

3rd WEEK: LYMPHATIC SYSTEM

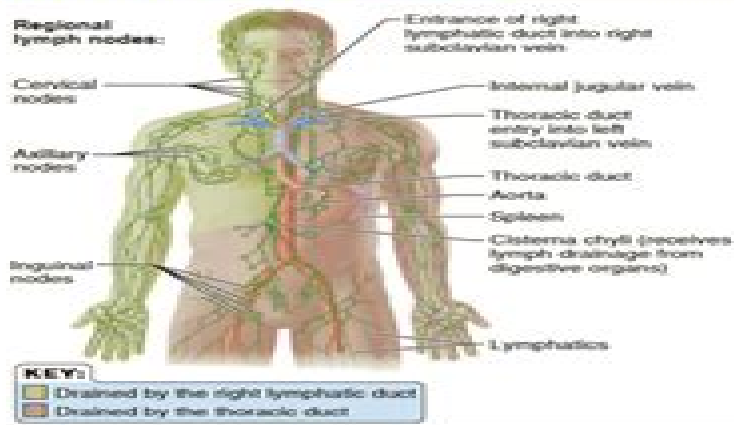


Figure 3. Distribution of lymphatic vessels and lymph nodes

LYMPHATIC VESSELS

- Similar to veins of the cardiovascular system
 - Thin walled
 - Larger vessels have valves
 - Low-pressure, pumpless system
- **Lymph transport is aided by:**
 - Milking action of skeletal muscles (like how skeletal muscles can open valves of veins when it is squeezed by the muscles)
 - Pressure changes in thorax during breathing
 - Smooth muscles in walls of lymphatics

LYMPH NODES

- Lymph nodes help protect the body by removing foreign material such as bacteria and tumor cells from the lymphatic stream by producing **lymphocytes** that function in the immune response
- Lymph nodes filter lymph before it is returned to the blood
 - As lymph is transported toward the heart, it is filtered through the thousands of lymph nodes that cluster along the lymphatic vessels
- Large clusters are found in the **inguinal, axillary, and cervical** regions of the body
- **Harmful materials that are filtered:**
 - Bacteria
 - Viruses
 - Cancer Cells
 - Cell debris
- **Defense cells within lymph nodes:**
 - **Macrophages** – engulf and destroy bacteria, viruses, and other foreign substances in the lymph before it is returned to the blood
 - **Lymphocytes** – respond to foreign substances in the lymphatic stream
- **Lymph nodes** vary in shape and size but most are **kidney-shaped**, less than 1 inch long, and buried in connective tissue

- Each node is surrounded by a **fibrous capsule** from which connective tissue strands called **trabeculae**
 - Divided into compartments by **trabeculae**

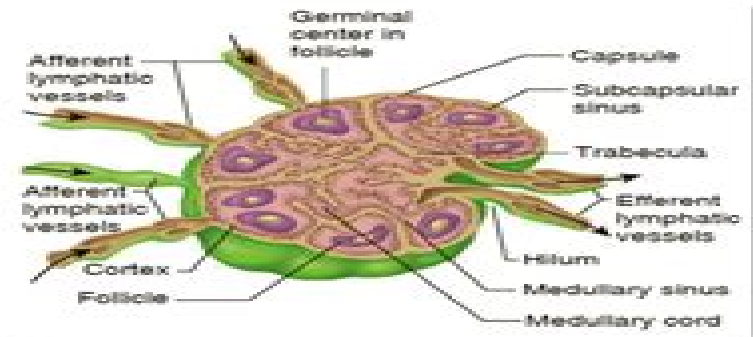


Figure 4. Structure of a lymph node

- Internal framework is a network of **soft reticular connective tissue**
- **Lymphocytes** arise from the redbone marrow but then migrate to the lymph nodes and other lymphoid organs, where they reproduce further
- The **cortex** (outer part) contains collections of lymphocytes called **follicles**
 - **Follicles** – collections of lymphocytes, many of which have **dark-staining** centers called **germinal centers**
 - Germinal centers enlarge when specific B lymphocytes (the B cells) are generating daughter cells **plasma cells** which release antibodies.
 - **T-cells** – the rest of the cortical cells that are in transit
 - Circulate continuously between the blood, lymph nodes, and lymphatic stream
- **Medulla** (inner part)
 - The **medullary cords** are inward extensions of cortical tissue that contain both B and T cells
 - **Phagocytic macrophages** are located in the central medulla of the lymph node

FLOW OF LYMPH THROUGH NODES

1. Lymph enters the convex side through **afferent lymphatic vessels**
2. Lymph flows through a number of sinuses or spaces inside the node
3. Lymph exits through **efferent lymphatic vessels** because there are fewer efferent than afferent vessels, flow is **slowed**
 - It allows time for the lymphocytes and macrophages to perform their protective functions

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M Tight



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case studies CPR and ACLS algorithms updated throughout text to reflect the current AHA guidelines 2023 2400 pages

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horoscope Avery covers the zodiac and its physical counterparts how different zodiacal signs can manage their health and how one's horoscope can hint at health issues before they surface *HBJ Science*, 1985

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Table of Contents The Lymphatic System And Body Defenses Packet

1. Understanding the eBook The Lymphatic System And Body Defenses Packet
 - The Rise of Digital Reading The Lymphatic System And Body Defenses Packet
 - Advantages of eBooks Over Traditional Books
2. Identifying The Lymphatic System And Body Defenses Packet
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an The Lymphatic System And Body Defenses Packet
 - User-Friendly Interface
4. Exploring eBook Recommendations from The Lymphatic System And Body Defenses Packet

- Personalized Recommendations
- The Lymphatic System And Body Defenses Packet User Reviews and Ratings
- The Lymphatic System And Body Defenses Packet and Bestseller Lists
- 5. Accessing The Lymphatic System And Body Defenses Packet Free and Paid eBooks
 - The Lymphatic System And Body Defenses Packet Public Domain eBooks
 - The Lymphatic System And Body Defenses Packet eBook Subscription Services
 - The Lymphatic System And Body Defenses Packet Budget-Friendly Options
- 6. Navigating The Lymphatic System And Body Defenses Packet eBook Formats
 - ePub, PDF, MOBI, and More
 - The Lymphatic System And Body Defenses Packet Compatibility with Devices
 - The Lymphatic System And Body Defenses Packet Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of The Lymphatic System And Body Defenses Packet
 - Highlighting and Note-Taking The Lymphatic System And Body Defenses Packet
 - Interactive Elements The Lymphatic System And Body Defenses Packet
- 8. Staying Engaged with The Lymphatic System And Body Defenses Packet
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers The Lymphatic System And Body Defenses Packet
- 9. Balancing eBooks and Physical Books The Lymphatic System And Body Defenses Packet
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection The Lymphatic System And Body Defenses Packet
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine The Lymphatic System And Body Defenses Packet
 - Setting Reading Goals The Lymphatic System And Body Defenses Packet
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of The Lymphatic System And Body Defenses Packet

- Fact-Checking eBook Content of The Lymphatic System And Body Defenses Packet
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning
- Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
- Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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