

CHAPTER TWENTY - FOUR

Content Review

1. The functions of the lymphatic system include transporting excess interstitial fluid back to the bloodstream, transporting dietary lipids, storing and assisting in lymphocyte development, and initiating an immune response.
2. Lymph is interstitial fluid containing dissolved solutes and sometimes foreign material. Once lymph enters the lymphatic capillaries, it is transported to and from lymph nodes via lymphatic vessels, lymphatic trunks, and finally lymphatic ducts before being emptied into large veins in the neck.
3. The thoracic duct drains the left side of the head and neck, the left upper limb, the left thorax, and all body regions inferior to the diaphragm (including the right lower limb and the right side of the abdomen).
4. Macrophages are monocytes that mature in the bone marrow and then migrate from the bloodstream into other tissues. They are responsible for phagocytosis of foreign substances. Special epithelial cells (also called nurse cells) in the thymus secrete thymic hormones. Dendritic cells in lymphatic nodules of lymph nodes collect antigens from the lymph and present them to other lymphatic cells. Lymphocytes are the most abundant cells in the lymphatic system, and each type has a specific job in the immune response. T-lymphocytes mature in the thymus. Helper T-lymphocytes initiate the immune response; cytotoxic T-lymphocytes kill by secreting substances into foreign or abnormal cells; memory T-lymphocytes mount an even faster immune response at the next encounter with the antigen; and suppressor T-lymphocytes turn off the immune response. B-lymphocyte types include plasma cells, which produce antibodies, and memory B-lymphocytes, which mount an even faster immune response at the next encounter with the antigen. NK cells are large, granular lymphocytes that kill infected cells or cancerous cells.
5. Helper T-lymphocytes recognize an antigen and then stimulate the production of cytotoxic T-lymphocytes and B-lymphocytes. The cytotoxic T-lymphocytes mount a cellular attack against foreign cells, and B-lymphocytes form plasma cells that produce antibodies against the antigens.
6. Lymphatic nodules are oval-shaped clusters of lymphatic cells and some extracellular connective tissue matrix that are *not* completely surrounded by a connective tissue capsule. The pale center of a lymphatic nodule, called the germinal center, contains proliferating B-lymphocytes and some macrophages. T-lymphocytes are located outside the germinal center. Individually, a lymphatic nodule is small. However, sometimes lymphatic nodules group together, forming larger structures such as mucosa-associated lymphatic tissue (MALT) or tonsils.
7. In infants and young children, the thymus is quite large and extends into the superior mediastinum. The thymus continues to grow until puberty, when it reaches a maximum weight of 30–50 grams. After this time, the thymus regresses, and the functional thymus is eventually replaced by adipose tissue. In adults, the thymus becomes almost nonfunctional.
8. Each lymph node is surrounded by a tough connective tissue capsule and has internal extensions called trabeculae subdividing it into compartments. Deep to the lymph

node capsule are an outer cortex and an inner medulla. The cortex consists of lymphatic nodules and cortical sinuses. The medulla contains strands of lymphatic tissue called medullary cords and medullary sinuses. Lymph nodes filter lymph.

9. The arterial supply to the spleen is associated with the white pulp and consists of circular clusters of T-lymphocytes, B-lymphocytes, and macrophages. The white pulp detects antigens in the blood and mounts an immune response when necessary. The red pulp is associated with the venous drainage of the spleen. It is formed by splenic cords (cords of Billoth) and splenic sinusoids. The red pulp is a reservoir of erythrocytes; macrophages there remove aged or damaged erythrocytes.
10. In general, the lymphatic system's ability to provide immunity and fight disease decreases as we get older. Helper T-lymphocytes do not respond to antigens as well and do not always reproduce rapidly. Without large numbers of helper T-lymphocytes, there are fewer B-lymphocytes and other kinds of T-lymphocytes. A reduced number of lymphocytes means that the body's ability to acquire immunity and resist infection decreases.