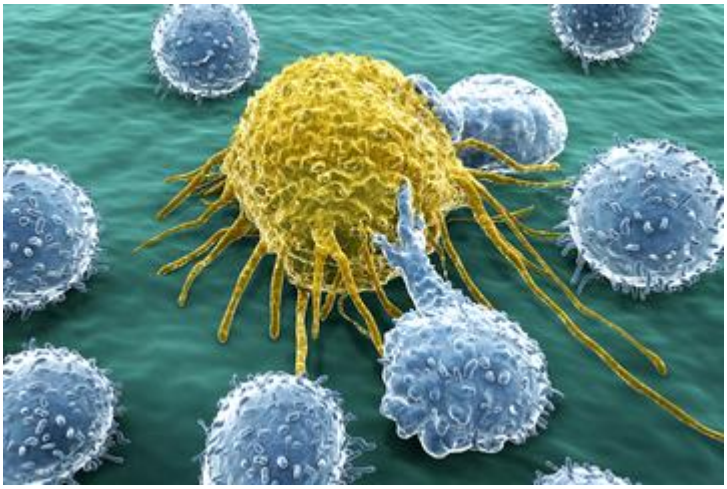
Lymphatic System: Facts, Functions & Diseases

Kim Ann Zimmermann, LiveScience Contributor | February 08, 2013 03:22pm ET



The primary function of the lymphatic system is to transport lymph, a clear, colorless fluid containing white blood cells that helps rid the body of toxins, waste and other unwanted materials.

Lymphatic comes from the Latin word *lymphaticus*, meaning "connected to water," as lymph is clear.

The lymphatic system, which is a subset of the circulatory system, has a number of functions, including the removal of interstitial fluid, the extracellular fluid that bathes most tissue. It also acts as a highway, transporting white blood cells to and from the lymph nodes into the bones, and antigen-presenting cells to the lymph nodes.

Description of the lymphatic system

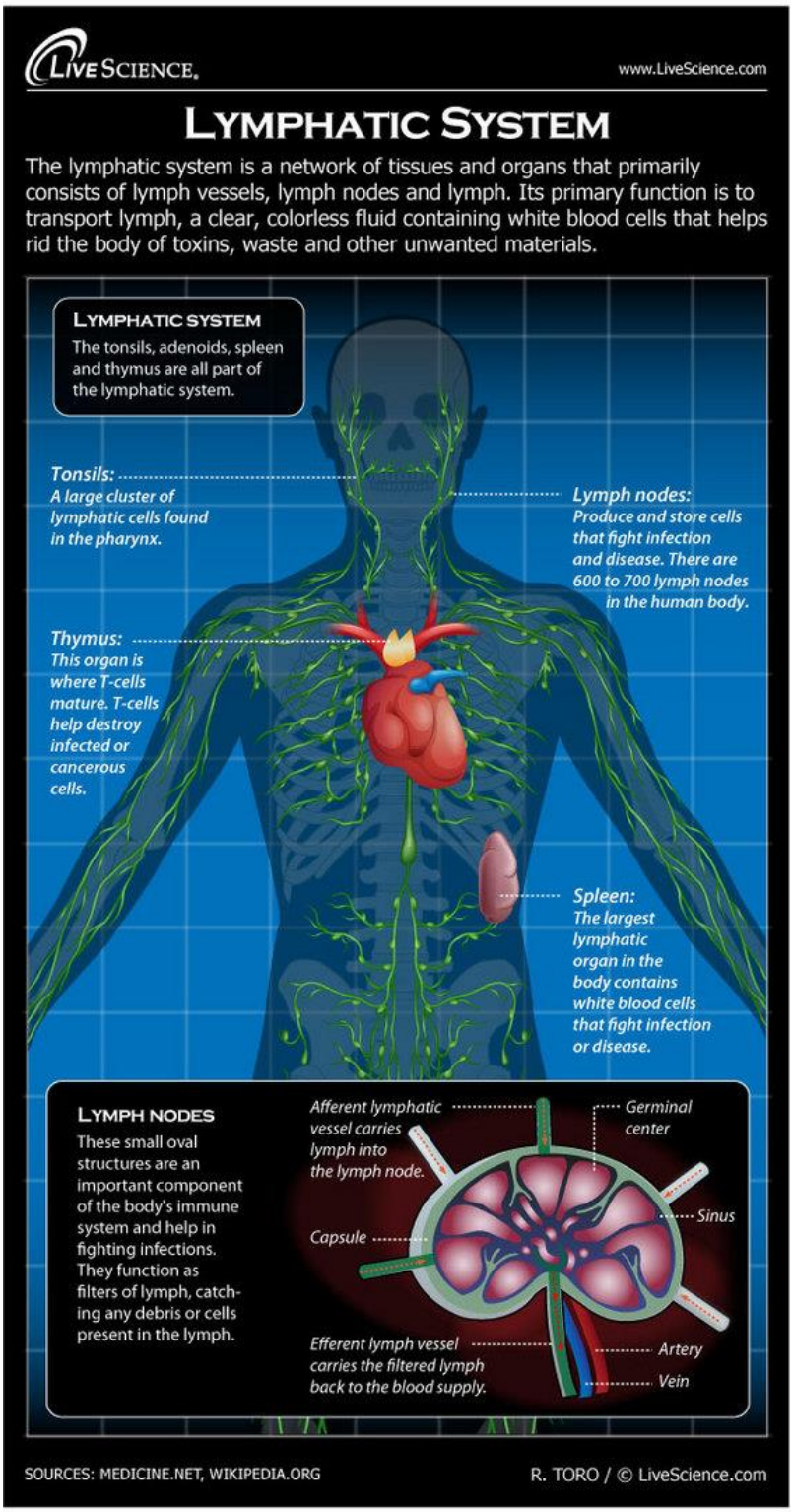
The lymphatic system is a network of tissues and organs that primarily consists of lymph vessels, lymph nodes and lymph. The tonsils, adenoids, spleen and thymus are all part of the lymphatic system.

There are 600 to 700 lymph nodes in the human body that filter the lymph before it returns to the circulatory system.

The spleen, which is largest lymphatic organ, is located on the left side of the body just above the kidney. Humans can live without a spleen, although people who have lost their spleen to disease or injury are more prone to infections.

The thymus, which stores immature lymphocytes and prepares them to become active T cells, is located in the chest just above the heart.

Tonsils are large clusters of lymphatic cells found in the pharynx. Although tonsillectomies occur much less frequently today then they did in the 1950s, it is still among the most common operations performed and typically follows frequent throat infections.



When bacteria are recognized in the lymph fluid, the lymph nodes make more infection-fighting white blood cells, which can cause swelling. The swollen nodes can sometimes be felt in the neck, underarms and groin.

Unlike blood, which flows throughout the body in a continue loop, lymph flows in only one direction — upward toward the neck — within its own system. It flows into the venous blood stream through the subclavien veins, which are located on either sides of the neck near the collarbones.

Plasma leaves the cells once it has delivered its nutrients and removed debris. Most of this fluid returns to the venous circulation through the venules and continues as venous blood. The remainder becomes lymph.

Lymph leaves the tissue and enters the lymphatic system through specialized lymphatic capillaries. About three-quarters of these capillaries are superficial capillaries that are located near the surface of the skin. There are also deep lymphatic capillaries that surround most of the body's organs.

There are two drainage areas that make up the lymphatic system. The right drainage area handles the right arm and chest. The left drainage area clears all of the other areas of the body, including both legs, the lower trunk, the upper left portion of the chest, and the left arm.

Diseases of the lymphatic system

Diseases and disorders of the lymphatic system are typically treated by immunologists. Vascular surgeons, dermatologists, oncologists and physiatrists also get involved in treatment of various lymphatic ailments. There are also lymphedema therapists who specialize in the manual drainage of the lymphatic system.

Lymphedema is a chronic swelling of the limbs caused by the accumulation of lymph fluid that occurs if the lymphatic system is damaged or not functioning properly. While the limbs are typically involved, the face, neck and abdomen may also be affected. Many develop the disorder following cancer therapy — particularly breast cancer where the lymph nodes under the arms are removed — recurrent infections, injuries or vascular surgery.

Hodgkin's lymphoma is a type of cancer that typically occurs when the white blood cells in the body become diseased or damaged.

Castleman disease is caused by benign tumors that affect the lymph nodes. While not specifically a cancer, it is a similar to a lymphoma and is often treated with chemotherapy. Localized Castleman disease affects the lymph nodes of the stomach and chest. Multicentric Castleman disease affects greater than one region of lymph nodes as well as lymphoid-containing organs such as the spleen.

Lymphangiomatosis is a disease involving multiple cysts or lesions formed from lymphatic vessels.

In **elephantiasis**, infection of the lymphatic vessels causes a thickening of the skin and enlargement of underlying tissues, especially in the legs and genitals.

Lymphangiosarcoma is a malignant soft-tissue tumor, whereas lymphangioma is a benign tumor occurring frequently in association with Turner syndrome.

Lymphangioleiomyomatosis is a benign tumor of the smooth muscles of the lymphatics in the lungs.

Lymphoid leukemias and lymphomas are called "leukemia" when in the blood or marrow and "lymphoma" when in lymphatic tissue.

Lymphatic filiaris is a disease in which parasitic worms infiltrate the lymph system via the bite of a mosquito. About 120 million people worldwide are affected by this disease.