

Ch14 Notes - Lymphatic System

“If you’re not with us, then you’re against us”

Three Parts

- _____ – pick up excess tissue fluid that have escaped from cardiovascular system and transport it back into blood
- _____ – house phagocytic cells and lymphocytes that aid in body’s defense and resistance to disease

Lymphatic Vessels

- **Lymph** = _____
- **Function:** carries fluid back to blood so blood can have a sufficient amount of volume
- **Structure:**
 - _____-way system – towards heart and returns to _____ system
 - Moves lymph by action of _____ muscles and pressure changes caused from breathing
- Cell debris, bacteria, and viruses can _____ enter the lymph capillaries but not blood capillaries
- Bacteria and viruses can use vessels as a transport system to other areas of the body

Lymph Nodes

- **Function:** help protect the body by removing _____ from lymph (immune response)
- **Location:** large clusters found within the _____ tissue of the _____, _____, and _____ regions
- Cells found in the nodes:
 - _____ – engulf and destroy bacteria, viruses, and other foreign substances
 - _____ – type of white blood cell that responds to foreign substances
- _____ lymph nodes are the result of trapped lymph during active infections
- Nodes can become secondary _____ if they get too large a number of the infectious cells

Lymph Organs

Spleen – blood-rich organ that _____

- Destroys worn out red blood cells and returns pieces to liver
- Stores platelets and is a blood reservoir
- Fetus – spleen makes red blood cells / Adult – makes lymphocytes

Thymus – found overlying the heart

- Produces hormones (Thymosin) that program _____ to carry out protective roles in body

Tonsils – small masses of lymphatic tissue around the pharynx

- Protects _____ system by trapping and removing bacteria and other foreign substances before they can enter the throat

Peyer’s Patches – found in walls of intestines

- Protects _____ system from bacteria, viruses, and other harmful substances

Body's Defenses – both systems work hand in hand

Nonspecific Defense System – responds _____ to protect body from all foreign substances

- _____ that cover body surfaces and cells and chemicals that initially act to protect the body against pathogens
- _____ = harmful or disease causing microorganisms

1) Surface Membrane Barriers

- Skin and mucous membranes are the body's _____ line of defense
 - Skin secretes _____ substances, stomach mucosa is acidic, saliva can kill bacteria, sticky mucous in digestive tract can trap microorganisms
- When surface barrier is broken other nonspecific responses occur

2) Inflammatory response – body's _____ line of defense

- Triggered whenever body tissues are injured
- Signs and Symptoms = redness, _____, swelling, and _____
- STEPS: Injury → release of chemicals from injury site → blood vessels _____ → activates pain receptors → attract phagocytes and white blood cells to area → _____ come in to block off injured area
- Prevents _____ of damaging agents, disposes cell debris and pathogens, and sets stage for repair

3) Cells

- Phagocytes (_____) – engulfs foreign substance and breaks it down
- _____ (NK) cells – found in blood and lymph and can kill _____ cells and virus-infected cells; can act against any foreign cell

4) Antimicrobial Molecules

- _____ – proteins that attach to and break apart foreign cells, which amplifies the inflammatory response
- _____ – proteins released by virus-infected cells that protect uninfected cells from viral takeover

5) Fever

- Abnormally high body temperature _____ multiplication of bacteria and enhances _____ processes
- Systemic response triggered by _____ (chemicals secreted by white blood cells and macrophages that have been exposed to foreign cells)

Specific Defense System – _____ system

- Attacks very specific foreign substances – either _____ cell attack or by releasing chemicals or _____ – and acts to destroy or inactivate them
- Protects us from most bacteria, viruses, transplanted organs or grafts, and cells that have turned against us (cancer cells)
- _____ = highly specific resistance to disease
- Must _____ encounter a substance (antigen) before it can protect the body against it

Immune Response – reaction to a _____ that starts the inflammatory response and attacks specific antigens

- body will attack anything that is recognized as not being part of the body

3 General Characteristics of Immune Response

- 1) _____ specific – acts on particular pathogens
- 2) _____ – not restricted to infection site
- 3) Has “_____” – recognizes and has even stronger attacks on previously encountered pathogens

Types of Immunity

- Humoral immunity – _____
 - Provided by antibodies present in body’s fluids
- Cellular immunity – _____
 - When lymphocytes (living cells) defend the body

_____ – any substance capable of exciting our immune system and provoking an immune response

Lymphocytes – formed in red bone marrow

- _____ – produce antibodies and oversee humoral immunity
- _____ – nonantibody-producing lymphocytes that make up cell mediated immunity
 - Mature in thymus
- Our _____, not antigens, determines what specific foreign substances our immune system will recognize and resist

Macrophages – do not respond to specific antigens, but _____ lymphocytes

- Engulf pathogens and _____
- Leave _____ of antigens on the surface so T cells can recognize the “bad guys”

Humoral (Antibody-Mediated) Immune Response

- B lymphocytes are activated when it binds to an _____
- Clonal selection – B lymphocytes are _____ out of the billions and begin to _____ and multiple rapidly
- Cloned lymphocytes with the antibodies they release are the _____ humoral response to antigens

- B cells turn into _____ (rapid multiplication) or _____ (long lived and can respond to antigen later)
- Blood antibody levels rise and then decline
- _____ responses to the same antigen are with memory cells – _____, more prolonged, and more effective

Active and Passive Humoral Immunity

- Active Immunity – B cells encounter antigens and produce antibodies
 - Naturally acquired – _____ infections
 - Artificially acquired – receive _____
- Passive Immunity – getting _____ from another immune human or animal donor
 - Naturally acquired – antibodies from _____ during fetal development
 - Artificially acquired – received from _____

Antibodies (Immunoglobulins)

- Part of _____ – soluble
- Each type only binds to _____ antigen
- Structure:
 - long and short chains of amino acids that form a _____
- Function:
 - Inactivate antigens by:
 - _____ – proteins bind to foreign cell and causing it to break apart
 - _____ – _____ harmful effects of toxins released from bacteria or virus
 - _____ – antibodies can bind to _____ antigen at a time and they can _____ foreign cells together; used in blood typing
 - _____ – antigen-antibody complexes are so large that they _____ of solution; this makes it easier for phagocytes to engulf and destroy antigens

Cellular (Cell-Mediated) Immune Response

- T cells are activated to form _____ (just like B cells) when the macrophage present broken down parts of antigens and T cells can recognize it as “non-self”
- T cells _____ bind to free antigens
- Classes:
 - _____ (killer) T cells – kill virus infected, cancer, or foreign graft cells
 - _____ T cells – directors of immune system; recruit other cells to fight infections
 - _____ T cells – slows activity of T and B cells; vital for stopping immune response
 - Delayed hypersensitivity T cells – allergies and long-term inflammation
 - _____ cells – remain behind to be activated again if antigen returns