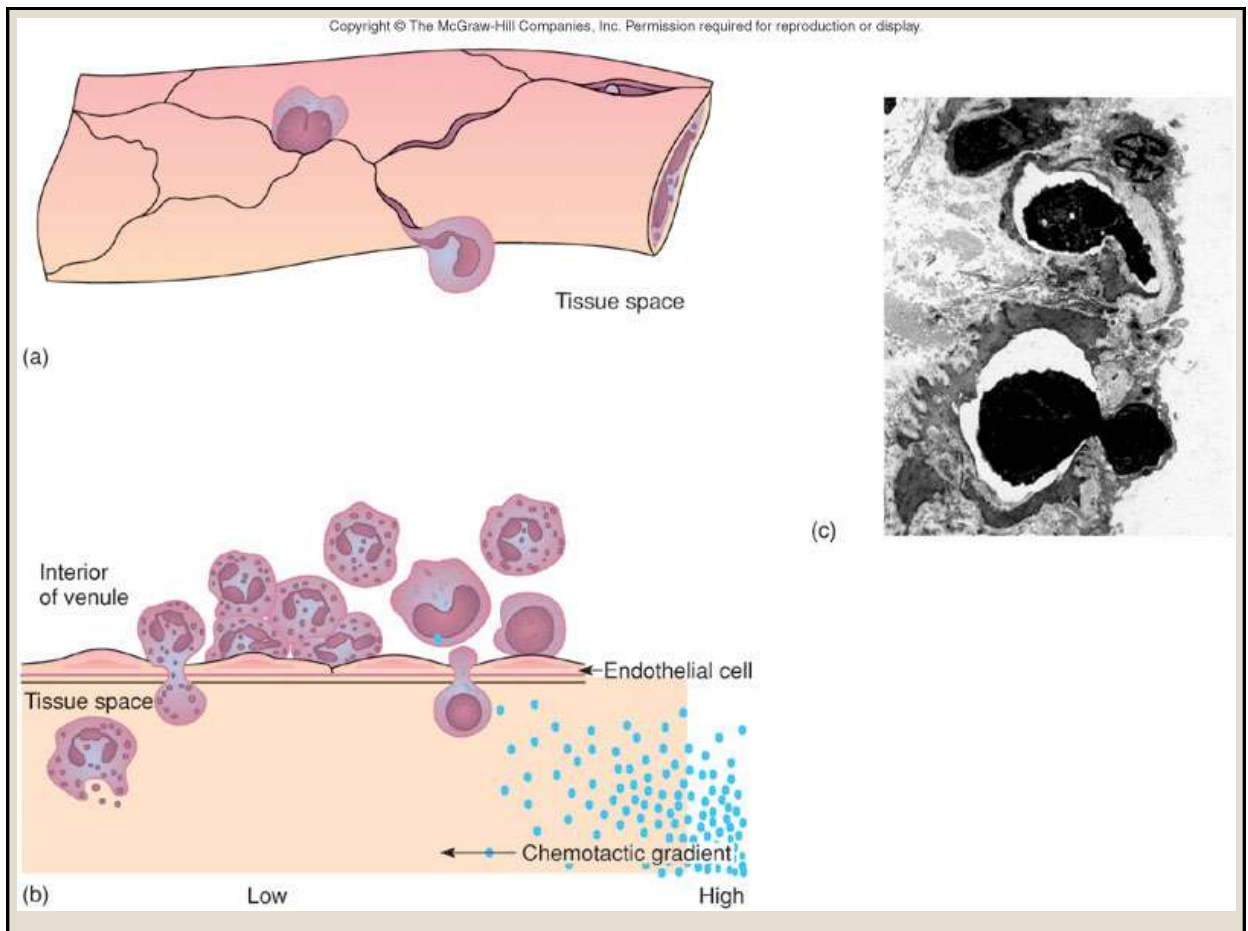


# **The Nature of Host Defenses.I:B**

## **Micro451 Immunology**

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**(Molecular Virologist & Immunology)**



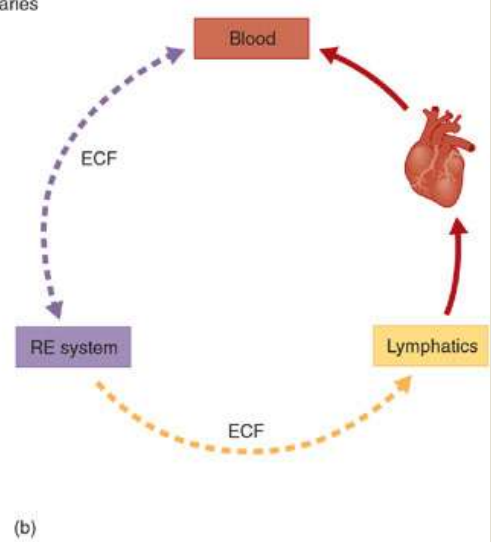
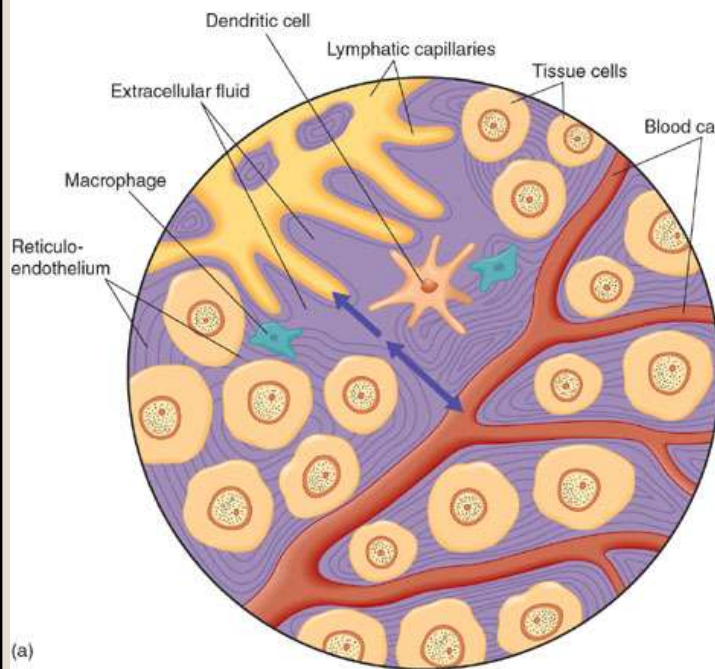
1. Provides an auxiliary route for return of extracellular fluid to the circulatory system
2. Acts as a drain-off system for the inflammatory response
3. Renders surveillance, recognition, and protection against foreign material

## **Lymphatic system**

- Key cells in the third line of defense and the specific immune response
- When stimulated by antigens, transform into activated cells that neutralize and destroy that foreign substance
- **B cells**
  - **Humoral immunity**: protective molecules carried in the fluids of the body
  - Produce specialized **plasma cells** which produce **antibodies**
- **T cells**
  - **Cell-mediated immunity**: T cells modulate immune functions and kill foreign cells

## Lymphocytes

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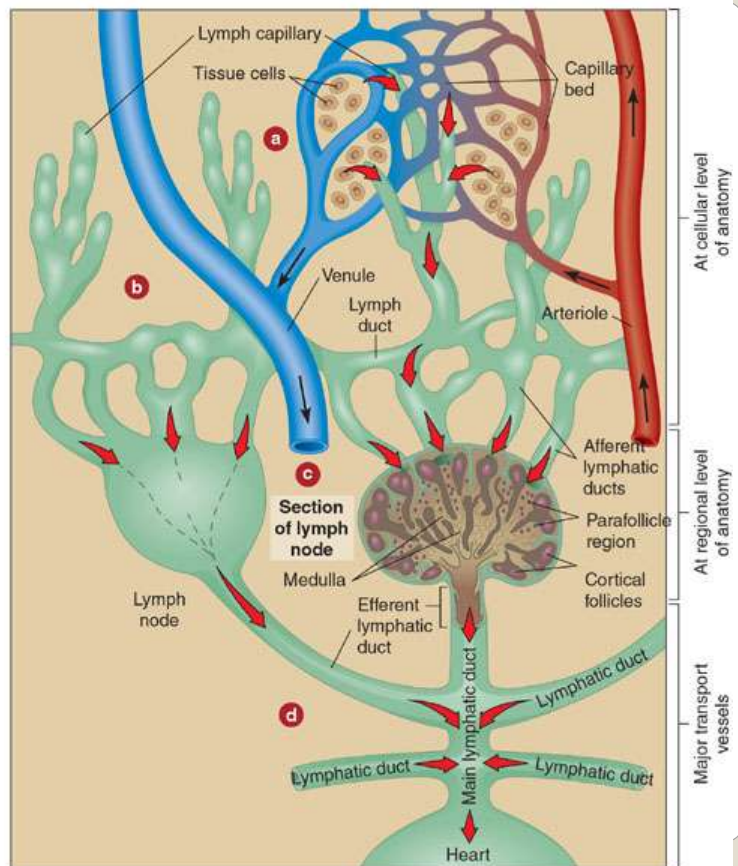
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(a) The finest level of lymphatic circulation begins with blind capillaries that pick up fluid, white blood cells, and microbes or other foreign matter from the surrounding tissues and transport this liquid mixture (lymph) away from the extremities via a system of small ducts.

(b) The ducts carry lymph into a circuit of larger ducts that ultimately flow into clusters of specialized filtering organs, the lymph nodes.

(c) The center diagram shows a section through a lymph node to reveal the afferent ducts draining into sinuses that house several types of white blood cells, primarily T lymphocytes, B lymphocytes, macrophages, and dendritic cells. Here, foreign material is filtered out, processed, and becomes the focus of various immune responses.

(d) Lymph continues to trickle from the lymph nodes via efferent ducts into a system of larger drainage vessels, which ultimately connect with large veins near the heart. In this way, cells and products of immunity continually enter the regular circulation.



- Lymphatic system: compartmentalized network of vessels, cells, and specialized accessory organs
- Transports lymph through a system of vessels and lymph nodes
- Major functions
  - Provide an auxiliary route for the return of extracellular fluid to the circulatory system proper
  - Act as a drain-off system for the inflammatory response
  - Render surveillance, recognition, and protection against foreign materials

#### **Components and Functions of the Lymphatic System**

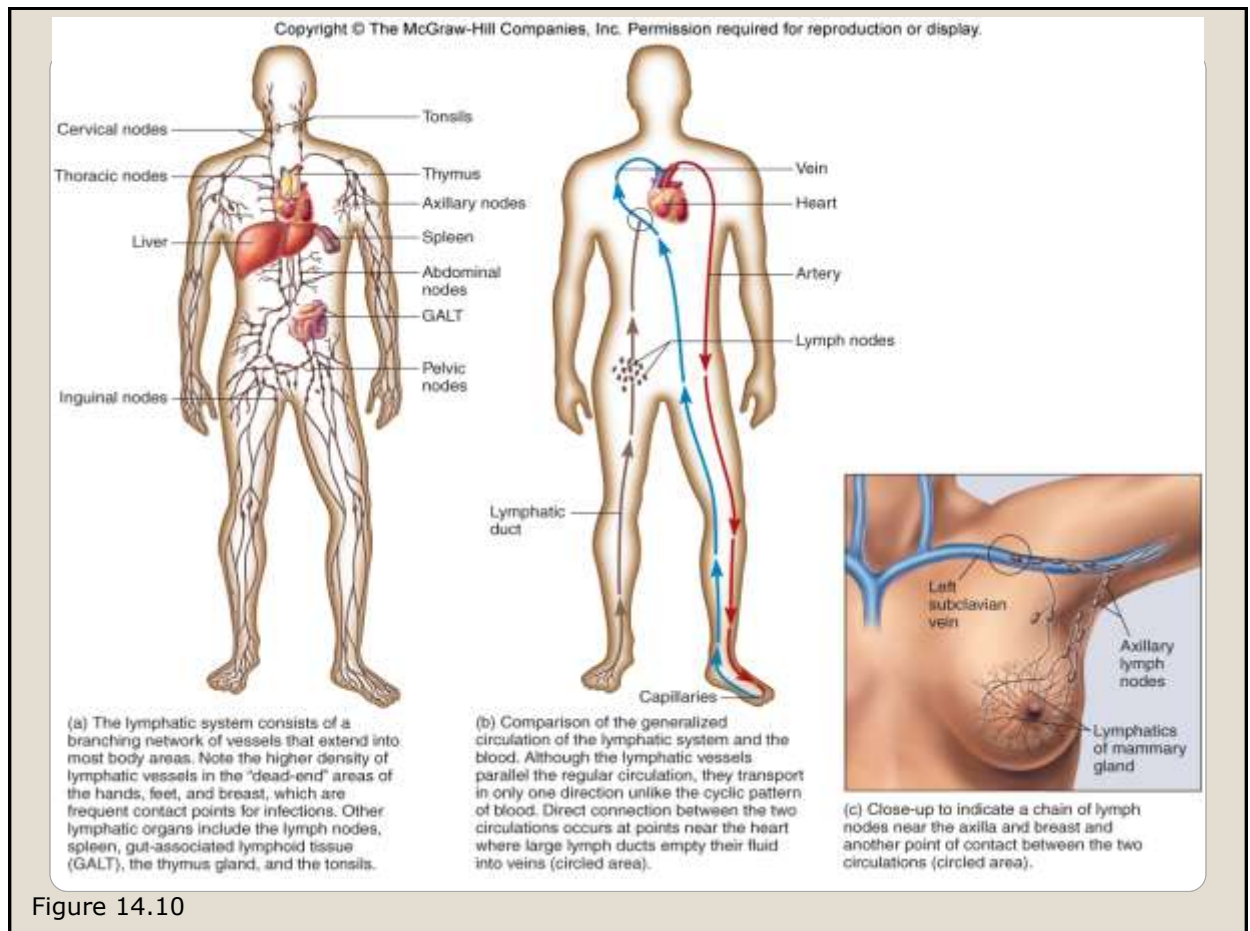


Figure 14.10



- Lymph
- Plasmalike liquid formed when certain blood components move out of blood vessels into the extracellular spaces and diffuse or migrate into the lymphatic capillaries
- Composition parallels that of plasma, but without red blood cells

## Lymphatic Fluid

- Along the lines of blood vessels
- Similar to thin-walled veins
- High numbers in hands, feet, and around the areola of the breast
- Flow of lymph is in one direction only- from extremities toward the heart
- Lymph is moved through the contraction of skeletal muscles through which the lymphatic ducts wend their way

## Lymphatic Vessels

- Lymph nodes
- Thymus
- Spleen
- Gut-associated lymphoid tissue (GALT)
- Tonsils
- Loose connective tissue framework that houses aggregations of lymphocytes

## **Lymphoid Organs and Tissues**

- Small, encapsulated, bean-shaped organs
- Usually found in clusters along lymphatic channels and large blood vessels of the thoracic and abdominal cavities
- Major aggregations: axillary nodes, inguinal nodes, cervical nodes

## Lymph Nodes

- Similar to a lymph node except it filters blood instead of lymph
- Filters pathogens from the blood

**Spleen**

- **Thymus** originates in the embryo
- High rates of activity and growth until puberty
- Shrinks gradually through adulthood
- Thymic hormones help thymocytes develop specificity to be released as mature T cells

**The Thymus: Site of T-Cell Maturation**

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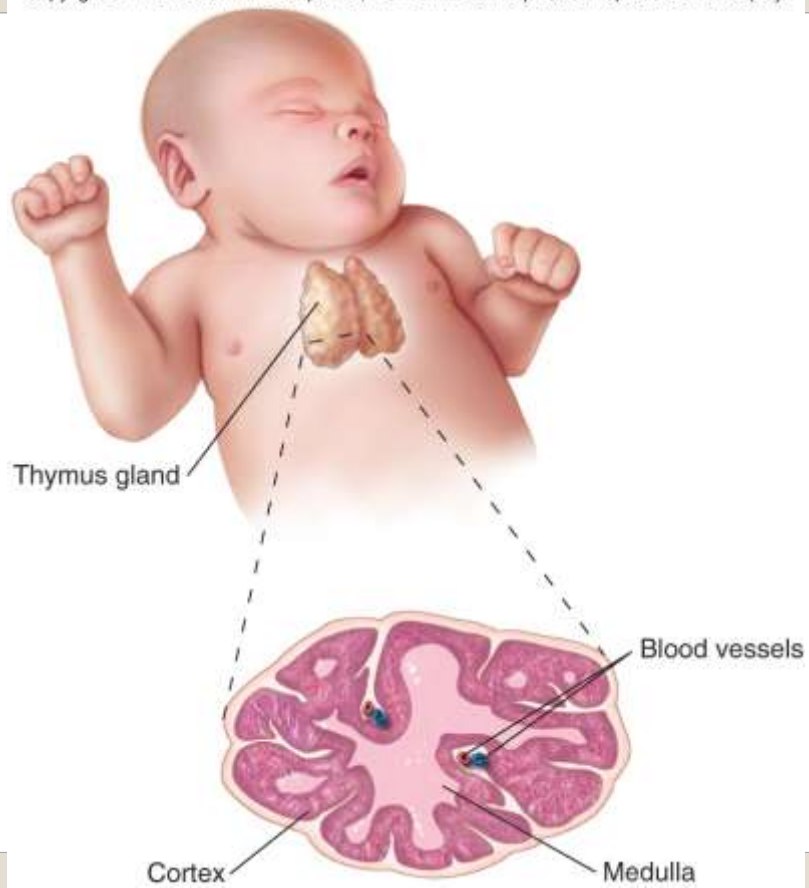


Figure 14.11

- Bundles of lymphocytes lie at many sites on or just beneath the mucosa of the gastrointestinal and respiratory tracts
- Tonsils
- Breasts of pregnant and lactating women
- **GALT** in the intestinal tract
  - Appendix
  - Lacteals
  - **Peyer's patches**
- Mucosal-associated lymphoid tissue (MALT)
- Skin-associated lymphoid tissue (SALT)
- Bronchial-associated lymphoid tissue (BALT)

## Miscellaneous Lymphoid Tissue