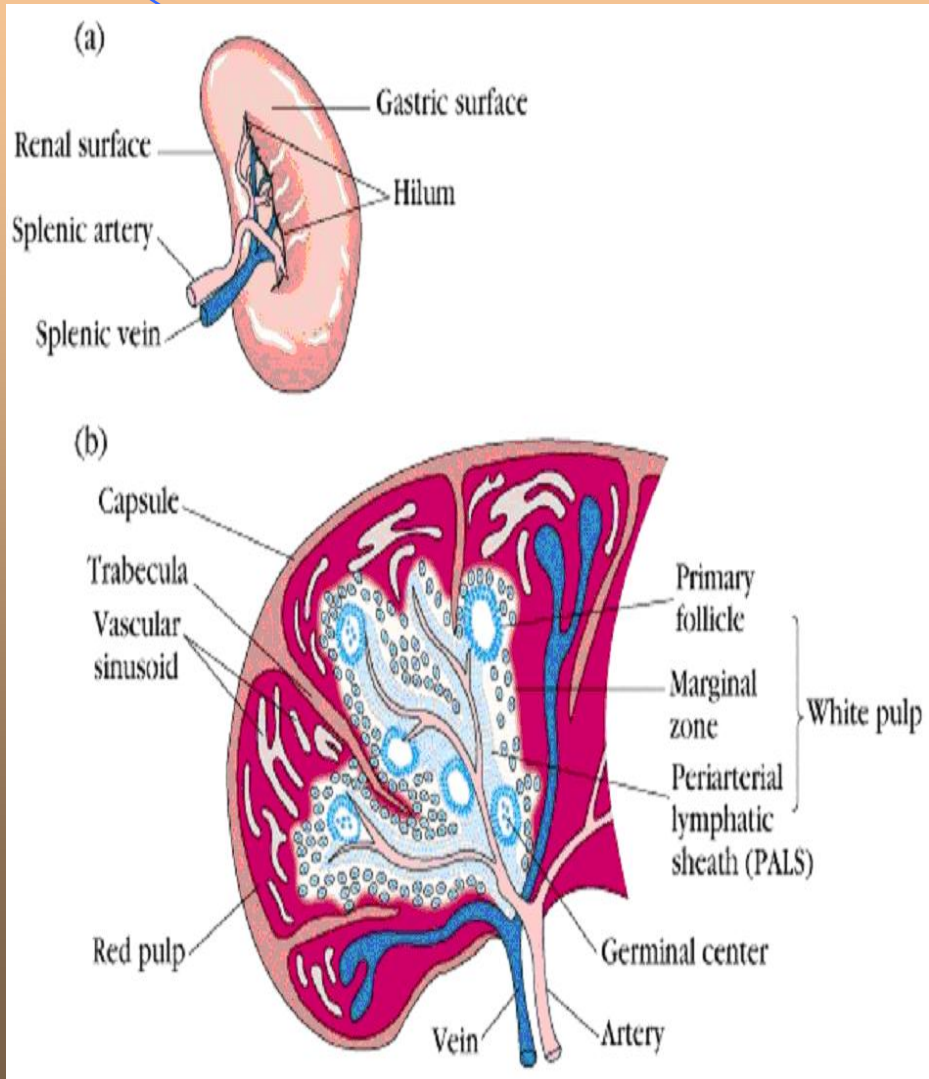
Lymph nodes

- They are encapsulated, kidney shaper or rounded lymphatic organs that are distributed throughout the course of lymphatic vessels.
- The LN is formed of stroma (CT capsule that sends septa dividing the node into equal compartments, and reticular network of reticular cells and fibers).
- The parenchyma is divided into cortex and medulla.
- The outer cortex is formed of lymphoid follicles (nodules) (primary and secondary with germinal centers).
- The inner cortex contains T-lymphocytes and is called T-dependent area.
- The medulla is formed of medullary cords (lymphocytes and plasma cells) and medullary sinuses.
- The afferent lymphatic enter through the capsule, empty into the supcapsular sinus then to trabecular sinuses then to medullary sinuses and leave the node via efferent lymphatic which exit through the hilus.



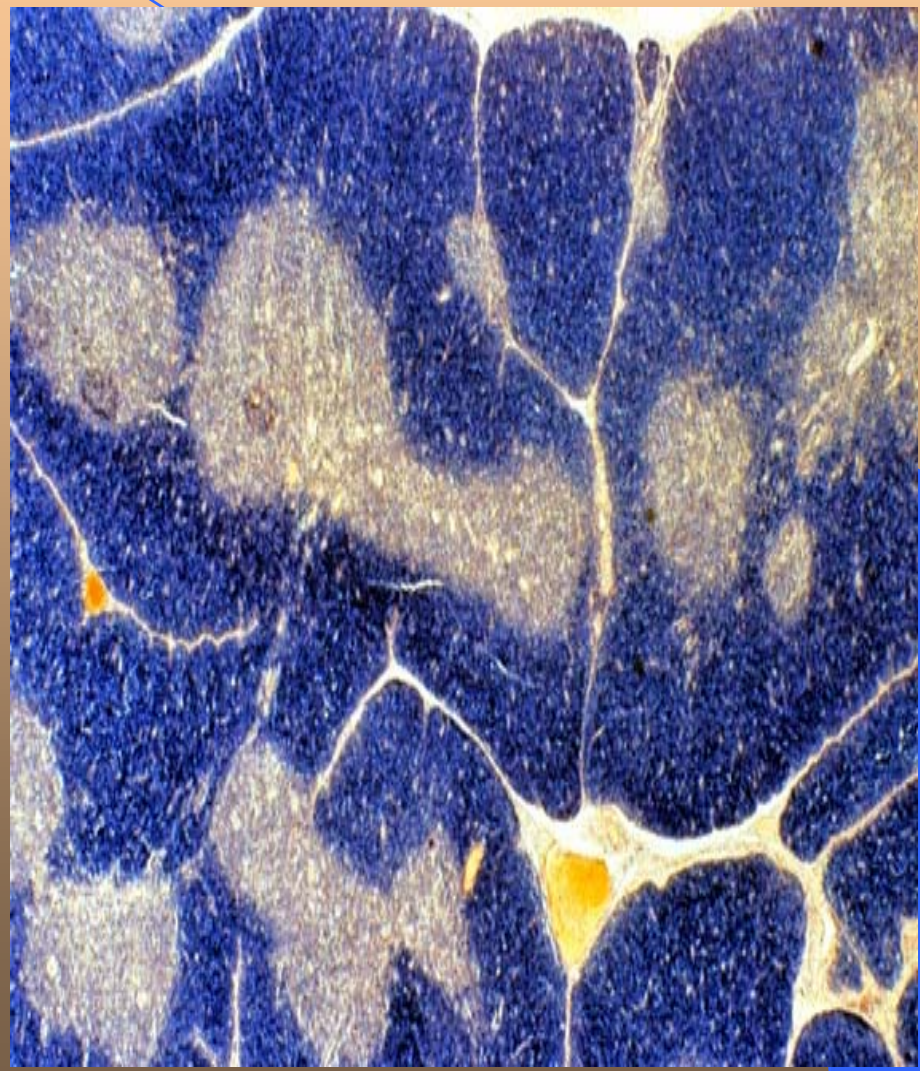
Spleen

- The spleen is formed of stroma and parenchyma.
- The stroma comprises capsule (dense CT with smooth muscle cells), trabeculae, and reticular network formed of reticular cells, reticular fibers and macrophages.
- The parenchyma is formed of white and red pulp.
- The white pulp splenic nodules composed mainly of B-lymphocytes and have a small central arteriole (eccentric in position), and peri-arterial lymphatic sheath (PALS) composed mainly of T-lymphocytes.
- The red pulp is formed of irregular blood sinusoids and splenic cords (of Billroth) which are cords of cells (blood cells, plasma cells, macrophages and reticular cells).



Thymus

- The thymus is a central immune organ located behind the sternum, it is large during fetal life and involutes after puberty.
- The thymus is formed of stroma, and parenchyma.
- The stroma is formed of capsule, incomplete septa dividing the organ into two lobes and incomplete lobules, and a network of cytoplasmic processes of epithelial reticular cells.
- Each thymic lobules is formed of outer dark cortex, and inner lightly stained medulla.
- The outer cortex is formed of small immature T-lymphocytes, and epithelial reticular cells, and few macrophages. The processes of ERC surrounds blood capillaries and form blood-thymus barrier.
- The inner medulla is lightly stained because it contains large number of ERC and large lymphocytes. It contains Hassal's corpuscles that consists of concentric layers of ERC whose its central cells degenerate and die forming acidophilic center.



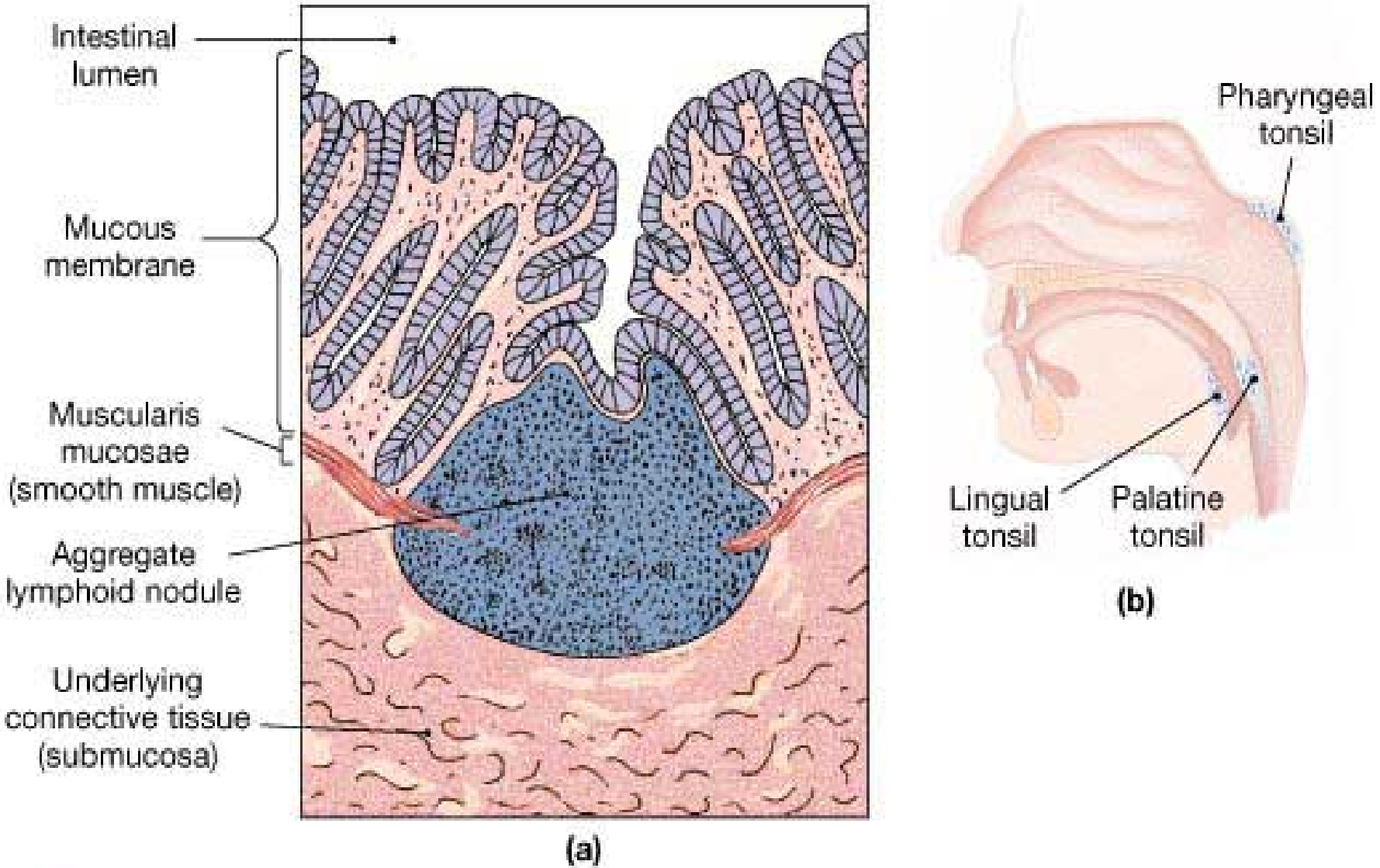


FIGURE 22-6 Lymphoid Nodules. **(a)** Appearance of a typical nodule in section. Note the relatively pale germinal center, where lymphocyte cell divisions occur. **(b)** The positions of the tonsils.

Tonsils

- The tonsils are incompletely encapsulated lymphatic tissue beneath the mucous membrane of mouse, pharynx, and tongue.
- They are palatine, pharyngeal, and lingual tonsils.
- The tonsil is formed of lymphatic tissue containing secondary lymphatic follicles with germinal centers.
- The tonsils are covered with stratified squamous epithelium that invaginated into the lymphoid tissue forming crypts.
- The lymphatic nodules are present under the epithelium and around the crypts.
- They are separated from the surrounding structure by dense CT capsule.

Tonsils

- The tonsils

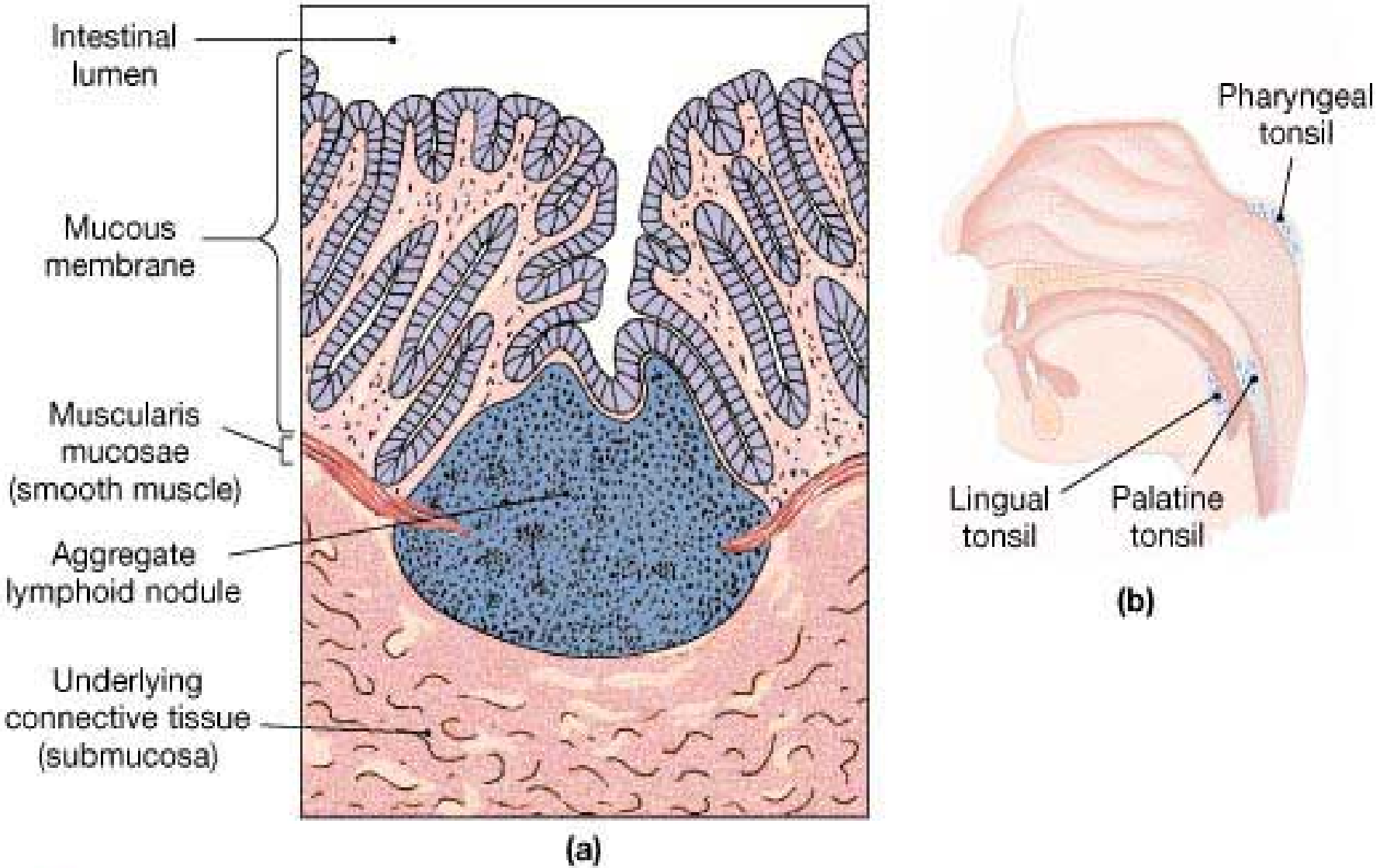


FIGURE 22-6 Lymphoid Nodules. **(a)** Appearance of a typical nodule in section. Note the relatively pale germinal center, where lymphocyte cell divisions occur. **(b)** The positions of the tonsils.