
Introduction to Human Anatomy & Physiology



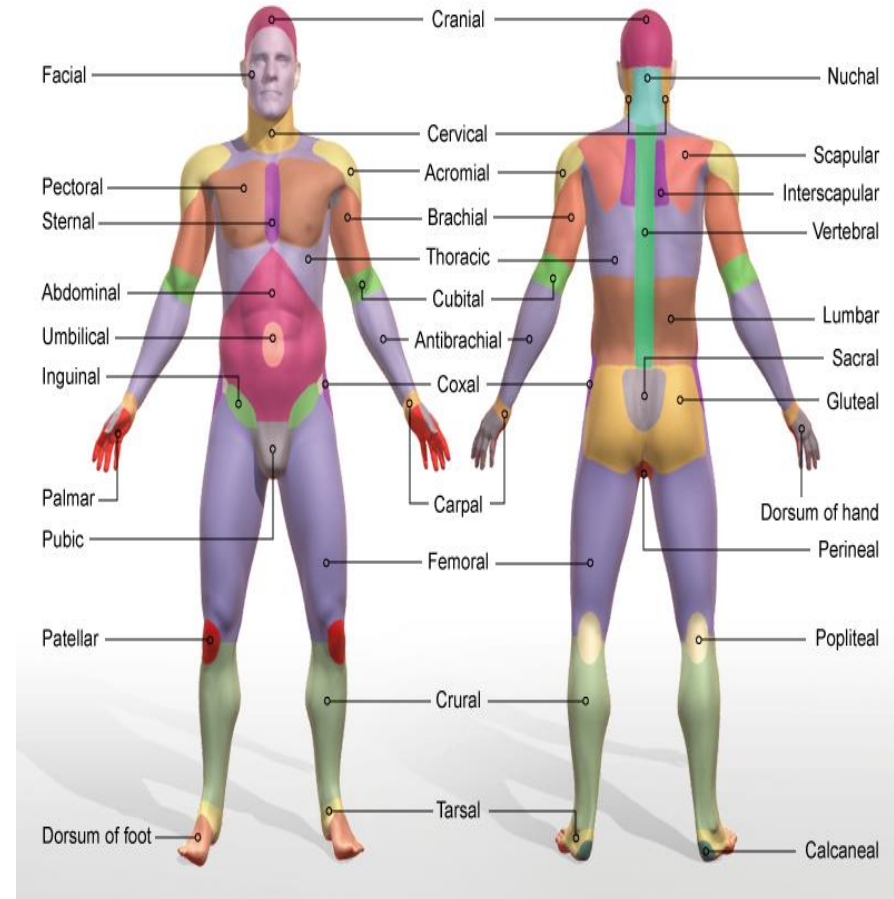
Ms. Mais Abdelhaq

Overview of Anatomy and Physiology

- **Anatomy** – the study of the structure of body parts and their relationships to one another
 - Gross or macroscopic
 - Microscopic
 - Developmental
- **Physiology** – the study of the function of the body's structural machinery

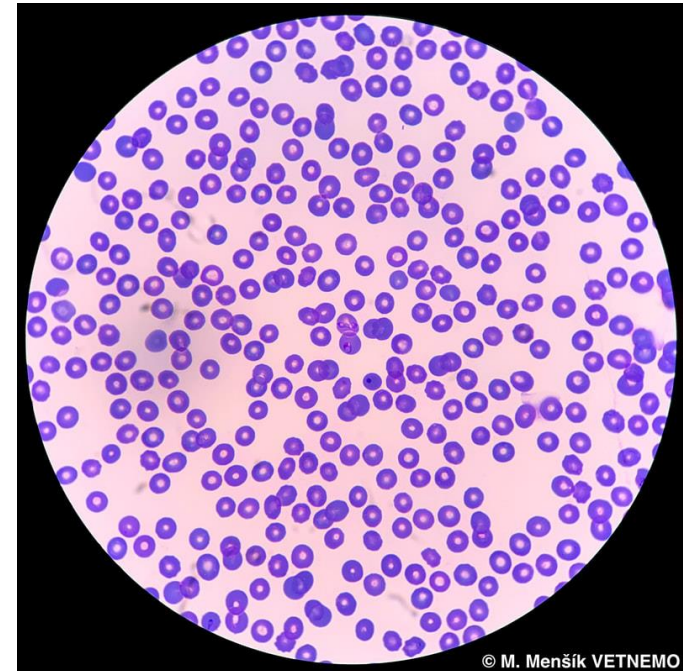
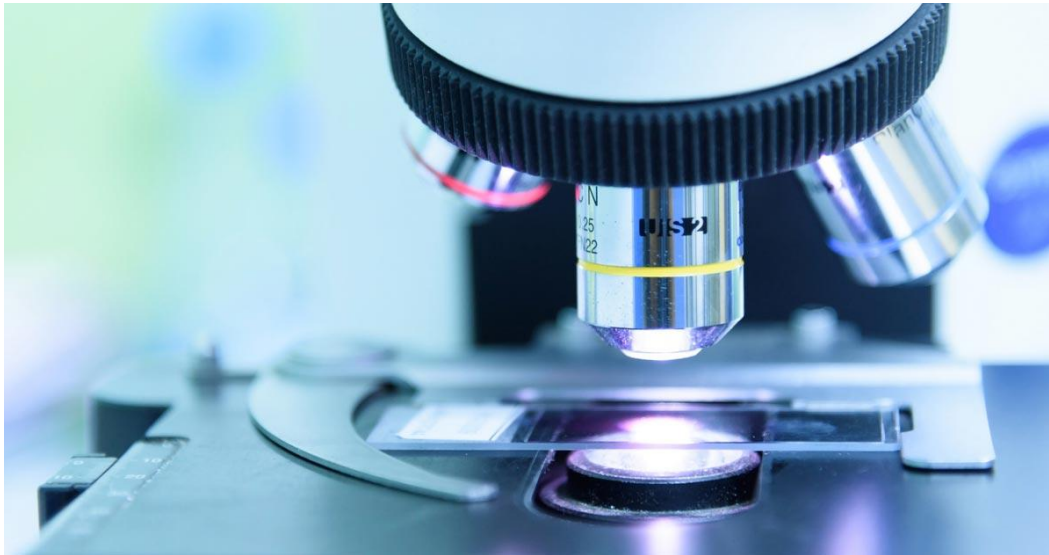
Gross Anatomy

- **Regional** – all structures in one part of the body
- **Systemic** – gross anatomy of the body studied system by system
- **Surface** – study of internal structures as they relate to the overlying skin



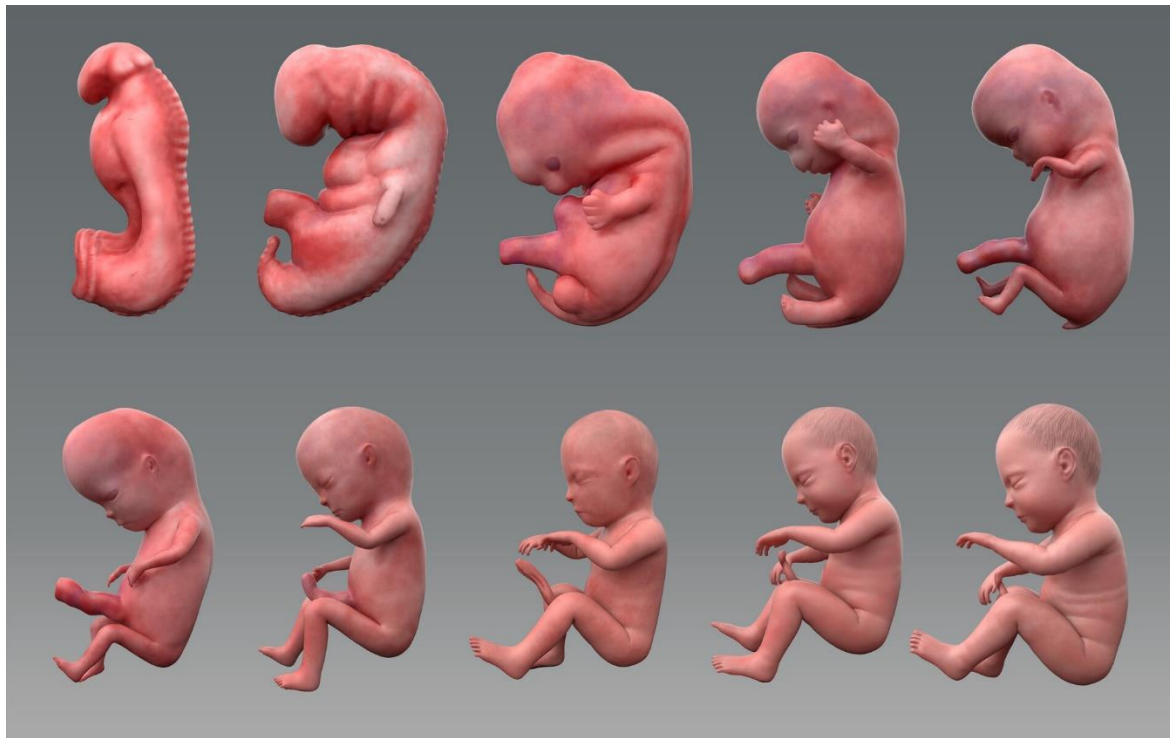
Microscopic Anatomy

- **Cytology** – study of the cell
- **Histology** – study of tissues



Developmental Anatomy

- Traces structural changes throughout life
- **Embryology** – study of developmental changes of the body before birth



Physiology

- Considers the operation of specific organ systems
 - Renal – kidney function
 - Neurophysiology – workings of the nervous system
 - Cardiovascular – operation of the heart and blood vessels
- Focuses on the functions of the body, often at the cellular or molecular level

Physiology

- Understanding physiology also requires a knowledge of physics, which explains
 - electrical currents
 - blood pressure
 - the way muscle uses bone for movement

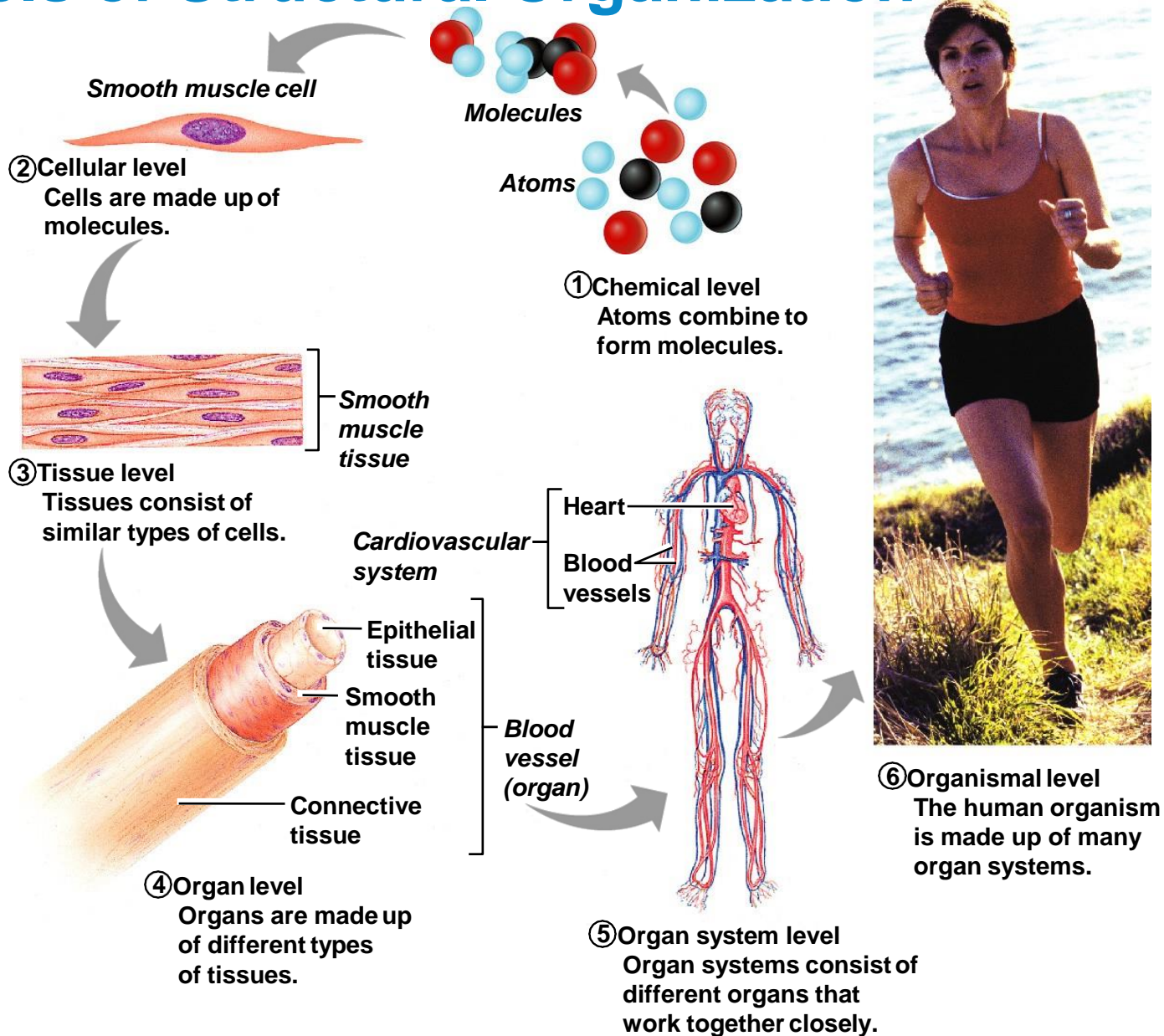
Principle of Complementarity

- Function always reflects structure
- What a structure can do depends on its specific form
- Physiology and anatomy are related to each other and they are inseparable.

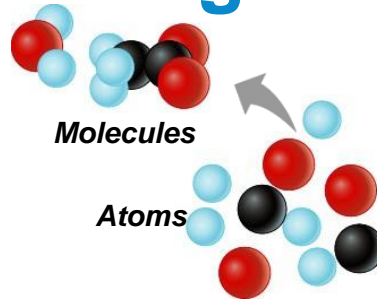
Levels of Structural Organization

- Chemical – atoms combined to form molecules
- Cellular – cells are made of molecules
- Tissue – consists of similar types of cells
- Organ – made up of different types of tissues
- Organ system – consists of different organs that work closely together
- Organismal – made up of the organ systems

Levels of Structural Organization

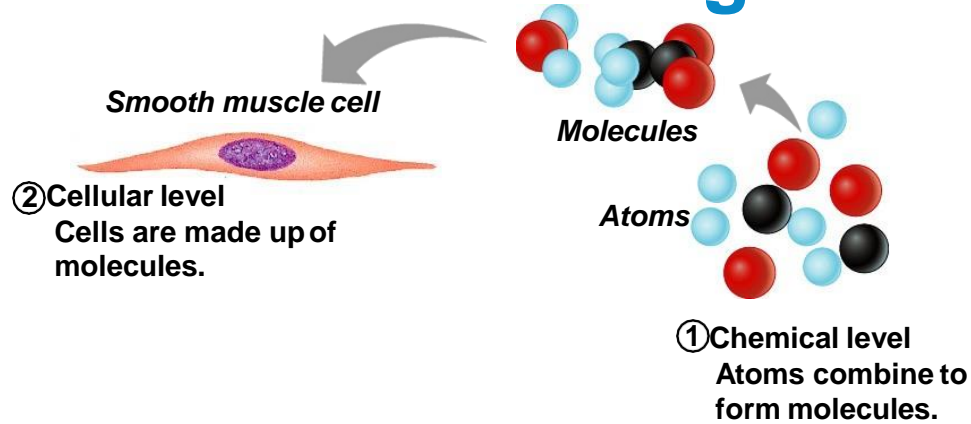


Levels of Structural Organization

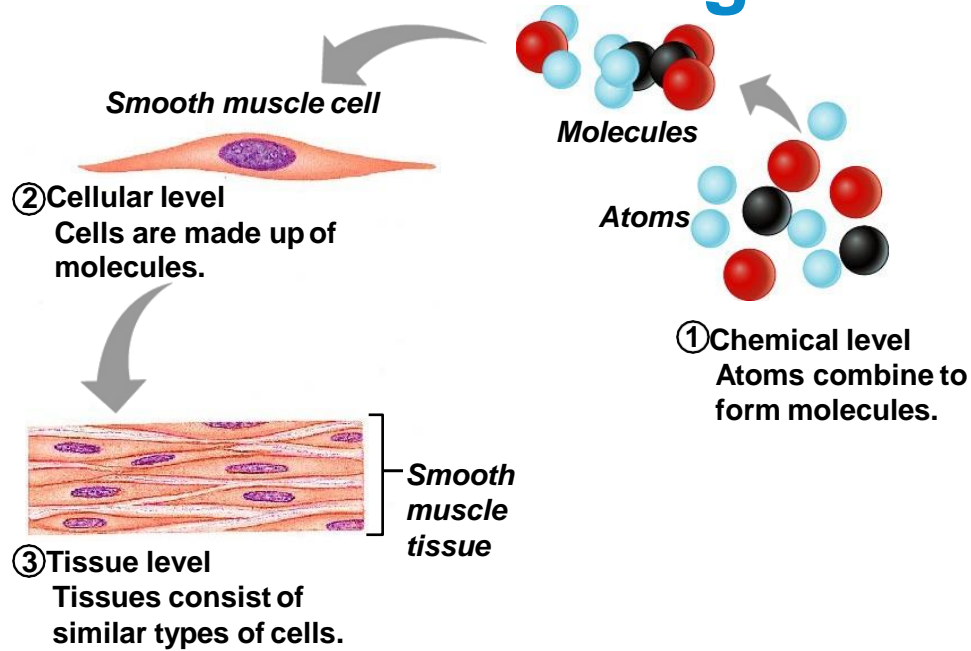


- ① Chemical level
Atoms combine to
form molecules.

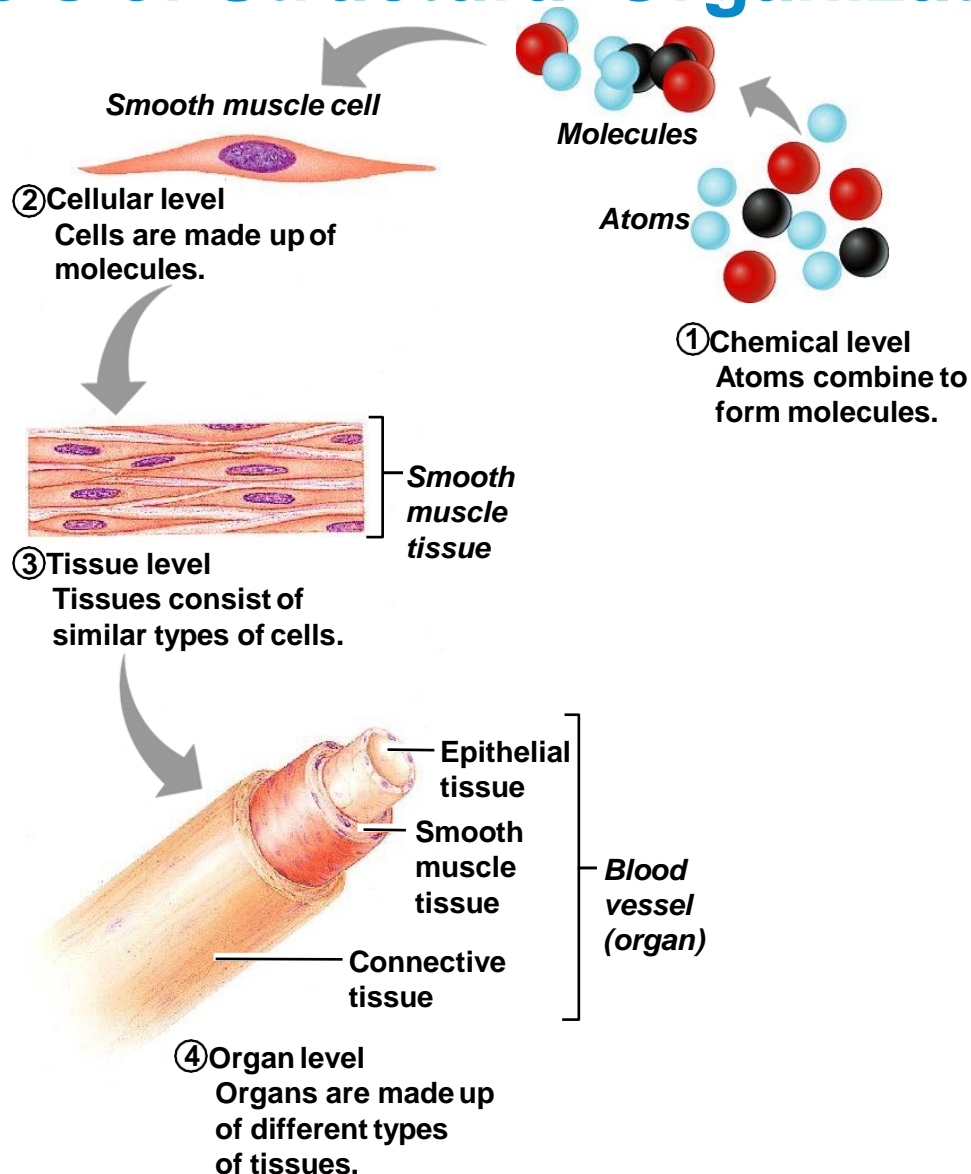
Levels of Structural Organization



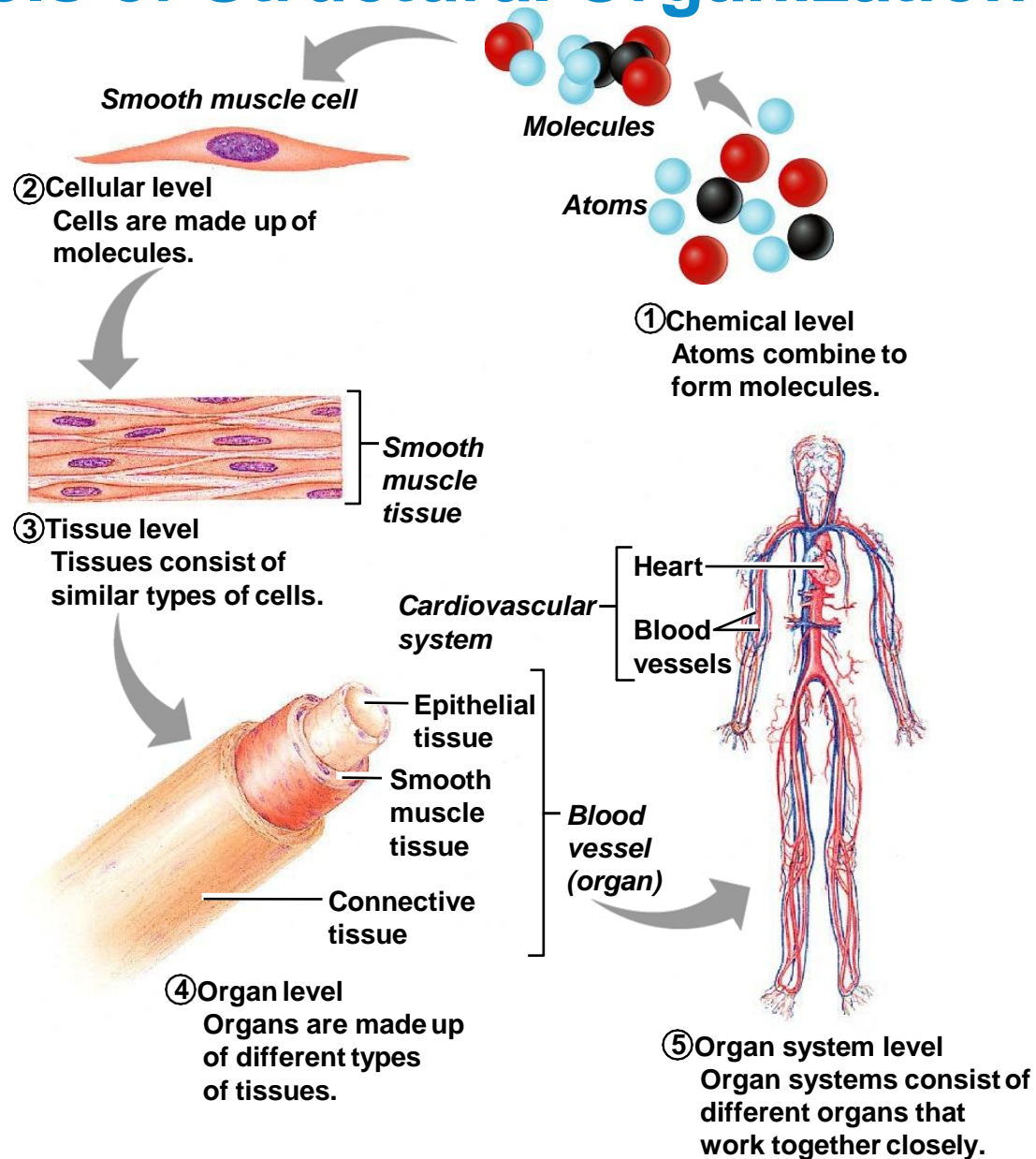
Levels of Structural Organization



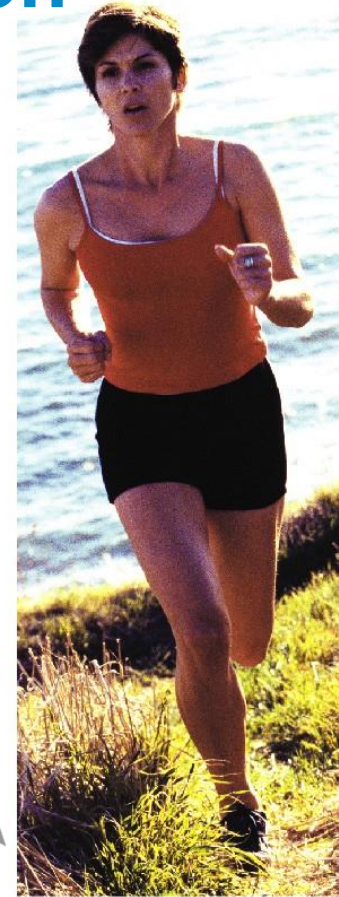
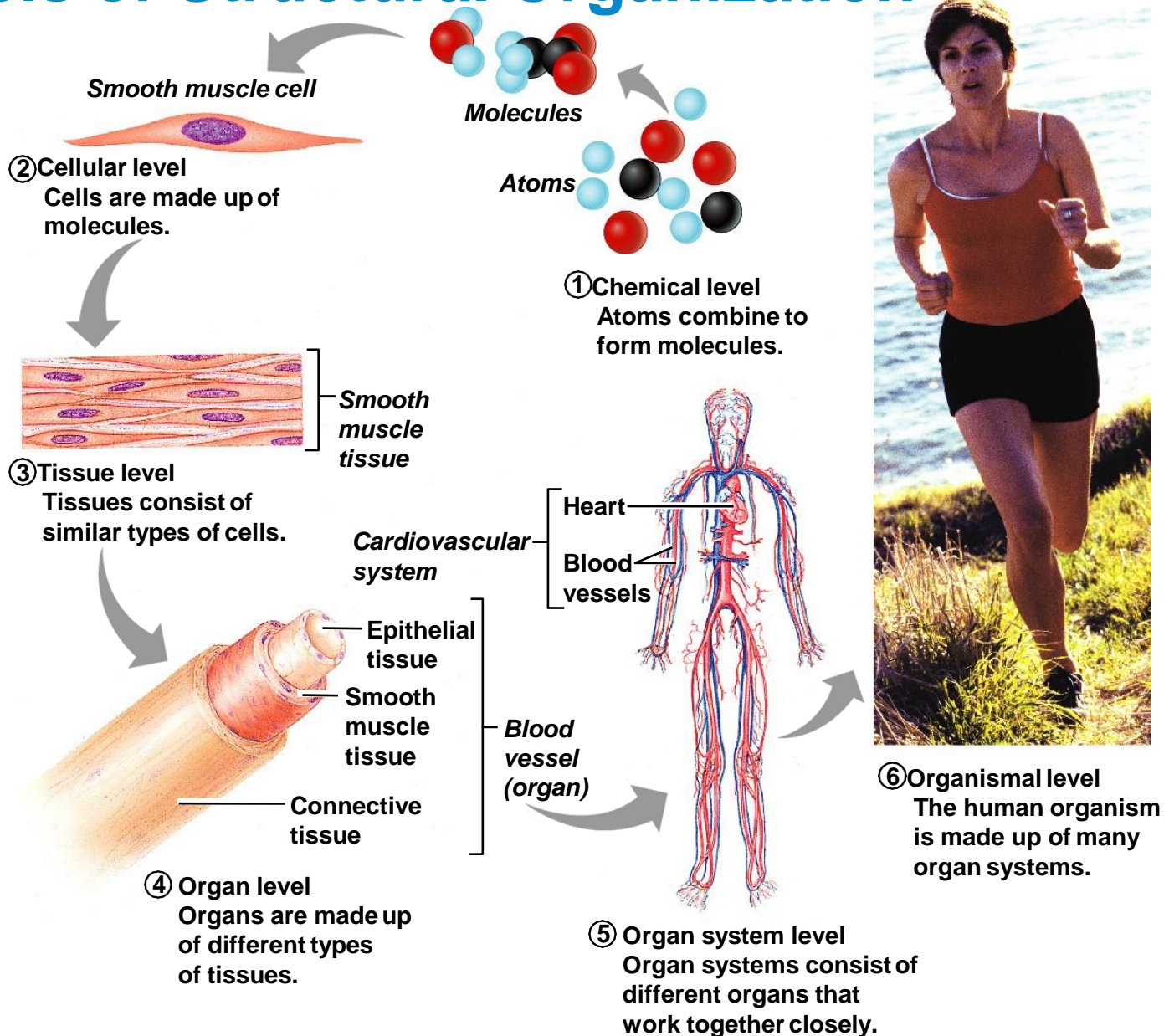
Levels of Structural Organization



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Levels of Structural Organization



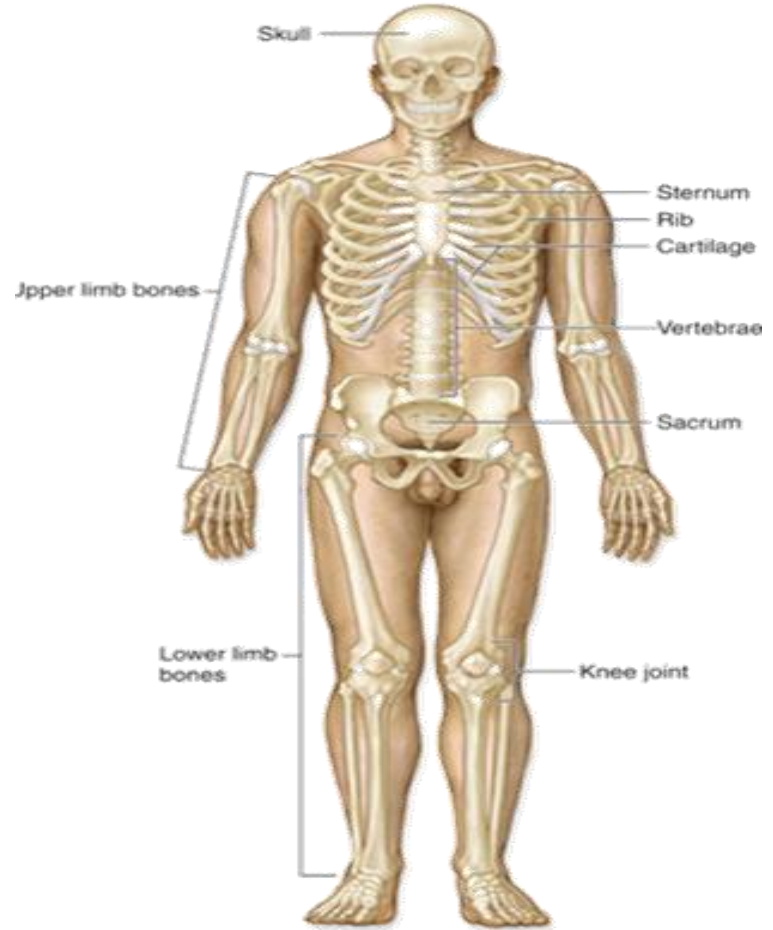
Integumentary System

- Forms the external body covering
- Composed of the skin, sweat glands, oil glands, hair, and nails
- Protects deep tissues from injury and synthesizes vitamin D



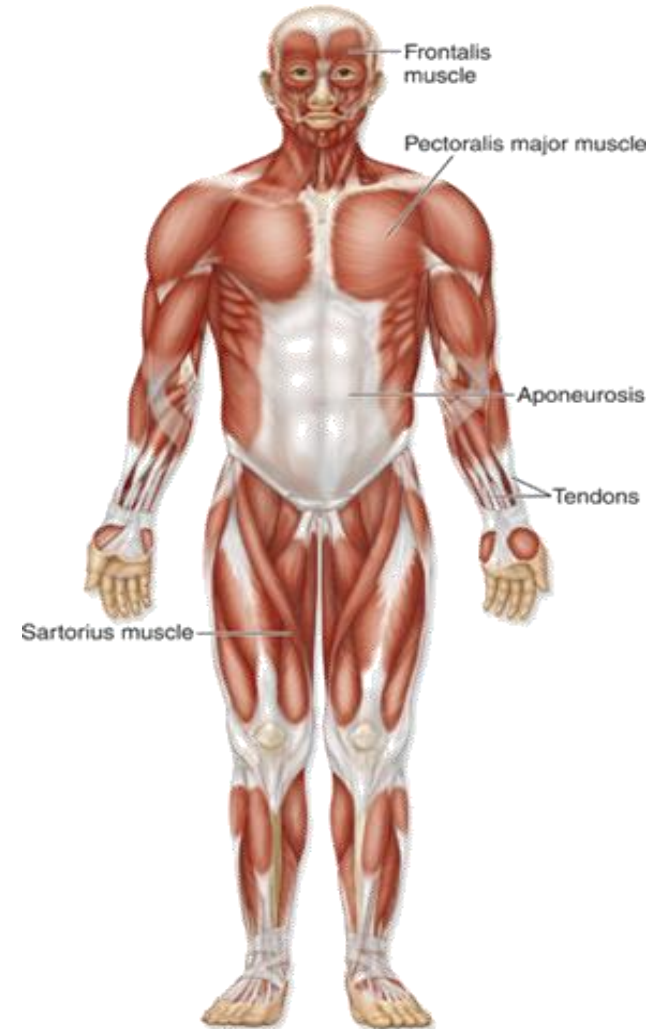
Skeletal System

- Composed of bone, cartilage, and ligaments
- Protects and supports body organs
- Provides the framework for muscles
- Site of blood cell formation
- Stores minerals



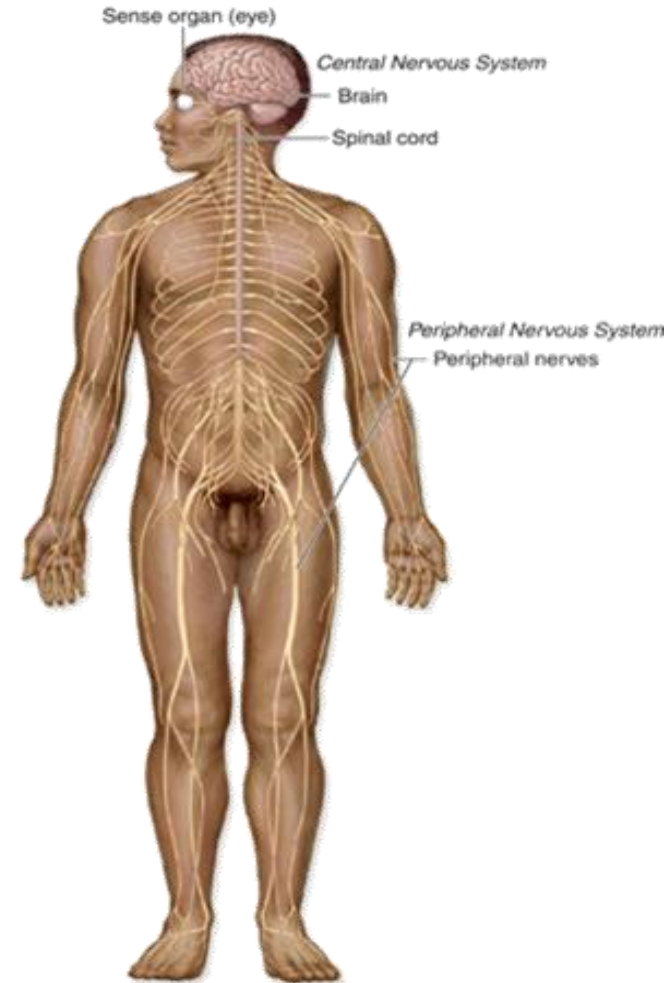
Muscular System

- Composed of muscles and tendons
- Allows manipulation of the environment, locomotion, and facial expression
- Maintains posture
- Produces heat



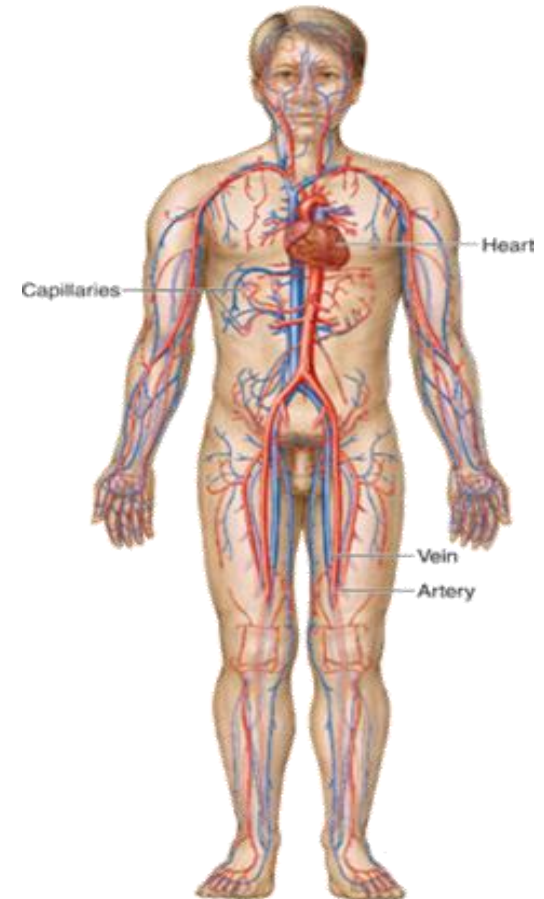
Nervous System

- Composed of the brain, spinal column, and nerves
- Is the fast-acting control system of the body
- Responds to stimuli by activating muscles and glands



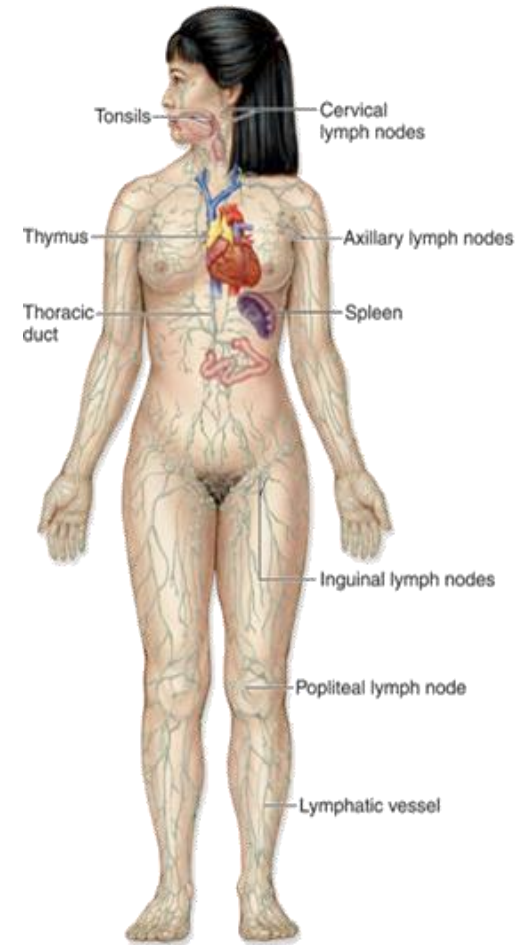
Cardiovascular System

- Composed of the heart and blood vessels
- The heart pumps blood
- The blood vessels transport blood throughout the body



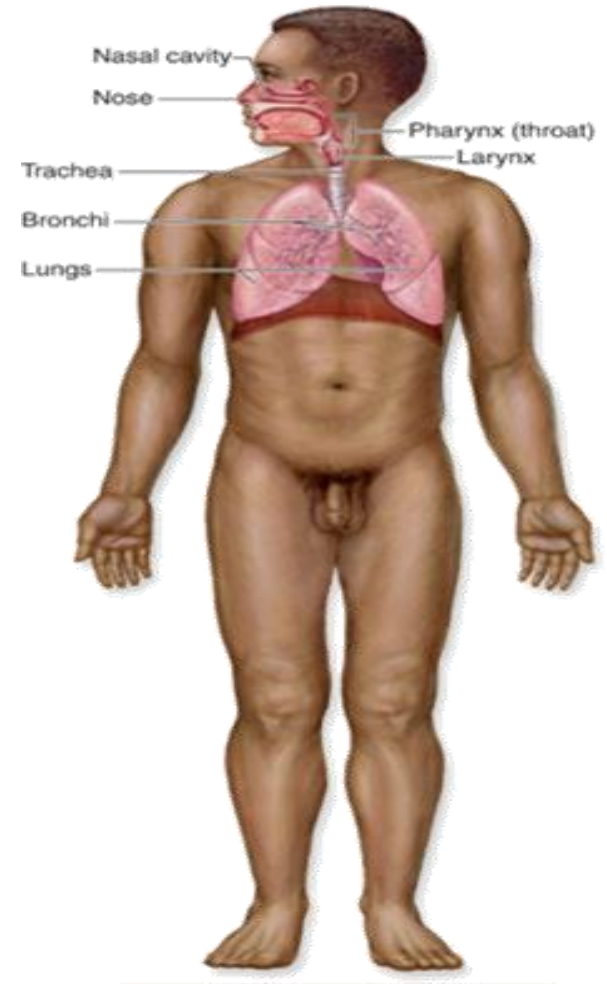
Lymphatic System

- Composed of red bone marrow, thymus, spleen, lymph nodes, and lymphatic vessels
- Picks up fluid leaked from blood vessels and returns it to blood
- Disposes of debris in the lymphatic stream
- Houses white blood cells involved with immunity



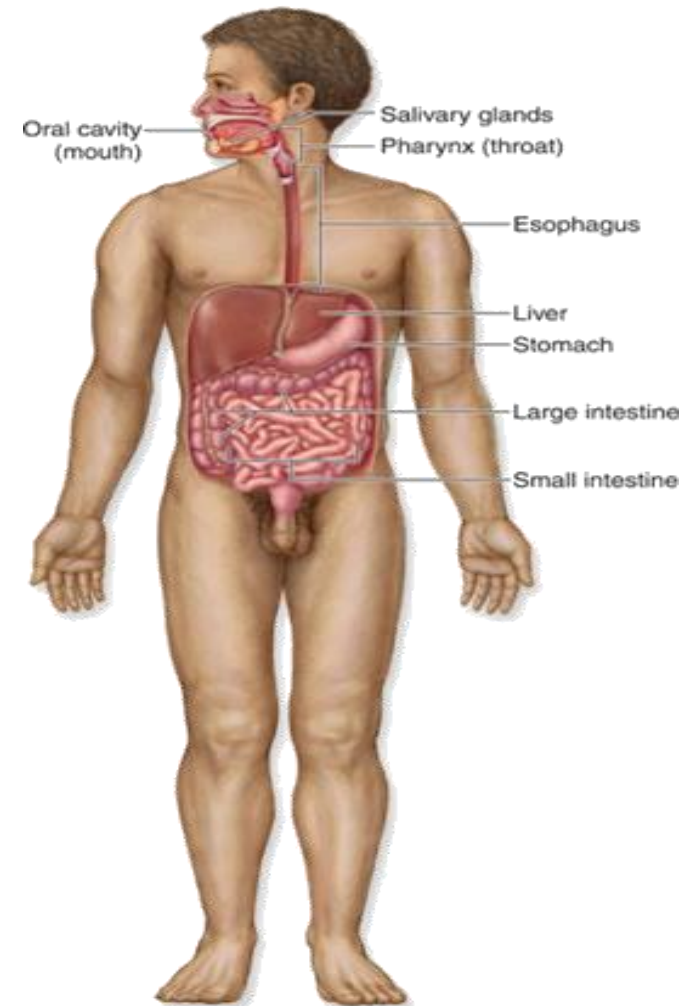
Respiratory System

- Composed of the nasal cavity, pharynx, trachea, bronchi, and lungs
- Keeps blood supplied with oxygen and removes carbon dioxide



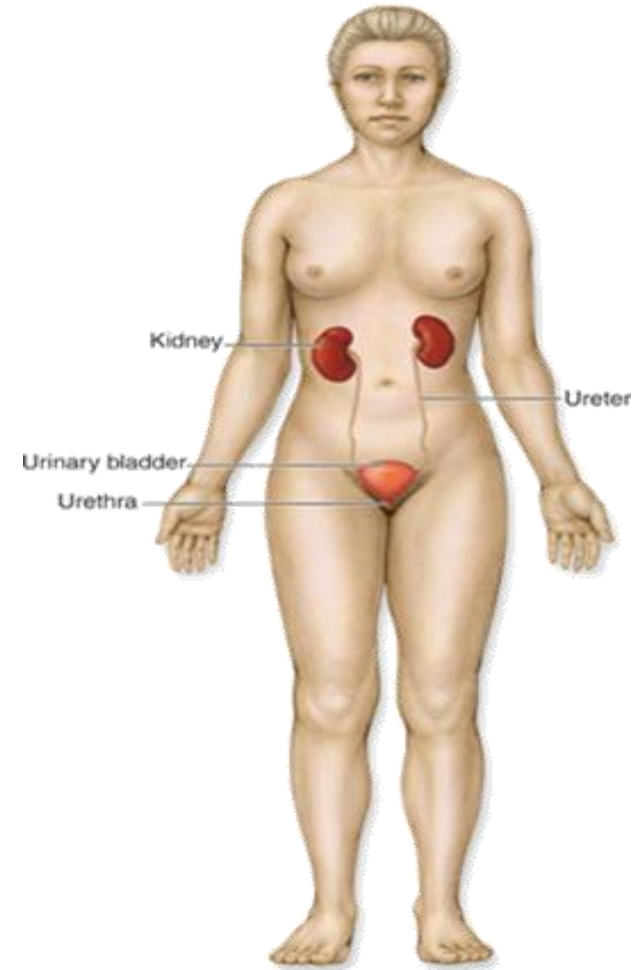
Digestive System

- Composed of the oral cavity, esophagus, stomach, small intestine, large intestine, rectum, anus
- Breaks down food into absorbable units that enter the blood
- Eliminates indigestible materials as feces



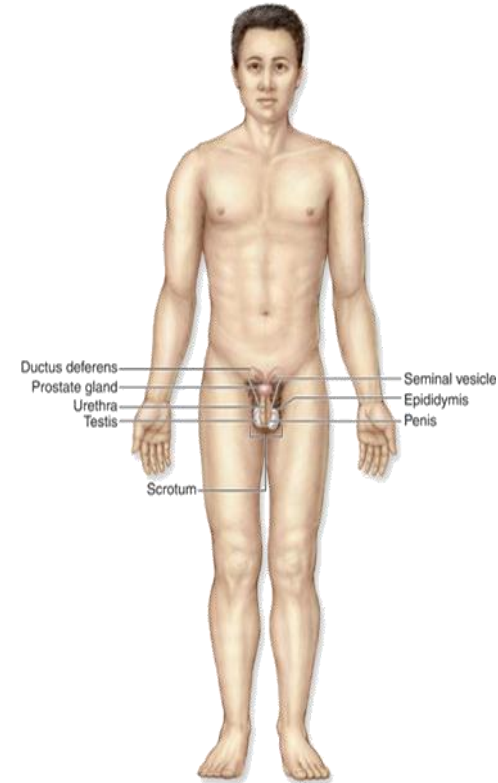
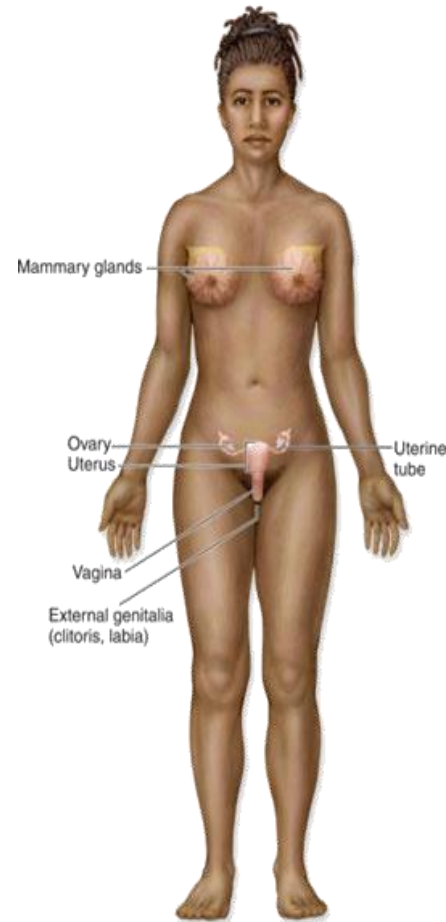
Urinary System

- Composed of kidneys, ureters, urinary bladder, and urethra
- Eliminates nitrogenous wastes from the body
- Regulates water, electrolyte, and pH balance of the blood



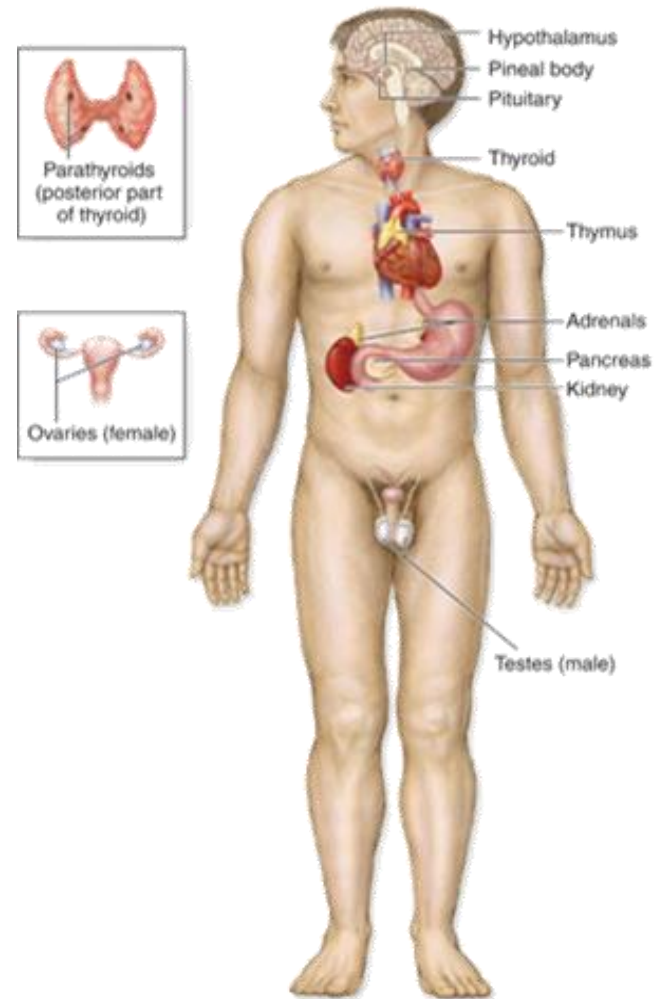
Reproductive System

- Main function is the production of offspring



Endocrine System

- Regulates body and cellular growth

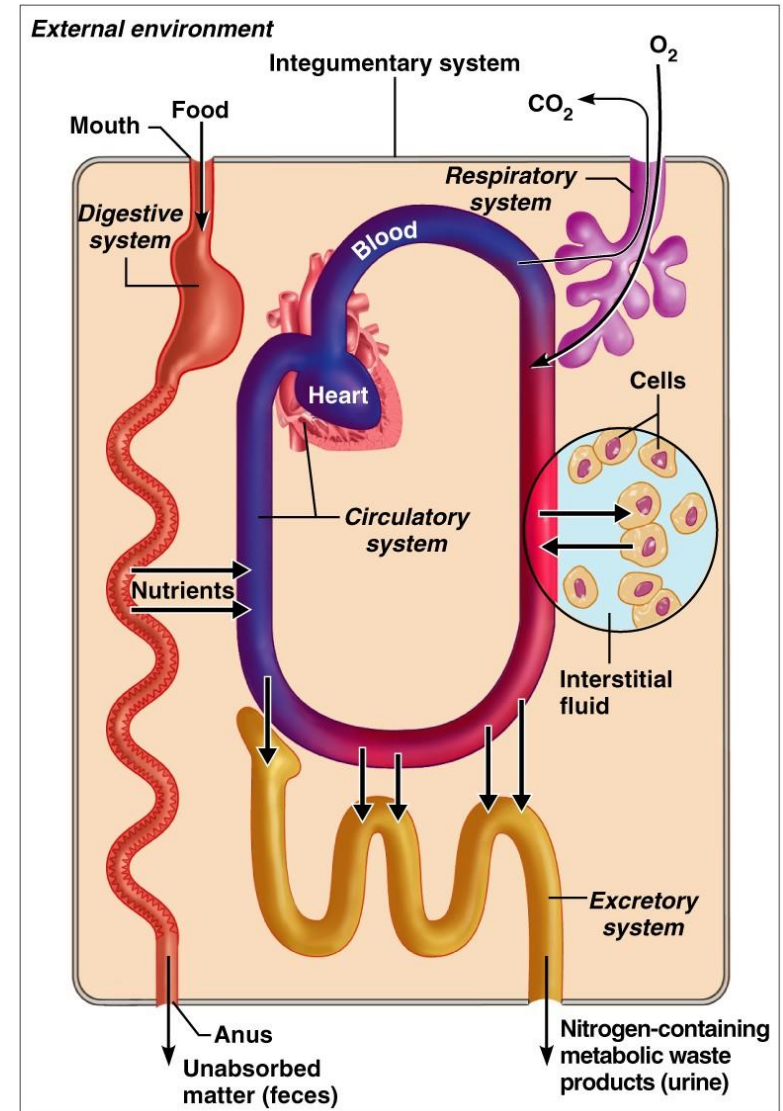


Organ Systems Interrelationships

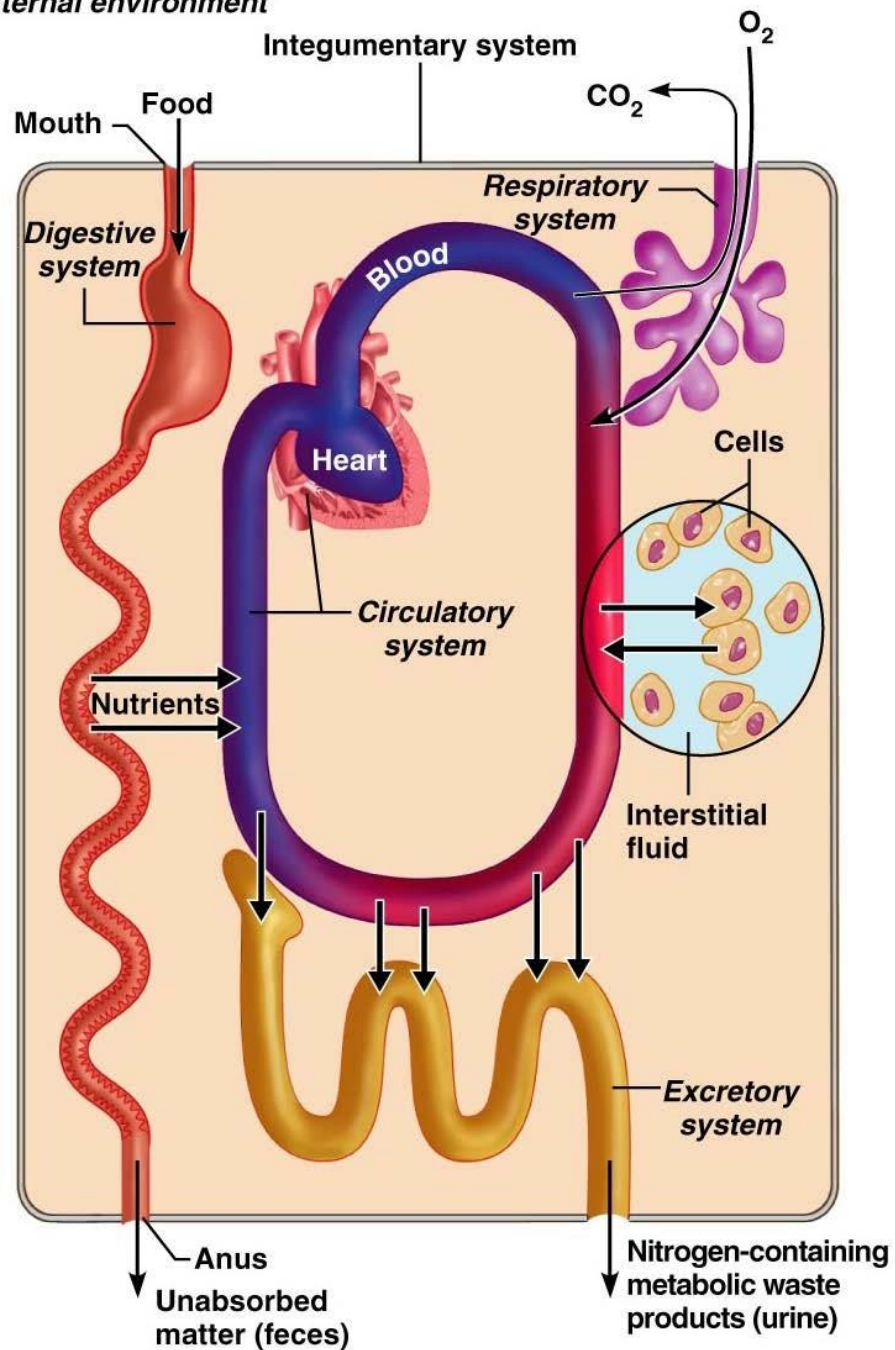
- The integumentary system protects the body from the external environment
- Digestive and respiratory systems, in contact with the external environment, take in nutrients and oxygen

Organ Systems Interrelationships

- Nutrients and oxygen are distributed by the blood
- Metabolic wastes are eliminated by the urinary and respiratory systems



External environment



Necessary Life Functions

- Maintaining boundaries – the internal environment remains distinct from the external environment
 - Cellular level – accomplished by plasma membranes
 - Organismal level – accomplished by the skin
- Movement – locomotion, propulsion (peristalsis), and contractility

Necessary Life Functions

- Responsiveness – ability to sense changes in the environment and respond to them
- Digestion – breakdown of ingested foodstuffs
- Metabolism – all the chemical reactions that occur in the body
- Excretion – removal of wastes from the body

Necessary Life Functions

- Reproduction – cellular and organismal levels
 - Cellular – an original cell divides and produces two identical daughter cells
 - Organismal – sperm and egg unite to make a whole new person
- Growth – increase in cell size and number

Survival Needs

- Nutrients – needed for energy and cell building
- Oxygen – necessary for metabolic reactions
- Water – provides the necessary environment for chemical reactions
- Normal body temperature – necessary for chemical reactions to occur at life-sustaining rates
- Atmospheric pressure – required for proper breathing and gas exchange in the lungs

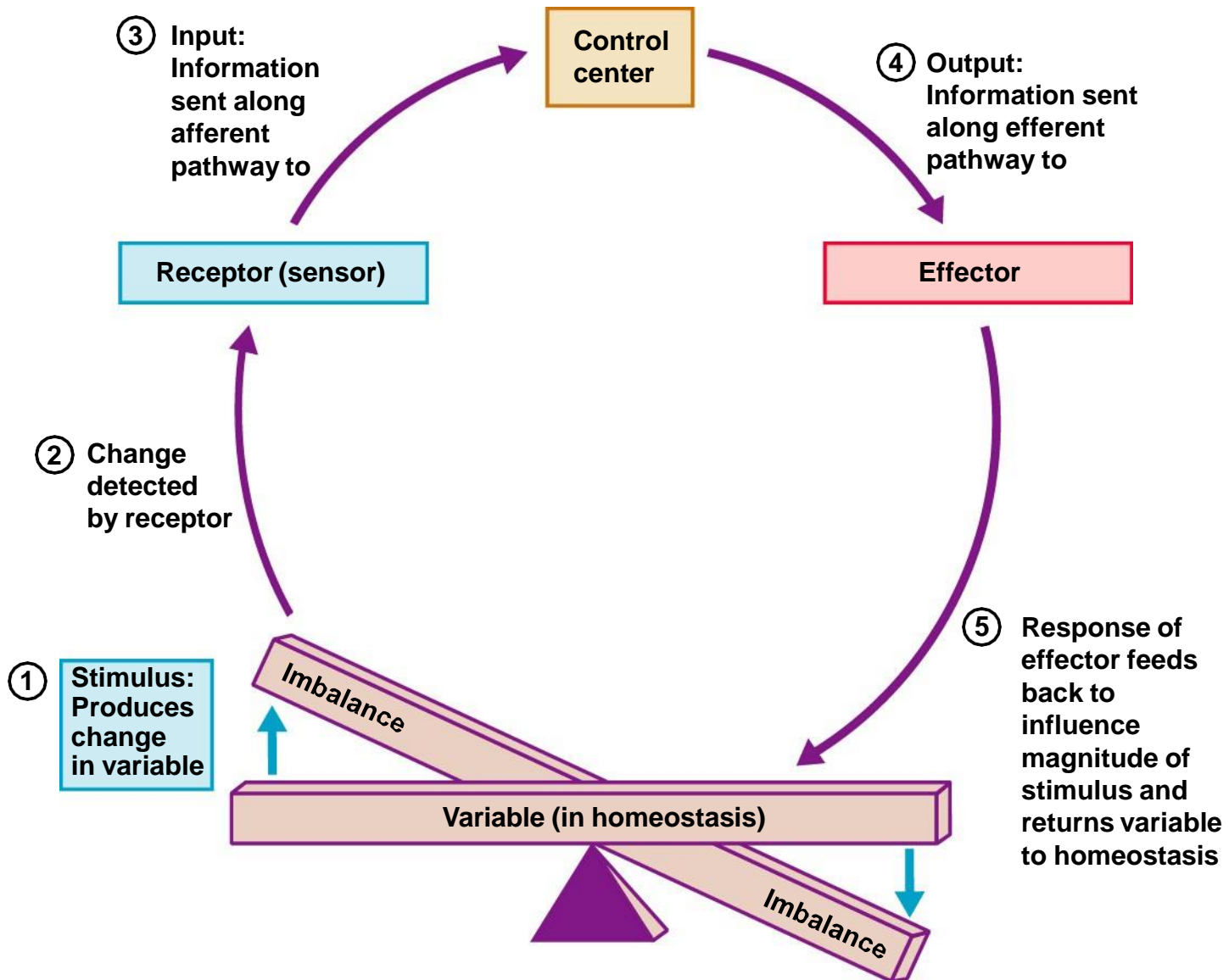
Homeostasis

- Homeostasis – ability to maintain a relatively stable internal environment in an ever-changing outside world
- The internal environment of the body is in a dynamic state of equilibrium
- Chemical, thermal, and neural factors interact to maintain homeostasis

Homeostatic Control Mechanisms

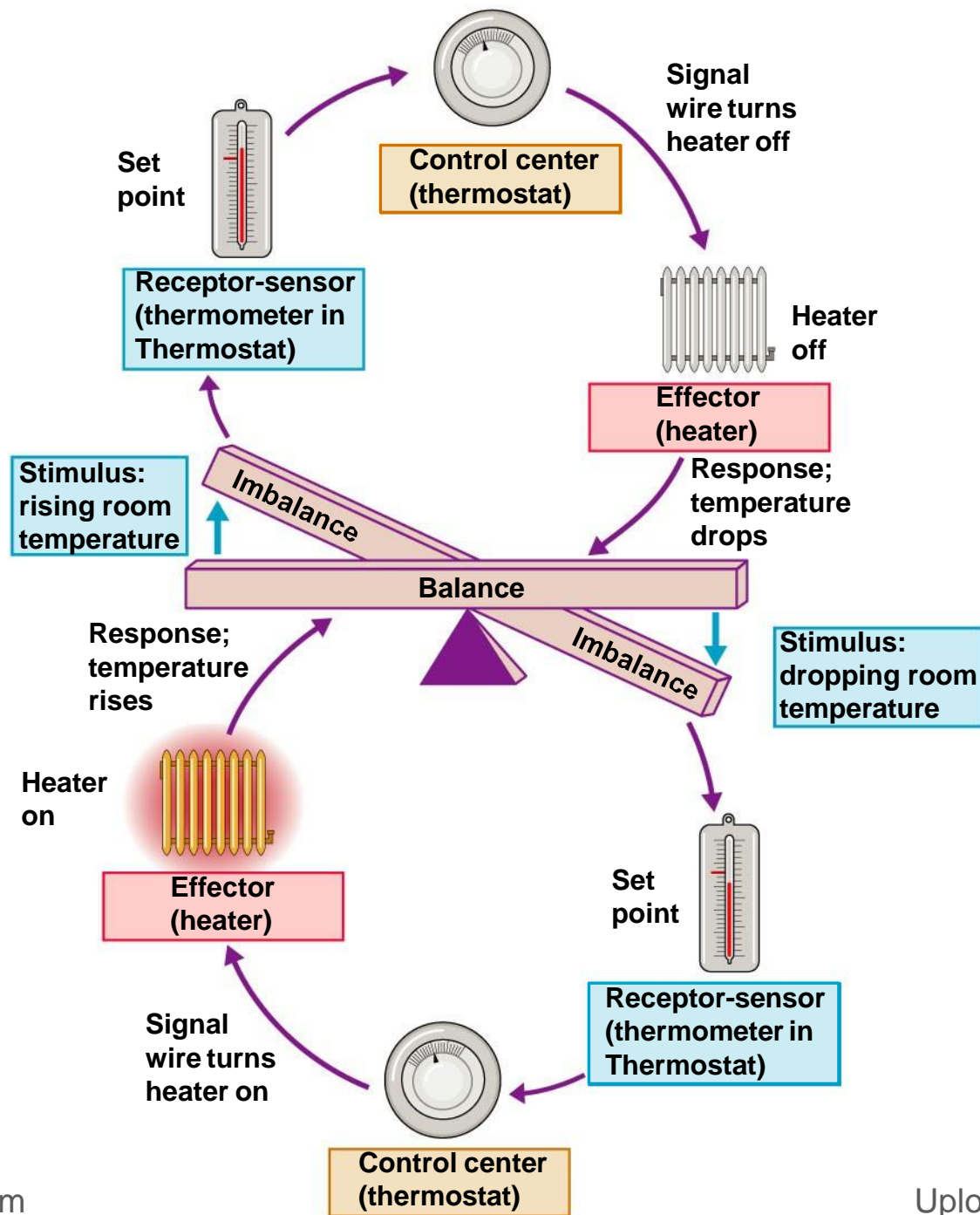
- Variables produce a change in the body
- The three interdependent components of control mechanisms:
 - **Receptor** – monitors the environments and responds to changes (stimuli)
 - **Control center** – determines the set point at which the variable is maintained
 - **Effector** – provides the means to respond to stimuli

Homeostatic Control Mechanisms



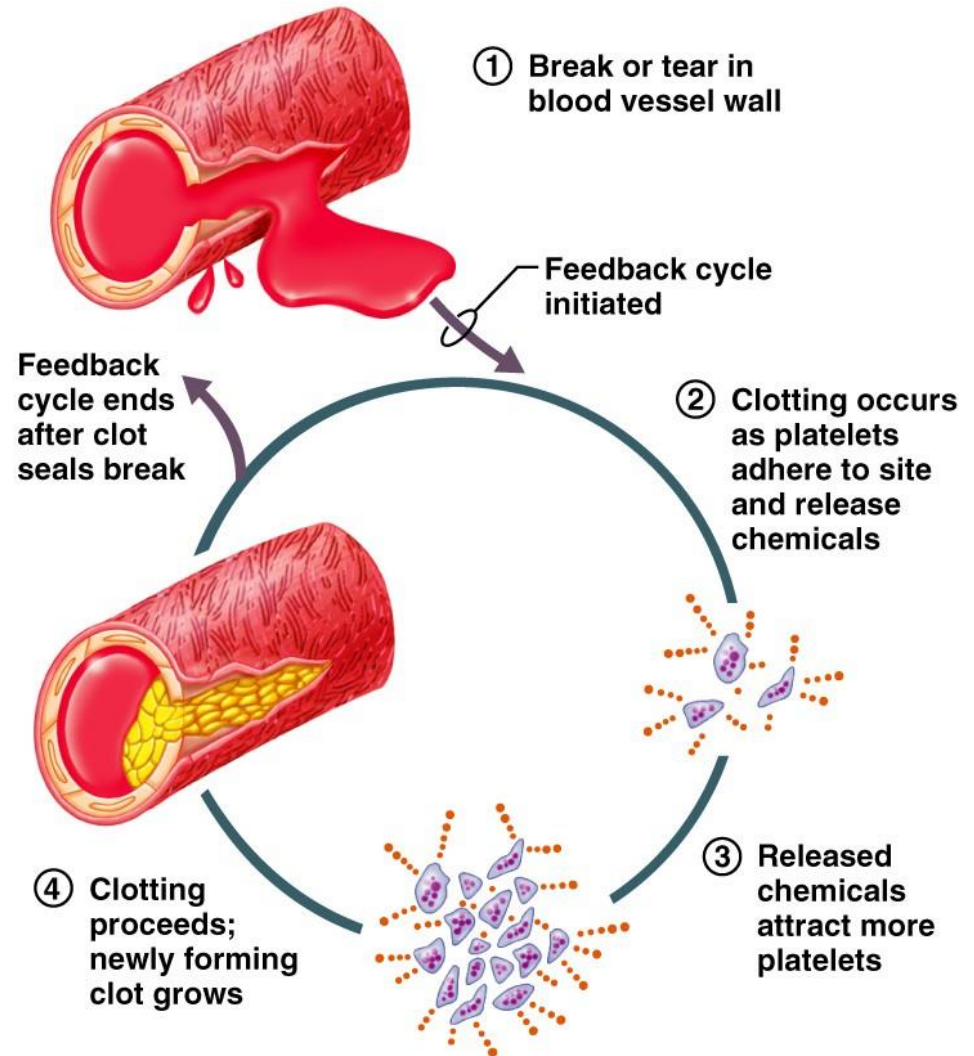
Negative Feedback

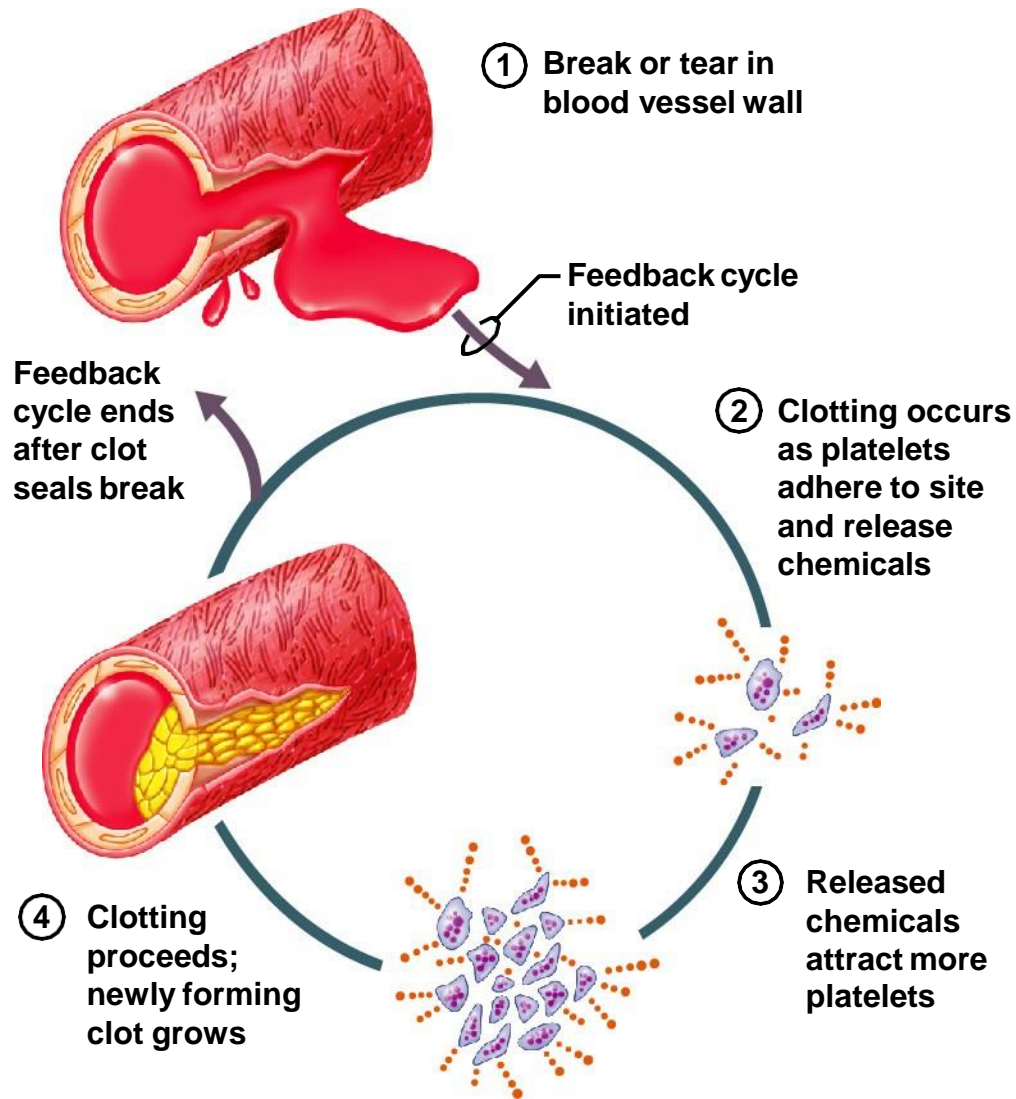
- In negative feedback systems, the output shuts off the original stimulus
- Example: Regulation of room temperature

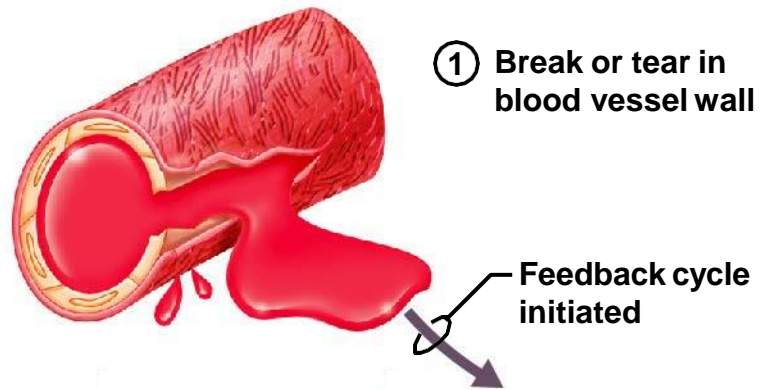


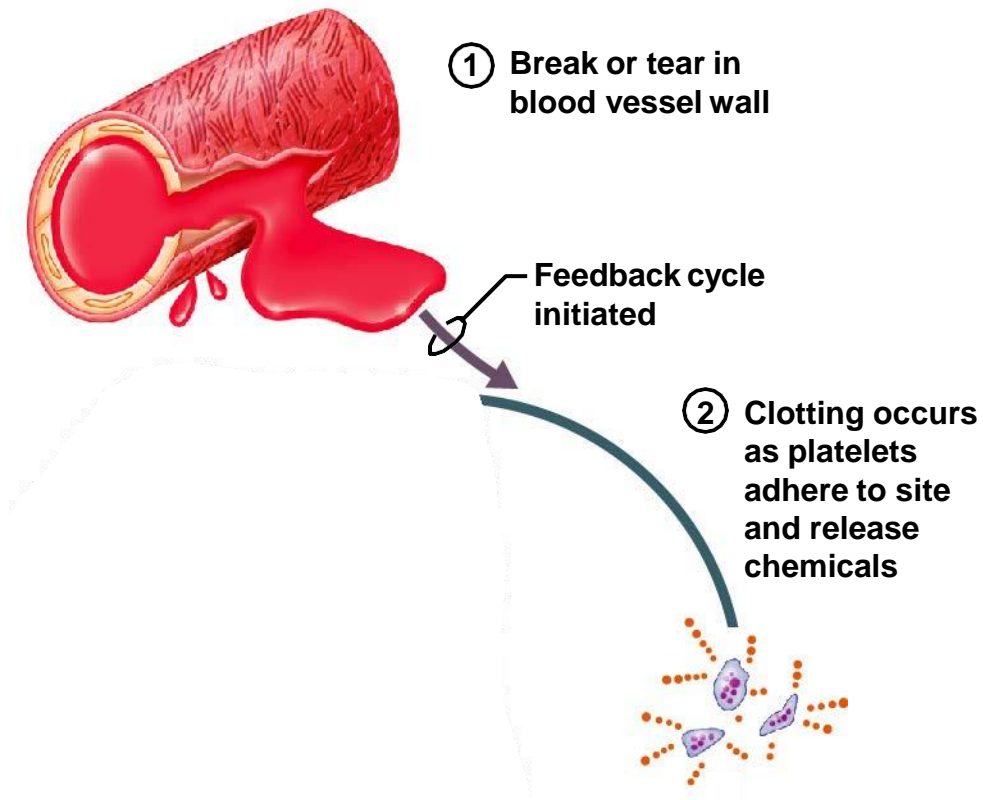
Positive Feedback

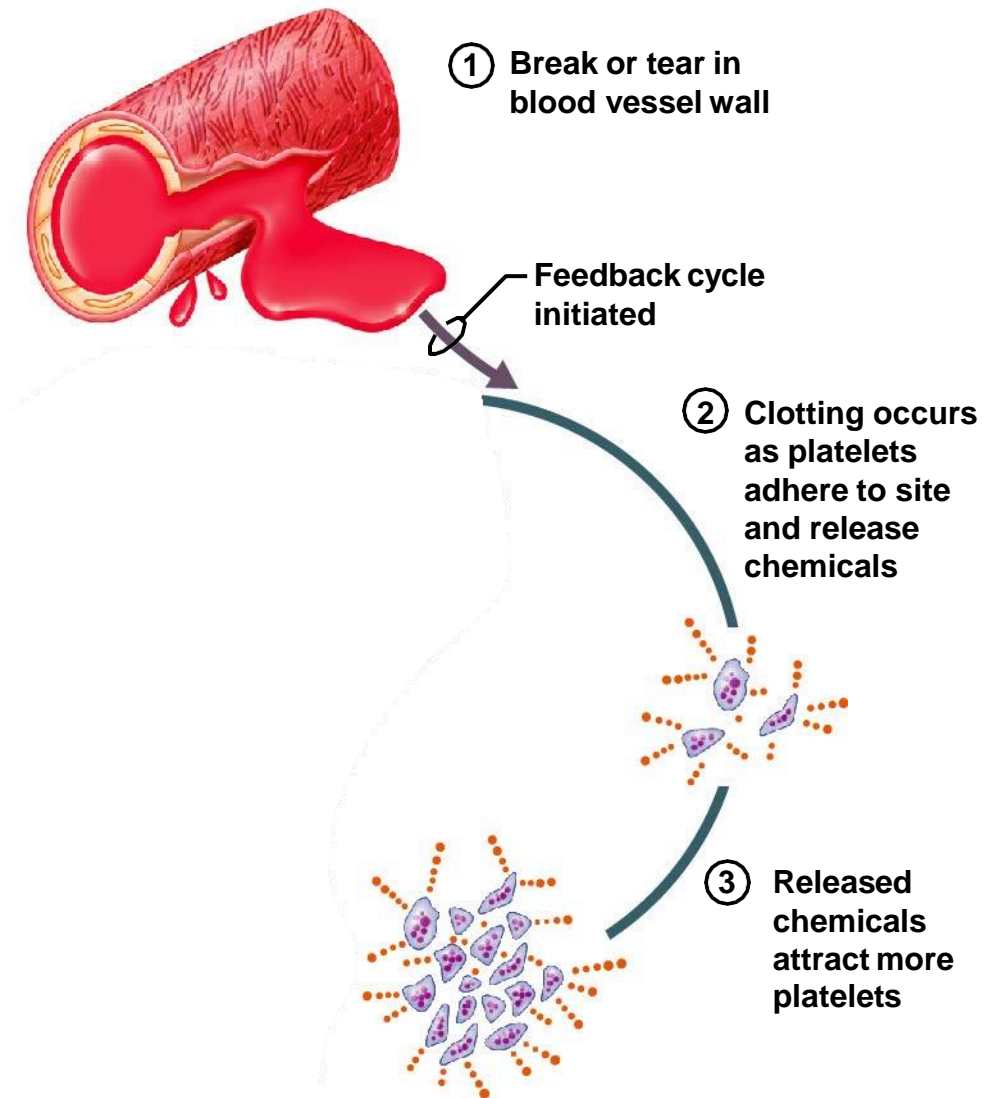
- In positive feedback systems, the output enhances or exaggerates the original stimulus
- Example: Regulation of blood clotting

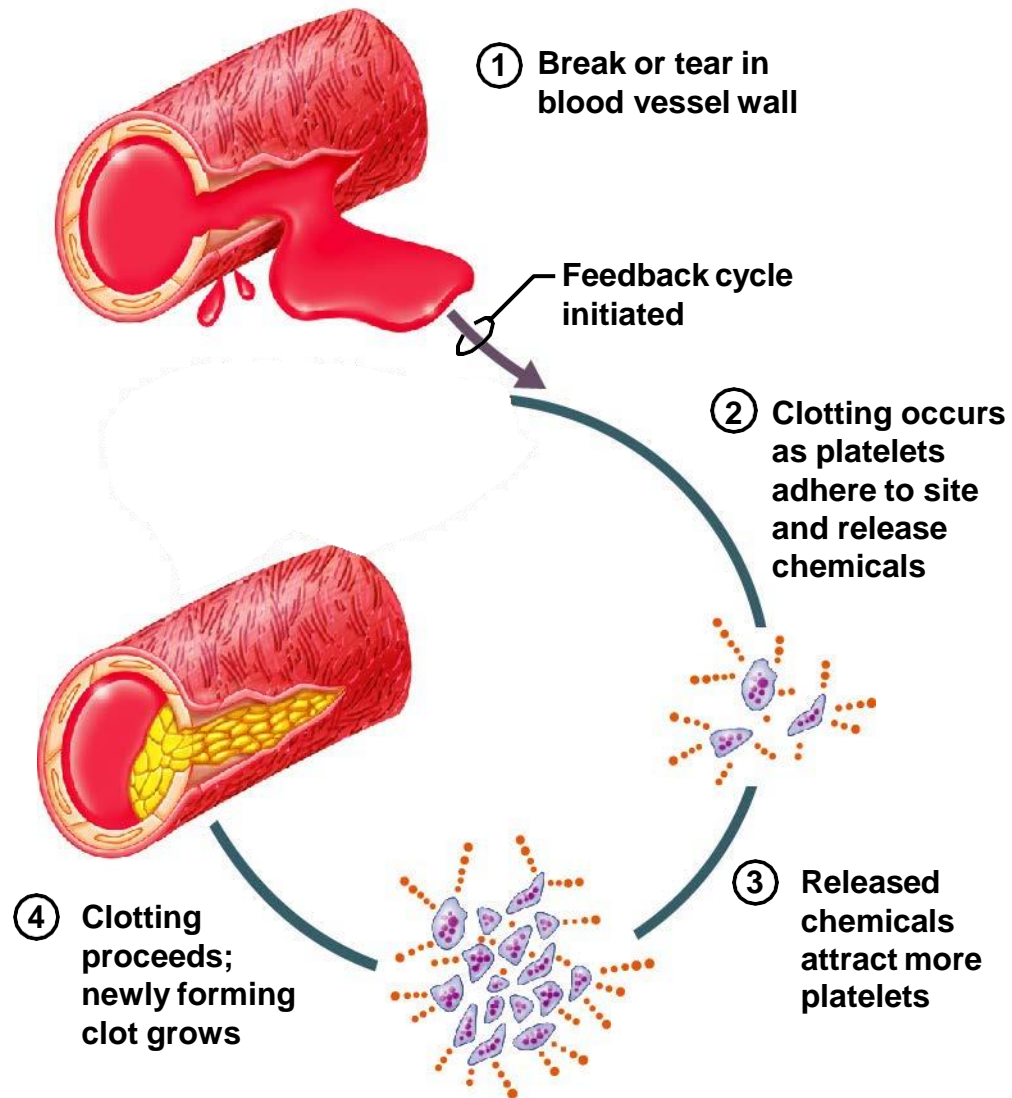


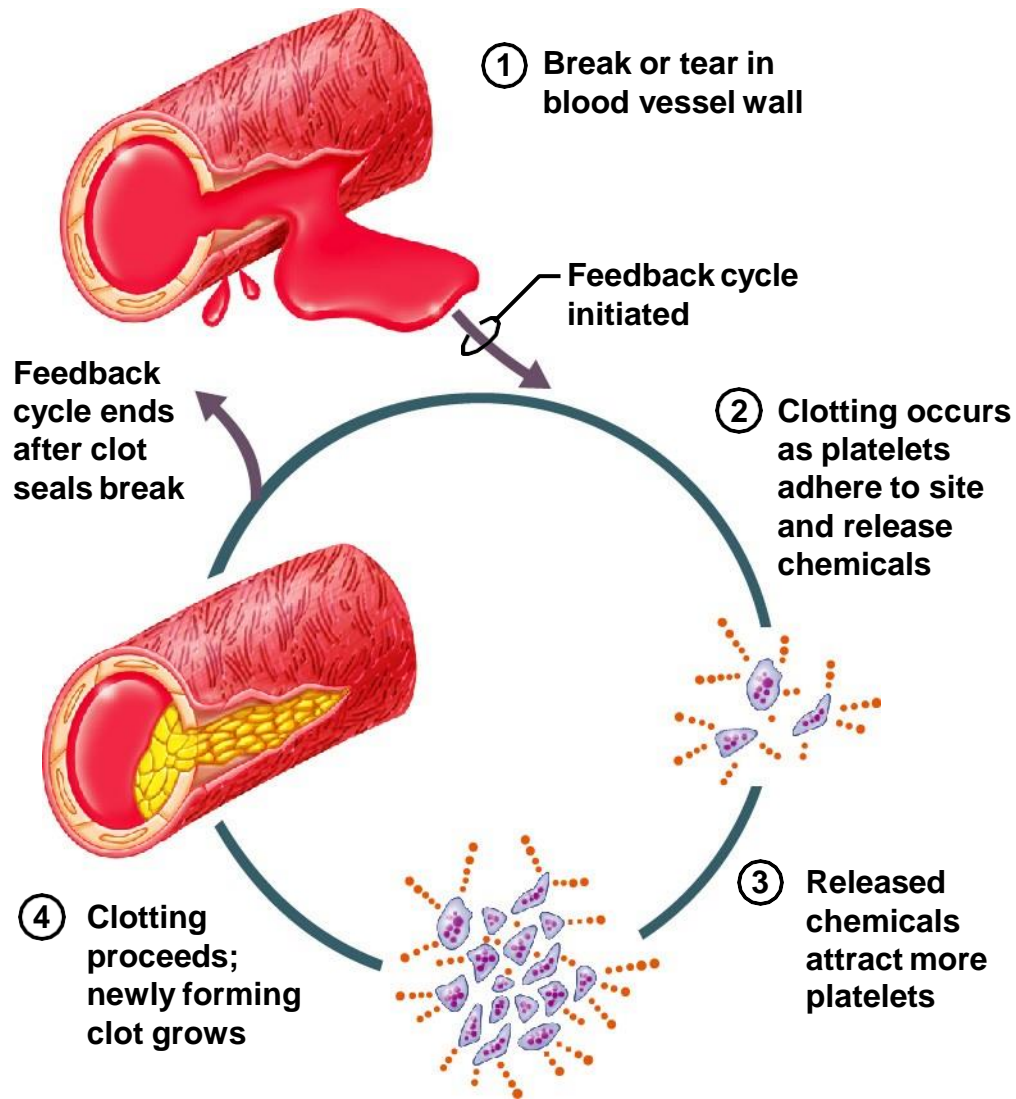












Homeostatic Imbalance

- Disturbance of homeostasis or the body's normal equilibrium
- Overwhelming the usual negative feedback mechanisms allows destructive positive feedback mechanisms to take over

Thank You