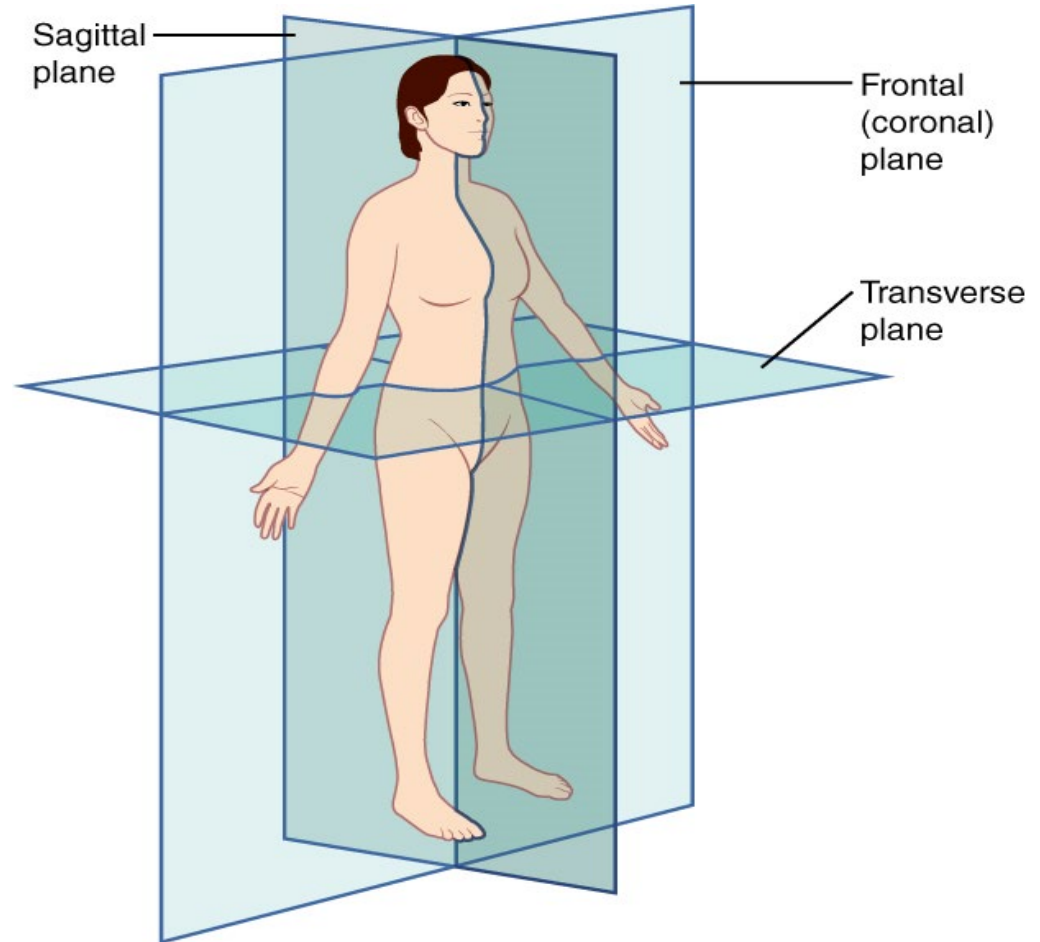


BIOLOGY 1103/1109

Human Anatomy and Physiology I

UNIT 7

Body structure

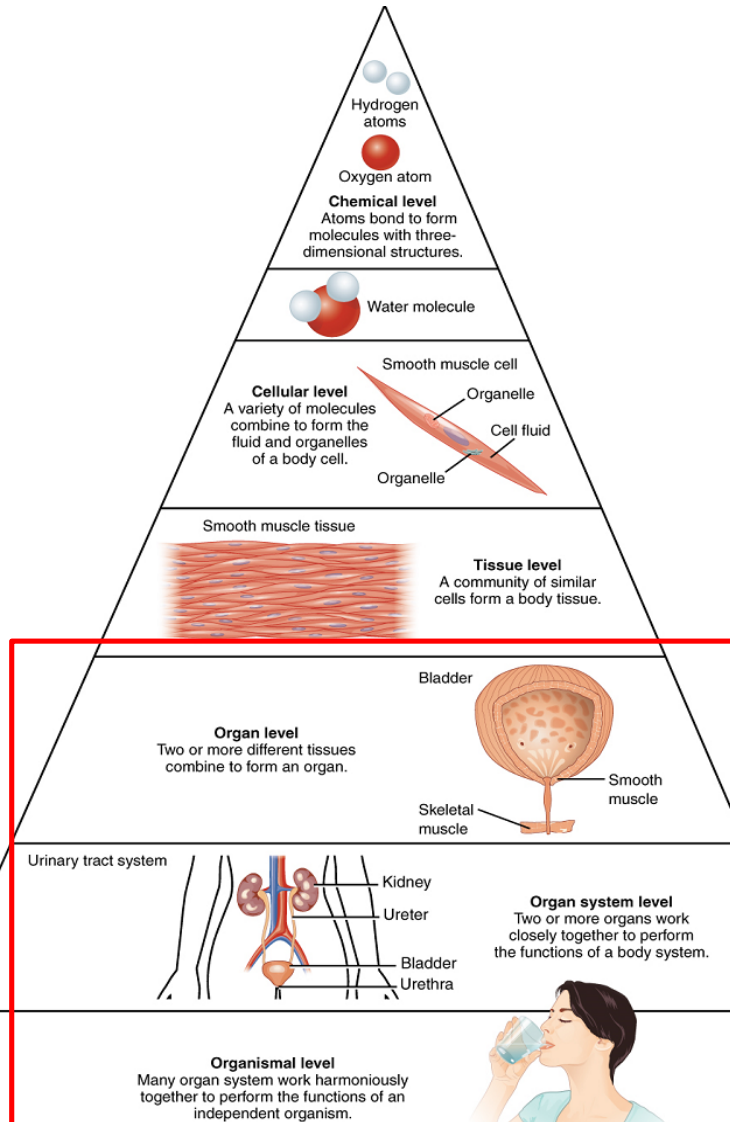


Body structure

Objectives

1. Define the terms organ, system and organism.
2. Specify eleven body systems and describe the major organs and give one function of each.
3. Define and demonstrate the anatomical position.
4. Locate the anterior (ventral) and posterior (dorsal) surfaces for the body, hands and feet.
5. Define terms that relate to body directions
6. Define sagittal, frontal, and transverse planes, and distinguish between midsagittal (median) and parasagittal planes
7. Specify and describe the limits of the body cavities
8. Describe how the abdominopelvic region is divided into either nine regions or four quadrants.

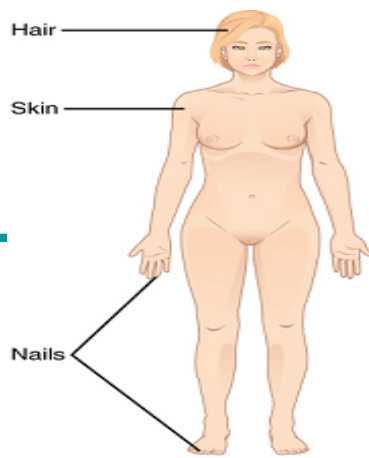
Levels of structural organization of the body



An **organ** is a distinct structure of the body composed of two or more tissue types

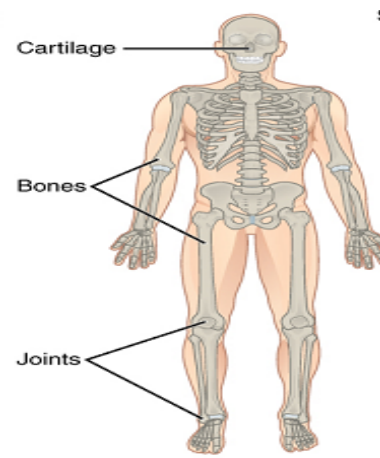
An **organ system** (11) is a group of organs that work together to perform major functions or meet physiological needs of the body

An **organism** is a living being that has a cellular structure and that can independently perform all physiologic functions necessary for life



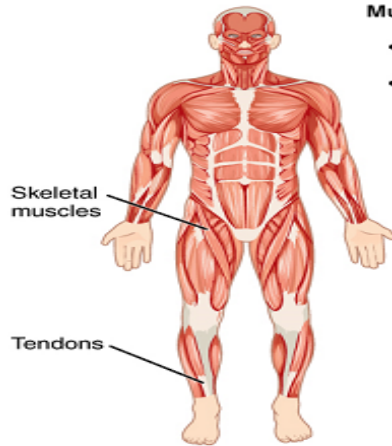
Integumentary System

- Encloses internal body structures
- Site of many sensory receptors



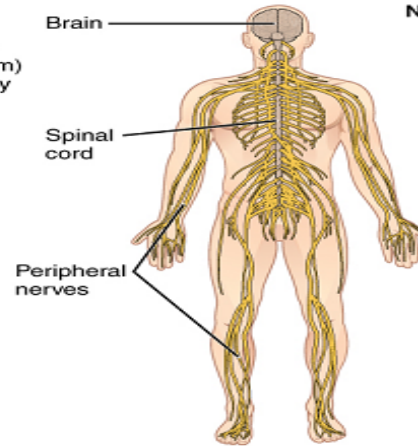
Skeletal System

- Supports the body
- Enables movement (with muscular system)



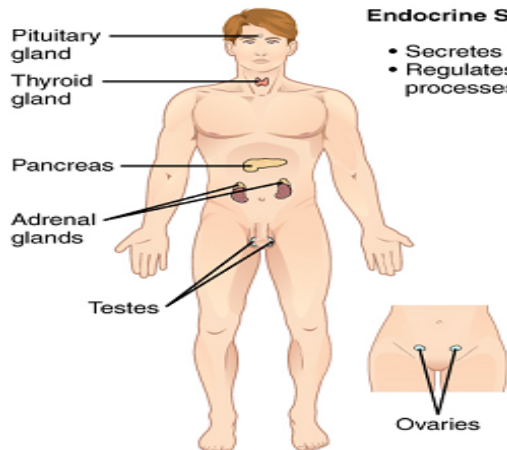
Muscular System

- Enables movement (with skeletal system)
- Helps maintain body temperature



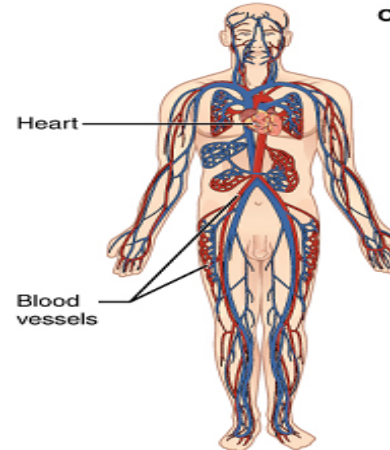
Nervous System

- Detects and processes sensory information
- Activates bodily responses



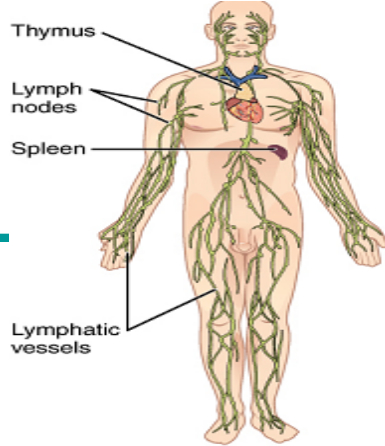
Endocrine System

- Secretes hormones
- Regulates bodily processes

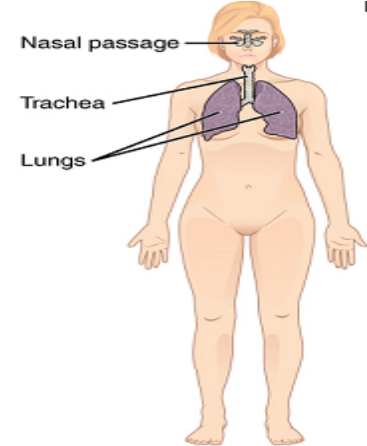


Cardiovascular System

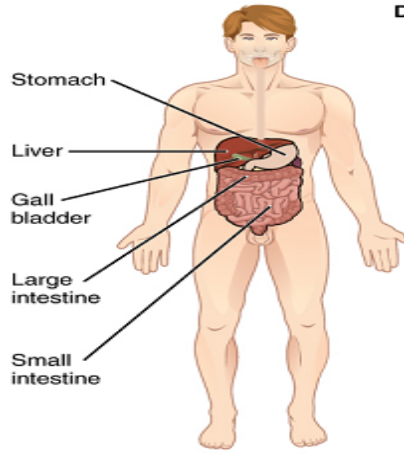
- Delivers oxygen and nutrients to tissues
- Equalizes temperature in the body



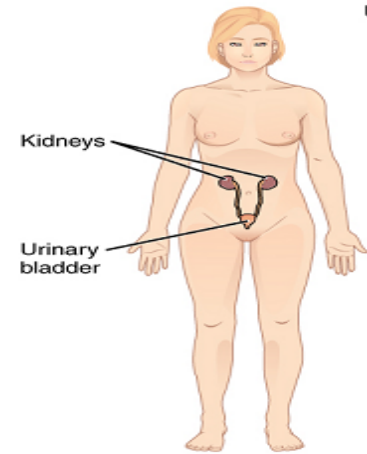
- Lymphatic System**
- Returns fluid to blood
 - Defends against pathogens



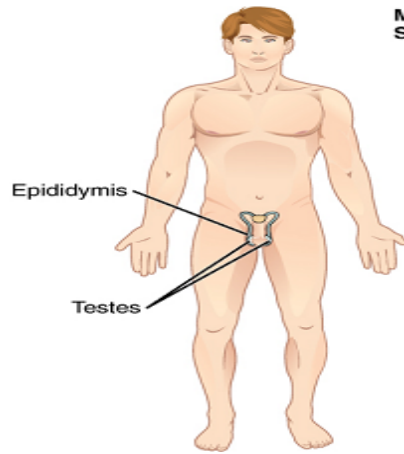
- Respiratory System**
- Removes carbon dioxide from the body
 - Delivers oxygen to blood



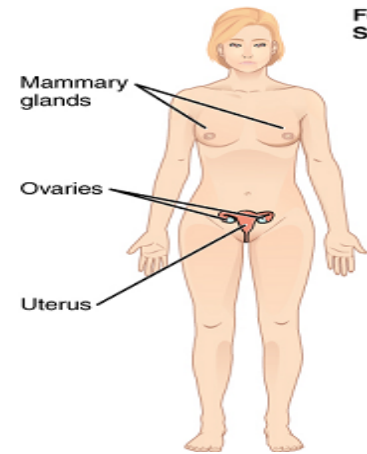
- Digestive System**
- Processes food for use by the body
 - Removes wastes from undigested food



- Urinary System**
- Controls water balance in the body
 - Removes wastes from blood and excretes them



- Male Reproductive System**
- Produces sex hormones and gametes
 - Delivers gametes to female



- Female Reproductive System**
- Produces sex hormones and gametes
 - Supports embryo/ fetus until birth
 - Produces milk for infant

The

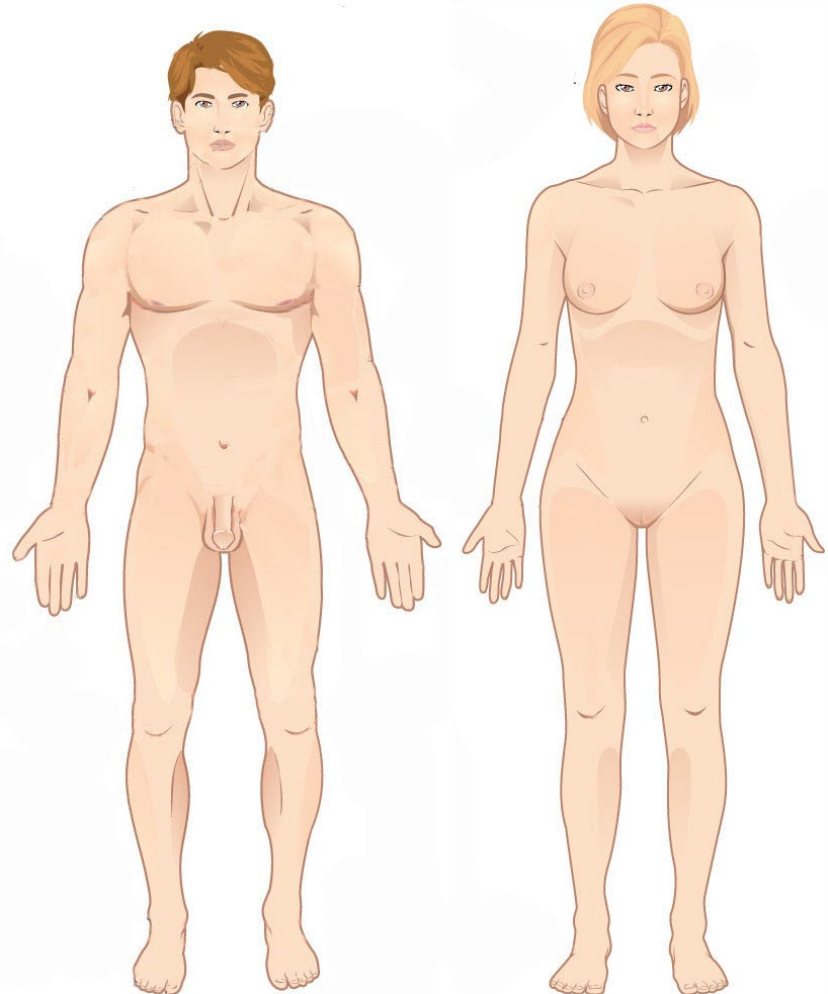
anatomical

position

- To describe body parts need a reference point = anatomical position

Main characteristics

Body erect & upright
Head facing forward
Feet slightly apart
Palms facing forward
Thumbs pointing away from body



Directional terms

- Reclining positions

Supine





Prone



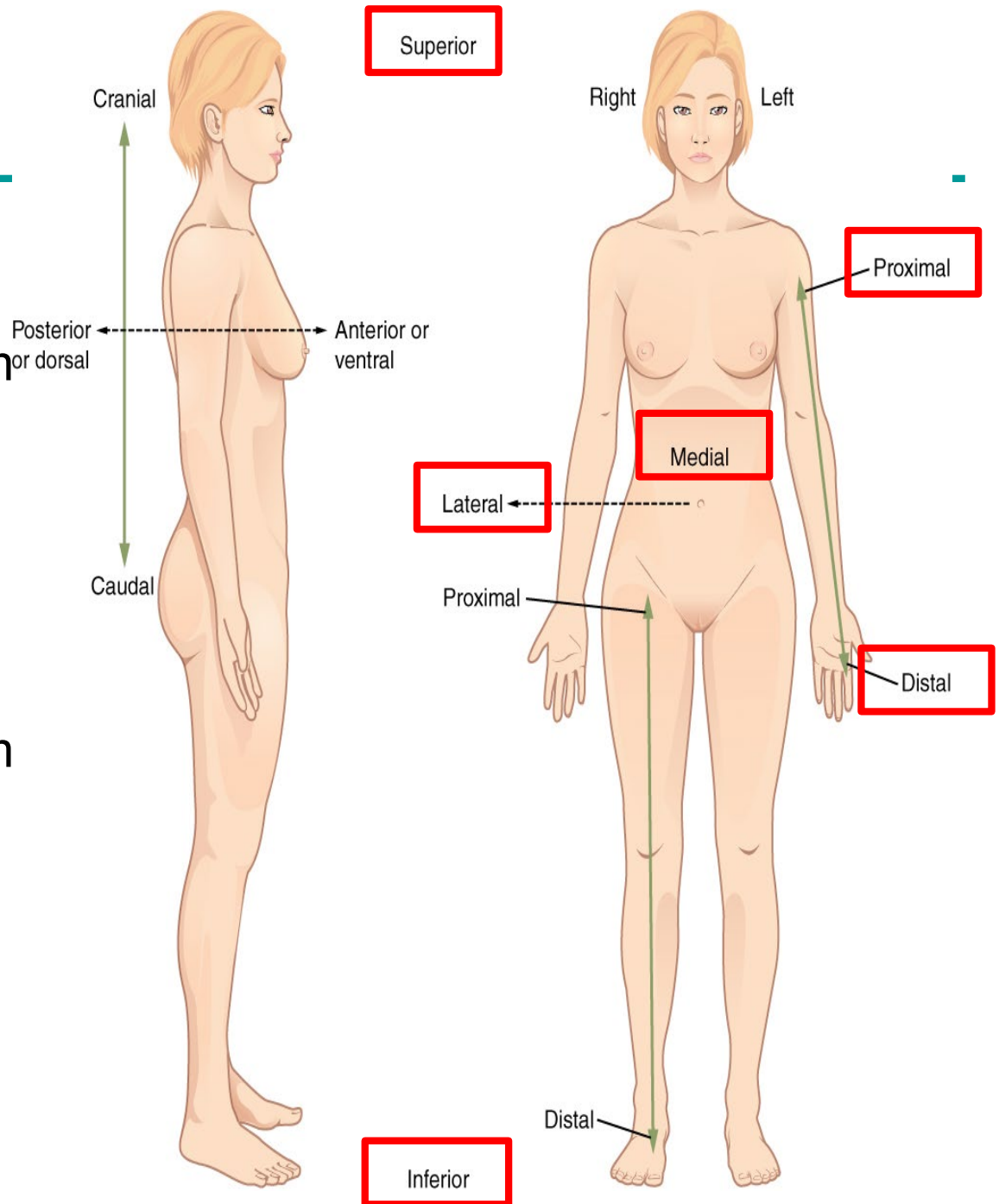
Directional terms

- Dorsal/ ventral
- Posterior/anterior

Surface	Description	Hands 	Feet 
<u>Dorsal</u> or posterior	At the back of body	Back (dorsal)	Top (dorsal)
<u>Ventral</u> or anterior	At the front of body	Palm (palmar)	Sole (plantar)

Directional terms

- Superior (cranial) / Inferior (caudal)
(toward head / away from head)
- Medial / Lateral
(toward midline / away from midline)
- Proximal / Distal
(toward trunk / away from trunk)



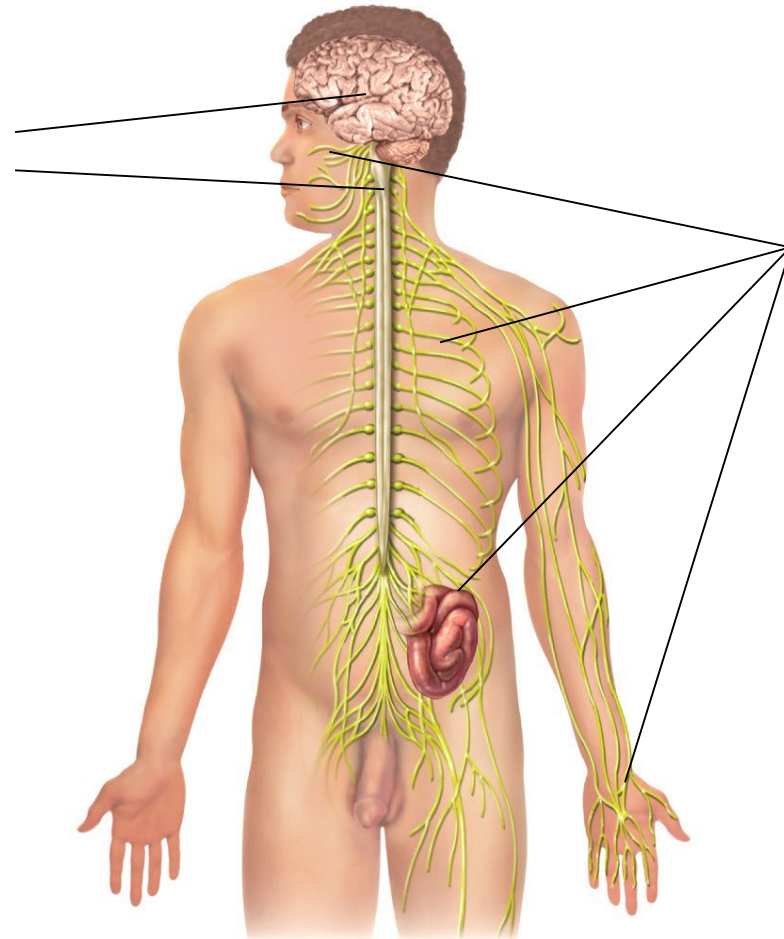
Directional terms

- **Peripheral /**

Central

(away from centre /
towards centre)

Central
Nervous
System

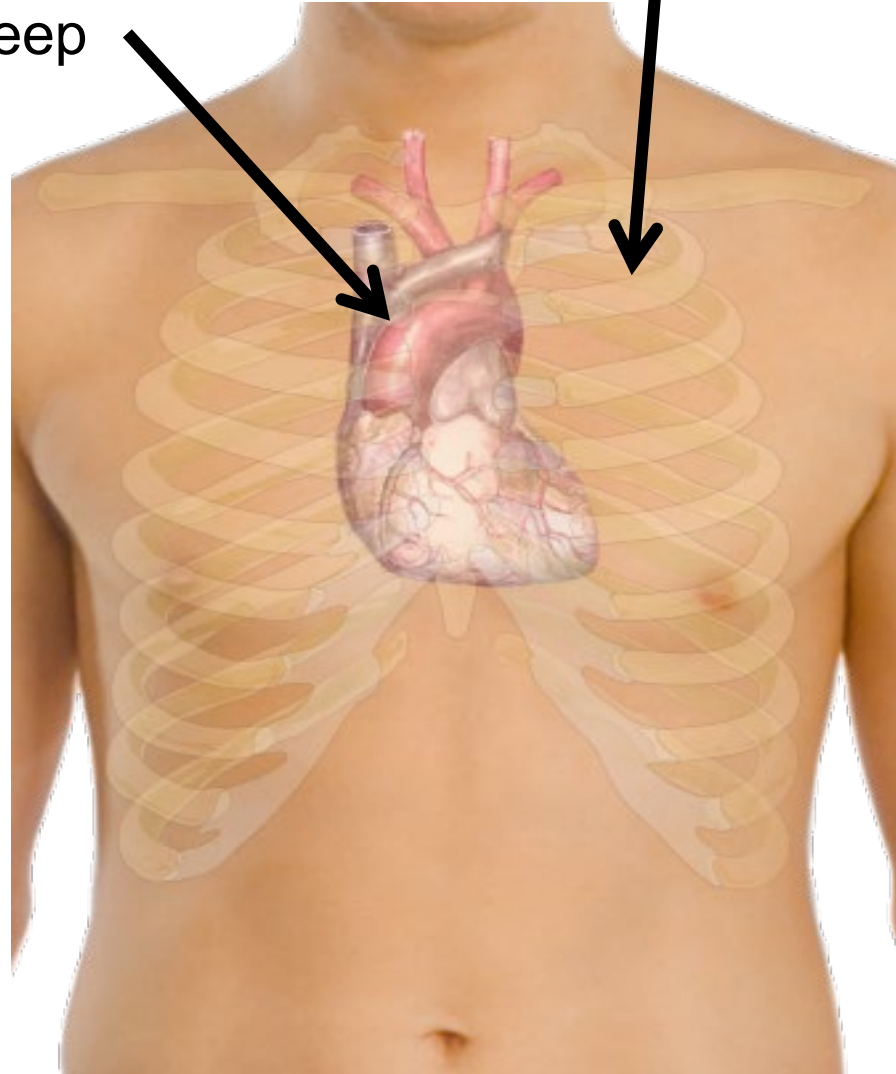


Peripheral
Nervous
System

Directional Terms

Ribs are superficial

Heart is Deep



- **Superficial /**

Deep

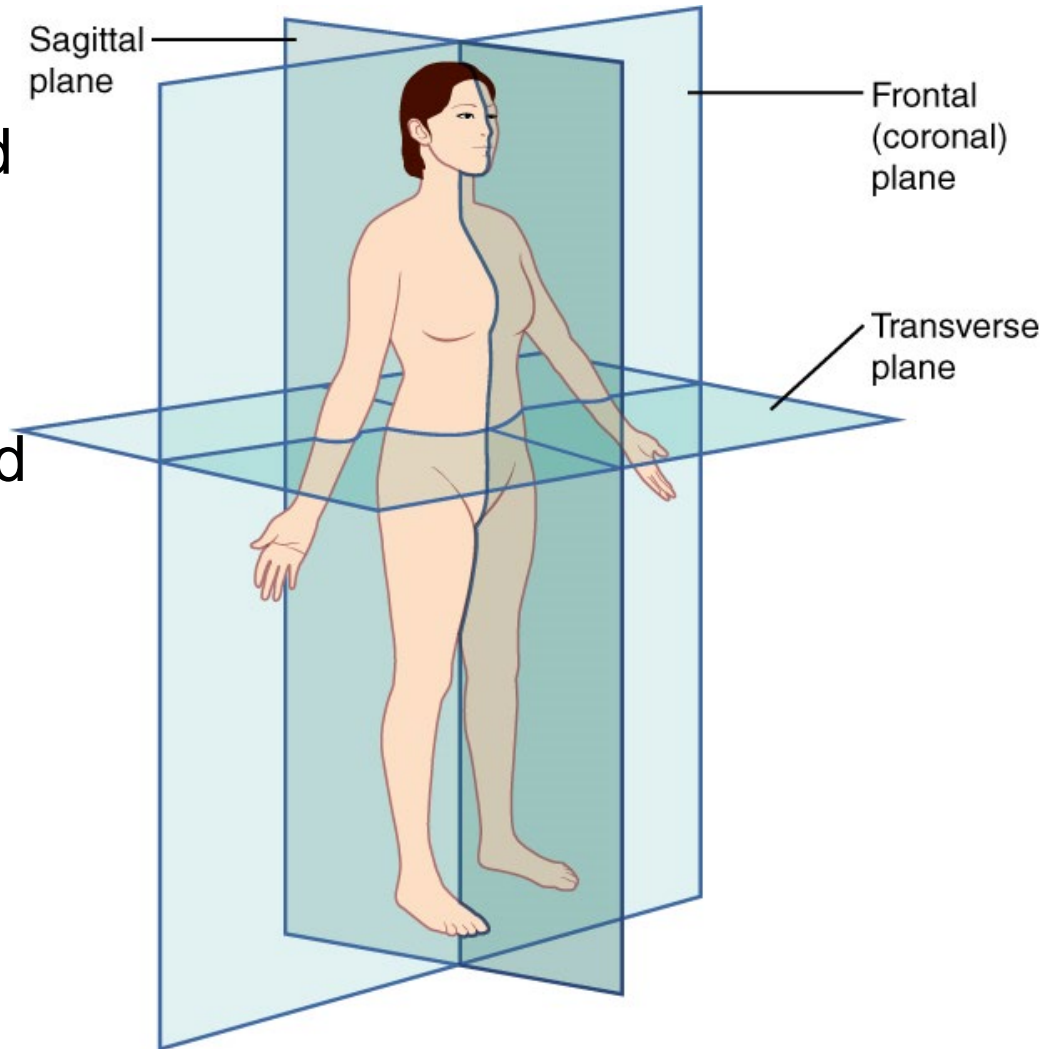
(near the surface / away from the surface)

Planes/sections through body

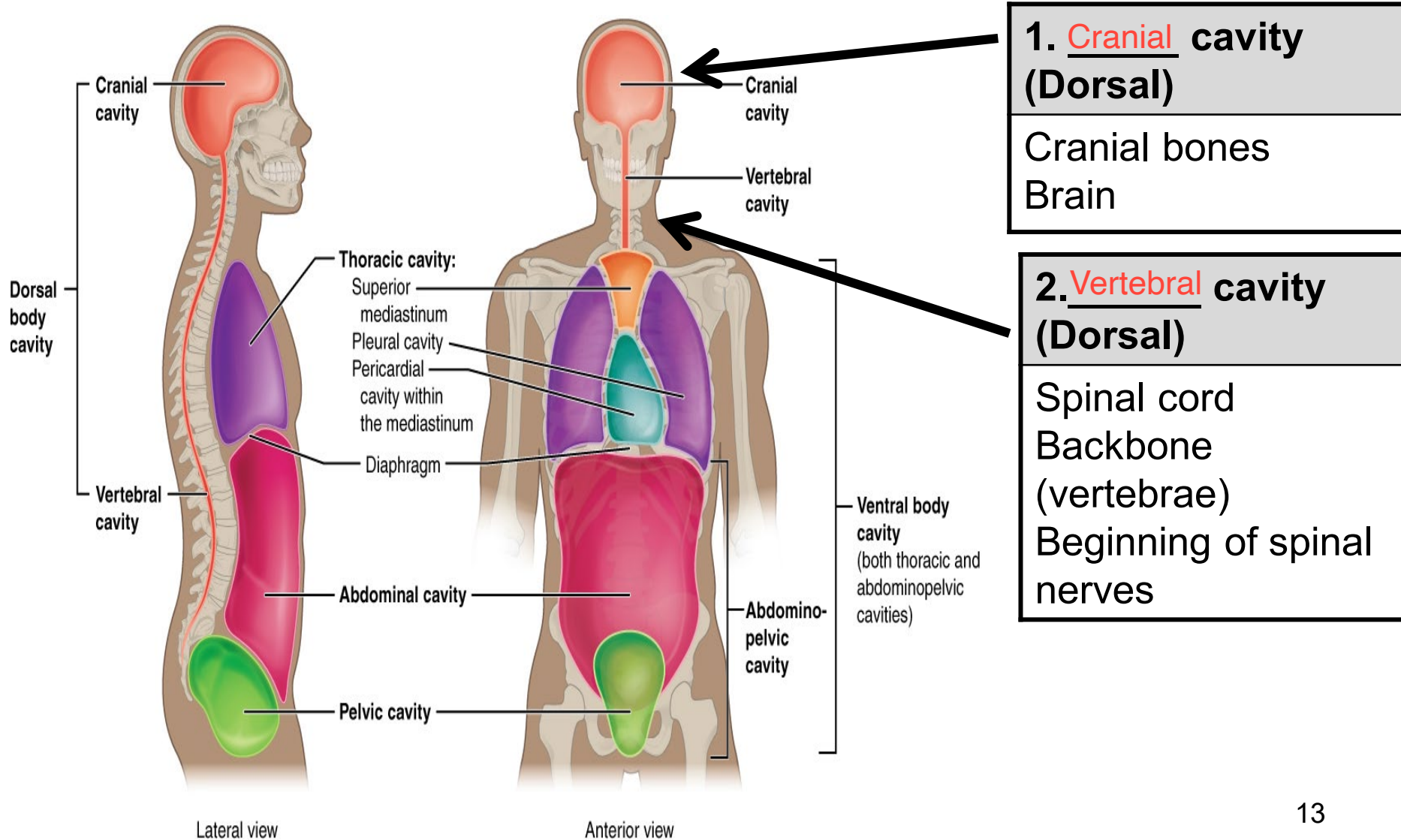
Sagittal **plane** divides the body vertically into right and left sides

Frontal plane divides the body into anterior (front) and posterior (rear) portions

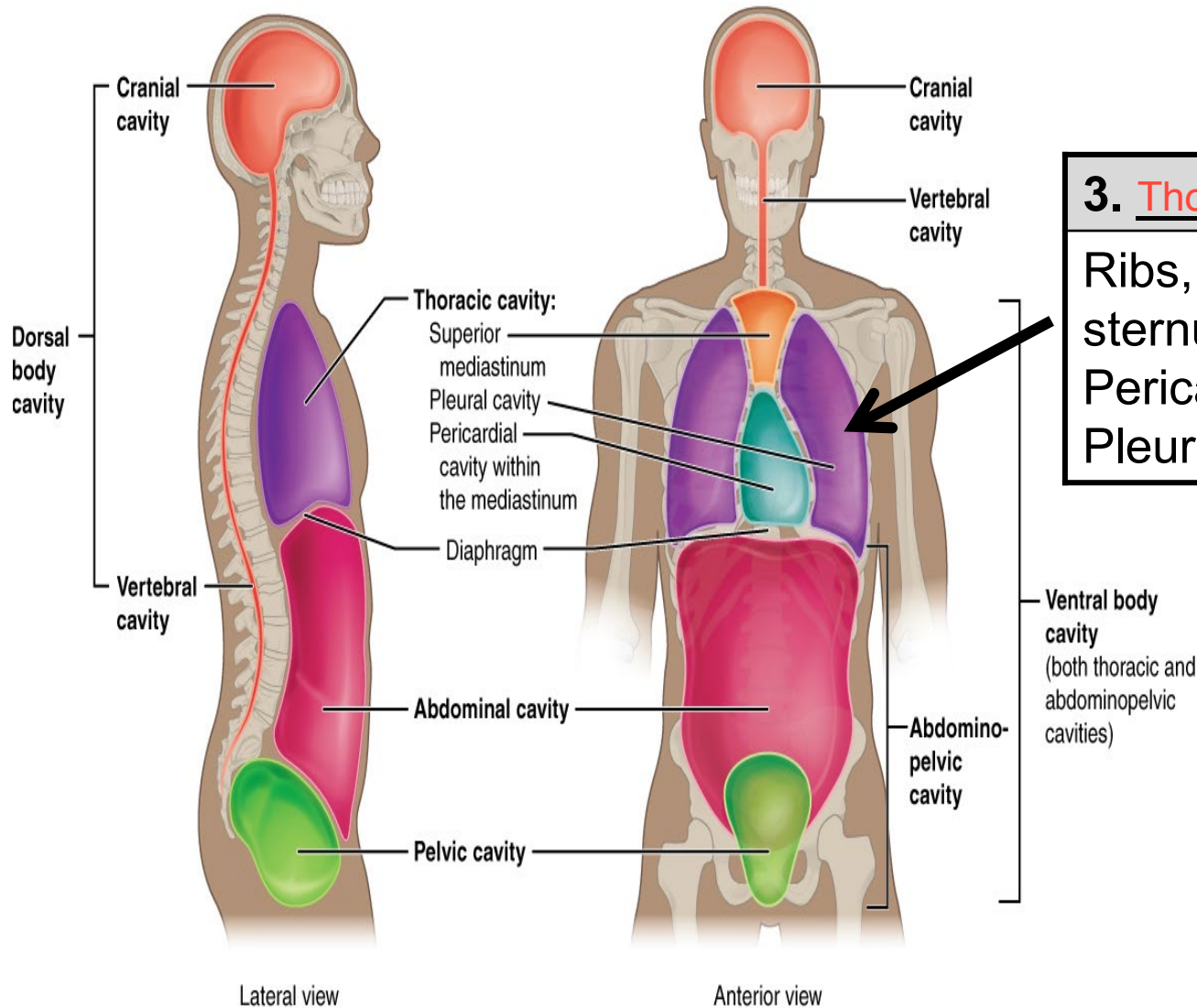
Transverse plane divides the body horizontally into upper and lower portions



Body cavities (spaces within the body)



3. The thoracic cavity



3. Thoracic cavity (Ventral)
Ribs, chest muscles,
sternum, thoracic vertebrae
Pericardial cavity
Pleural cavities

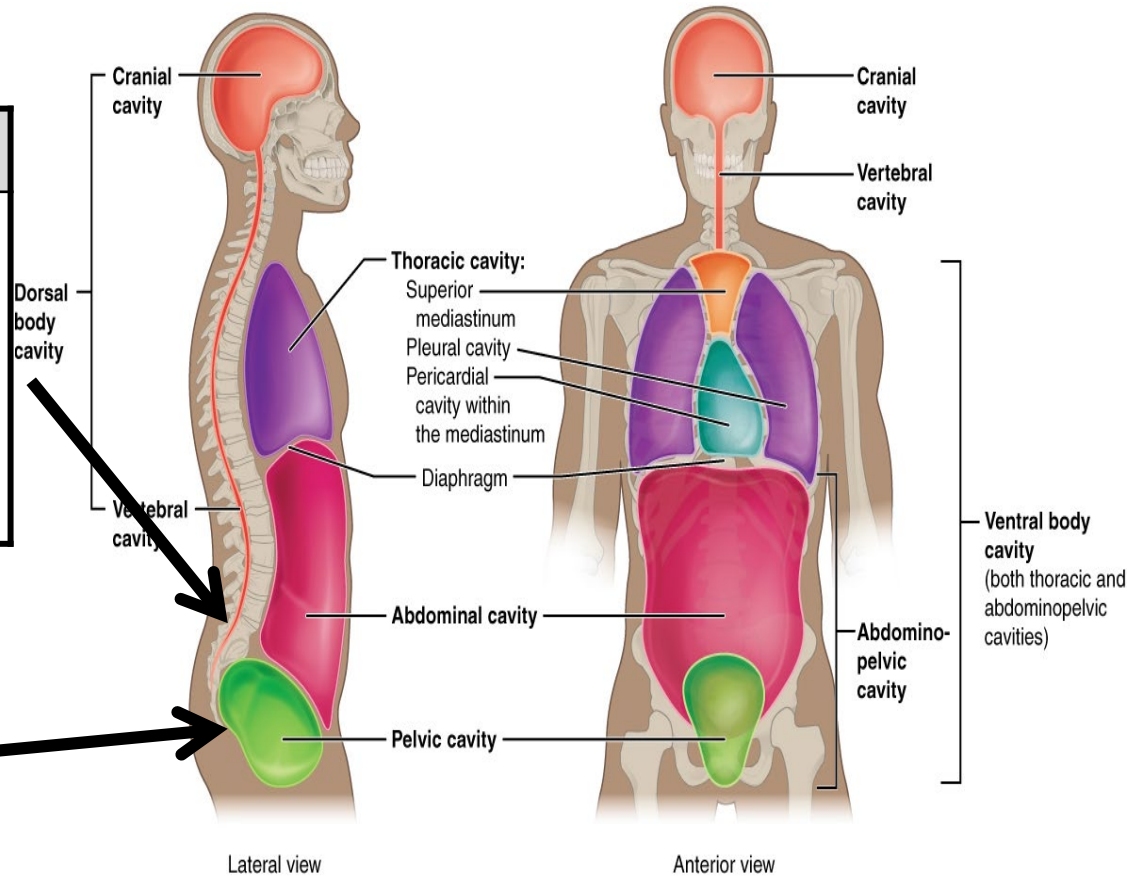
4. & 5. The abdominopelvic cavity

4. Abdominal cavity (Ventral)

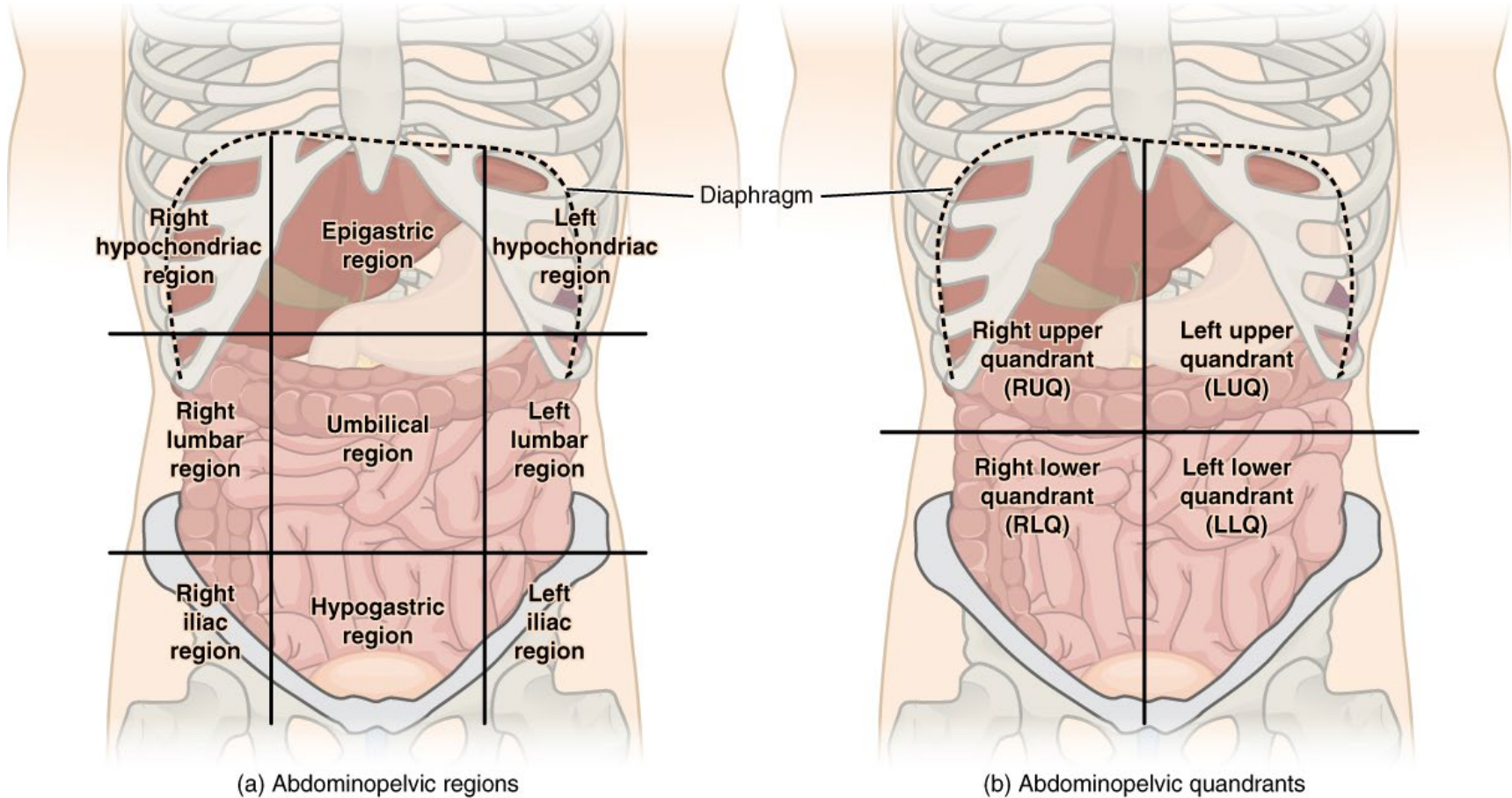
Stomach, spleen, liver, gallbladder, part of pancreas, most of small intestine, most of large intestine
Peritoneum

5. Pelvic cavity (Ventral)

Urinary bladder, part of colon, reproductive organs

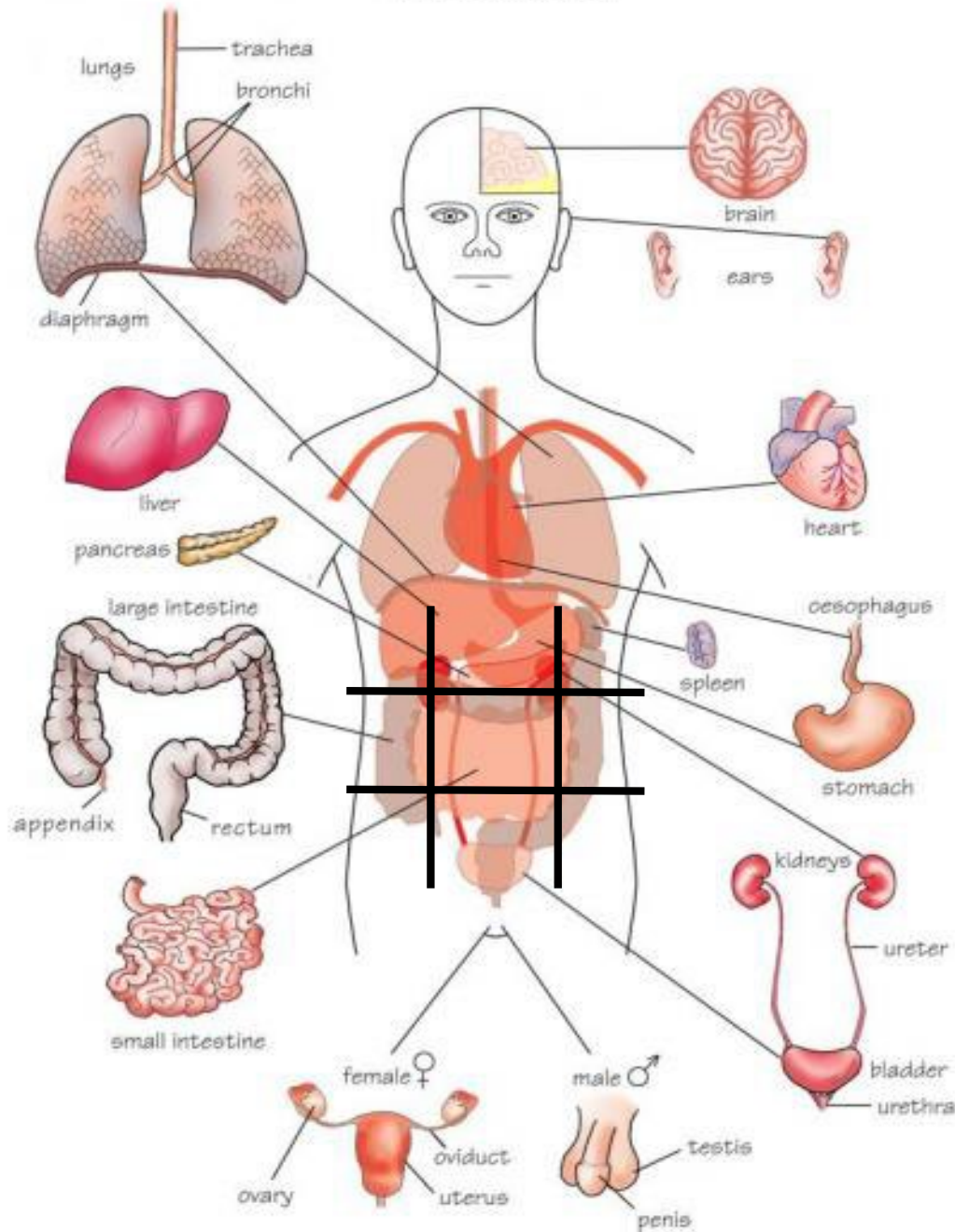


Regions of the abdominopelvic cavity



Abdominopelvic Regions

Organs in the regions of the abdominopelvic cavity



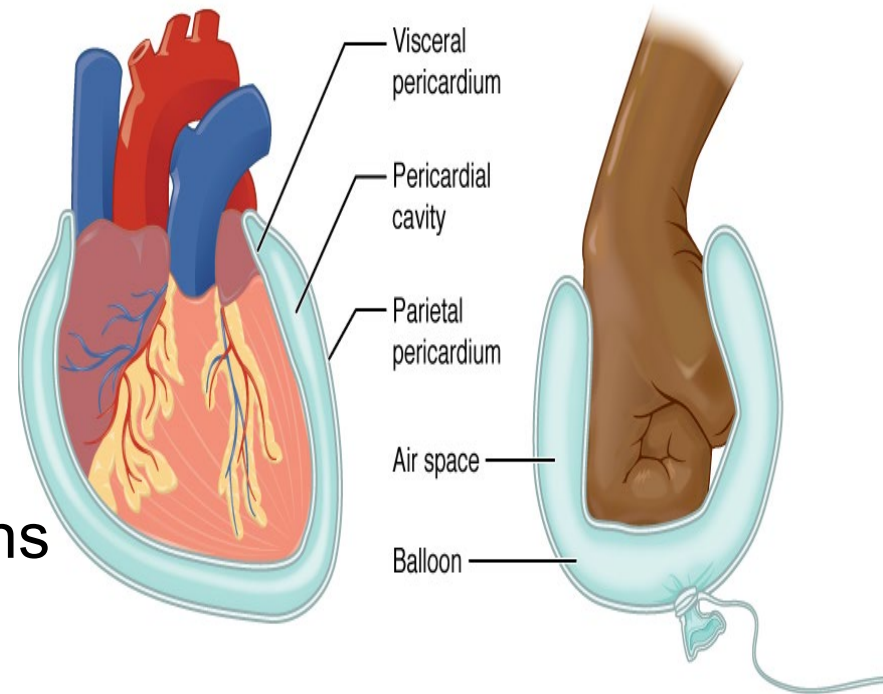
Body cavity membranes

A serous **membrane** is a thin membranes that cover the walls and organs in the thoracic and abdominopelvic cavities

The parietal layers the walls of the body cavity

The visceral layer covers the organs

The serous membranes form fluid-filled sacs that cushion and reduce friction on internal organs when they move



Body structure

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BIOLOGY 1103/1109

Human Anatomy and Physiology I

UNIT 8

Homeostasis



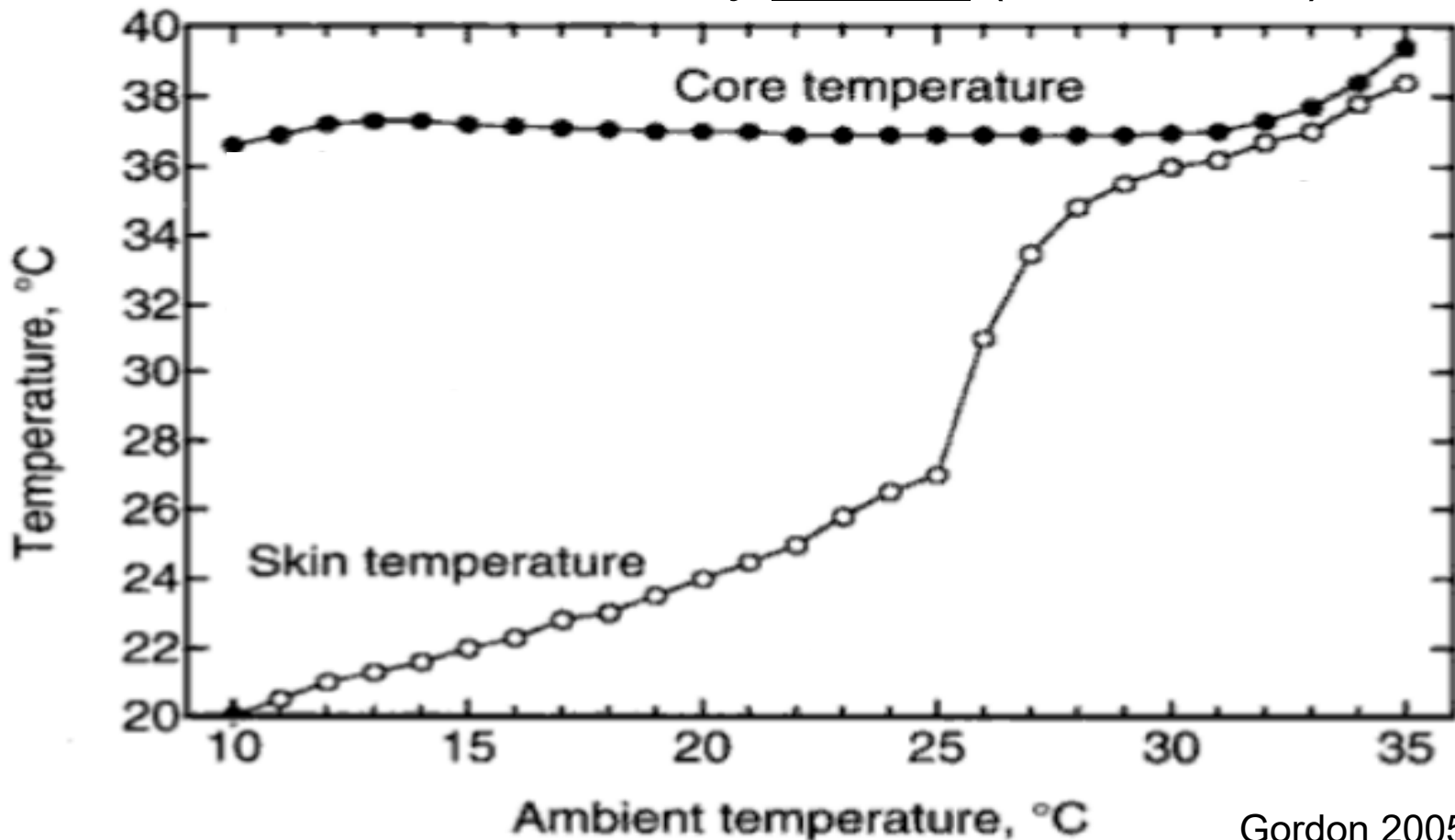
Homeostasis

Objectives

1. Explain the importance of homeostasis to physiology and specify three conditions that are maintained by homeostatic processes.
2. Describe the internal environment of the human body.
3. Define the term stressor.
4. Define a feedback loop. Explain what is meant by negative and positive feedback systems and describe their role in homeostasis.

Homeostasis

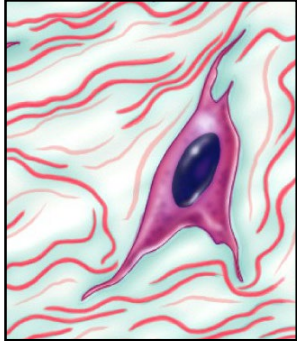
The condition in which the body's internal environment remains relatively constant (within limits)



Gordon 2005

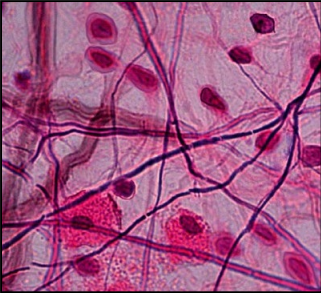
Homeostasis key concepts

<u>Homeostasis</u>	The condition in which the body's internal environment remains relatively constant.
<u>internal environment</u>	Environment in which your cells live, i.e. the extracellular fluid.

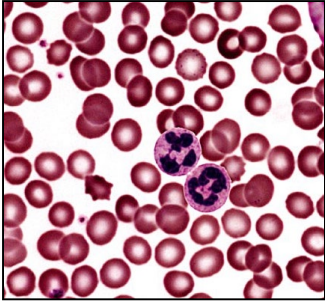


Extracellular fluid (ECF) = fluid outside cells

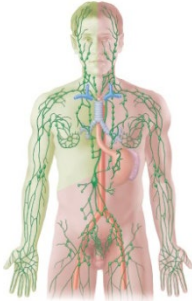
Interstitial fluid
(in tissues)



Blood plasma
(in blood)

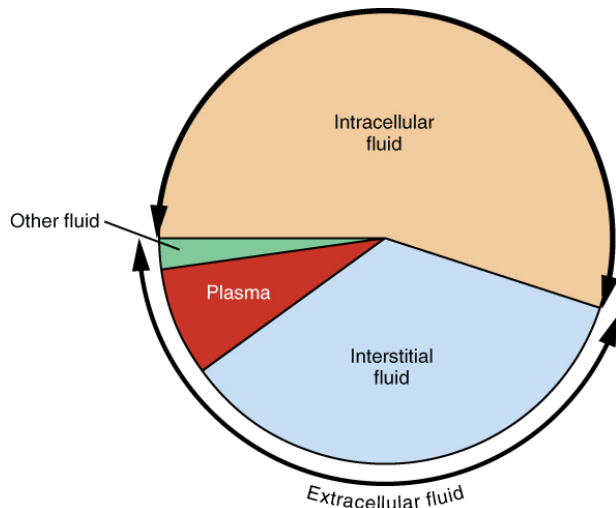


Lymph fluid
(in lymph)

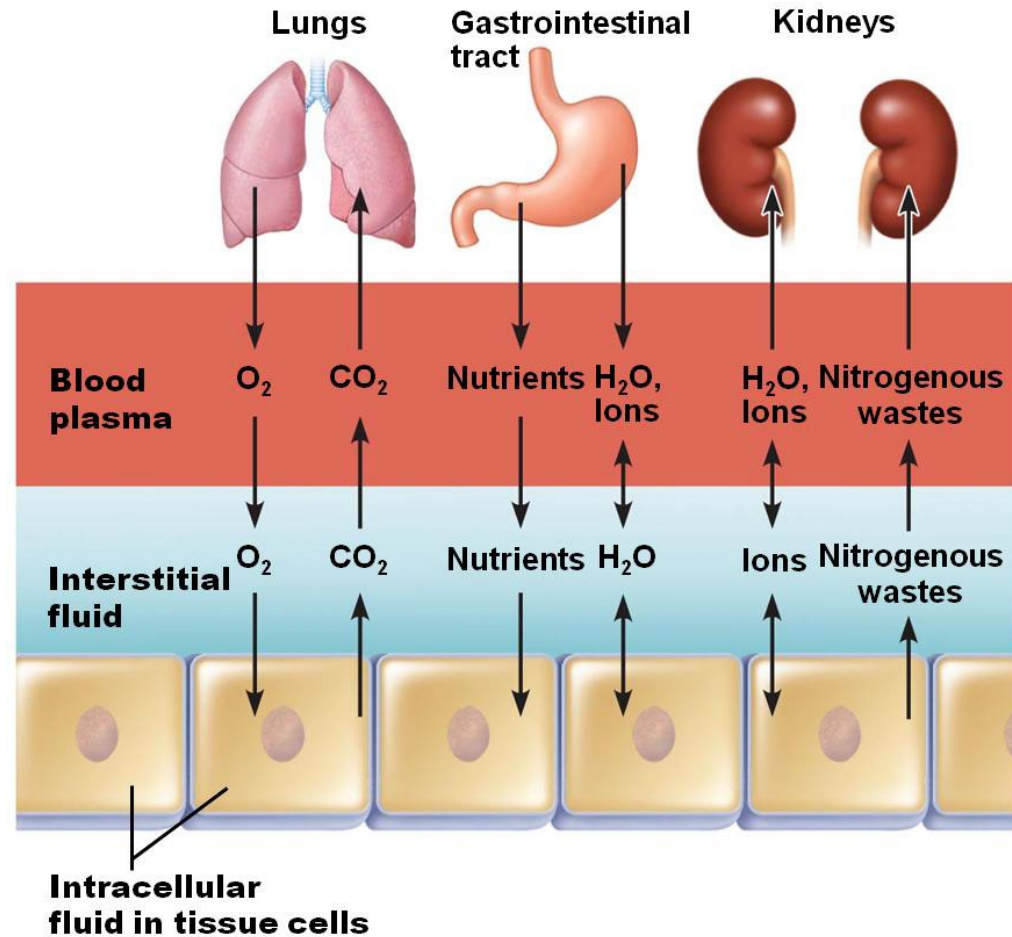


Internal environment is Extracellular fluid (ECF)

Wikimedia Commons



- Includes: blood, plasma, lymph and interstitial fluid



- Constant exchange between extracellular and intracellular fluids; this is important for maintaining homeostasis

Homeostasis:

constancy of the body's internal environment; chemical reactions happen in a narrow range

Three conditions necessary for homeostasis:

Optimum temperature
= 37.5 °C

Optimum pressure
e.g. blood pressure, pressure of gases

Proper concentration of substances

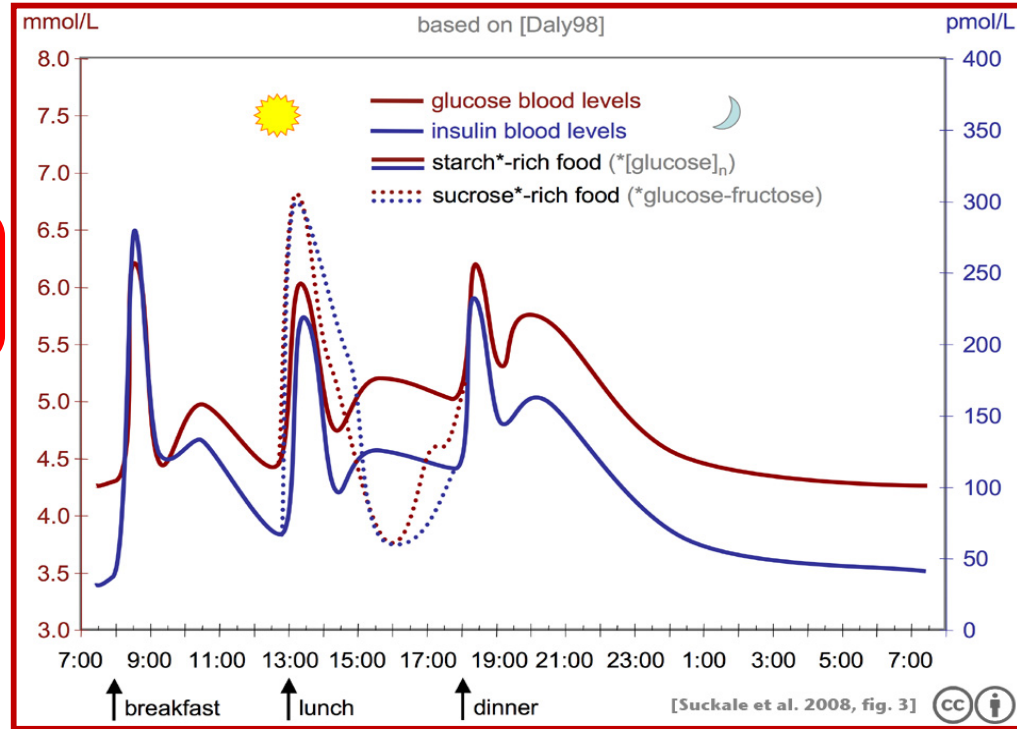
Gases
O₂, CO₂

Nutrients
e.g. glucose

Salts
e.g. NaCl

Waste

Water



What is stress?

Definition: any stimulus that causes an stress in the internal environment.

Type	Example
Temporary	Change in composition of air
Prolonged	Infections
From internal source	Change in blood pressure Change in levels of nutrients
From external source	Lack of O ₂ Excess heat or cold

Stress:

stimulus that causes an imbalance in homeostasis

Examples of stresses: Hypothermia

Hyperthermia

Optimum temperature
= 37.5 °C



Optimum pressure
e.g. blood pressure,
pressure of gases

Proper concentration of
substances

Gases
O₂, CO₂

Nutrients
e.g. glucose

Waste

Salts
e.g. KCl

Water

Hypoxia



Hemorrhage



Hyperglycemia



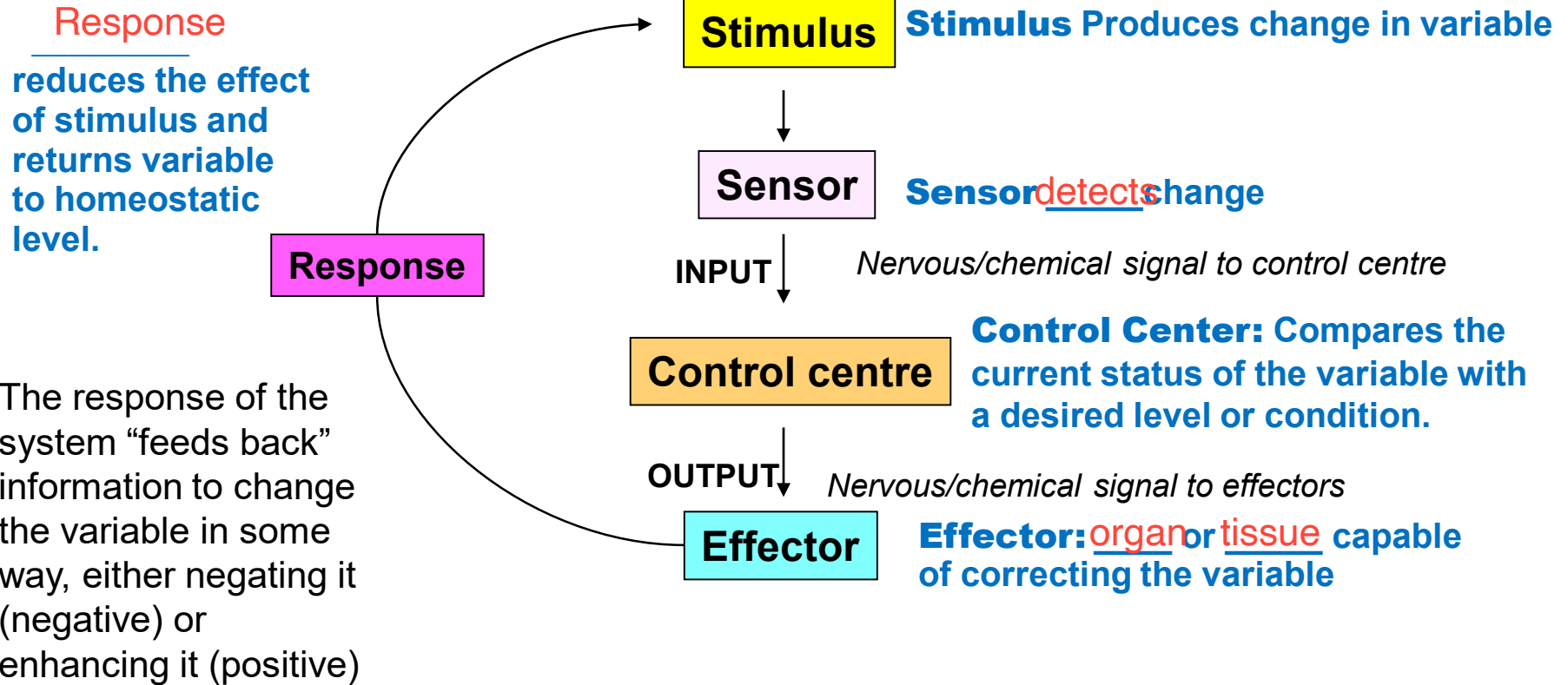
Dehydration



Feedback loops

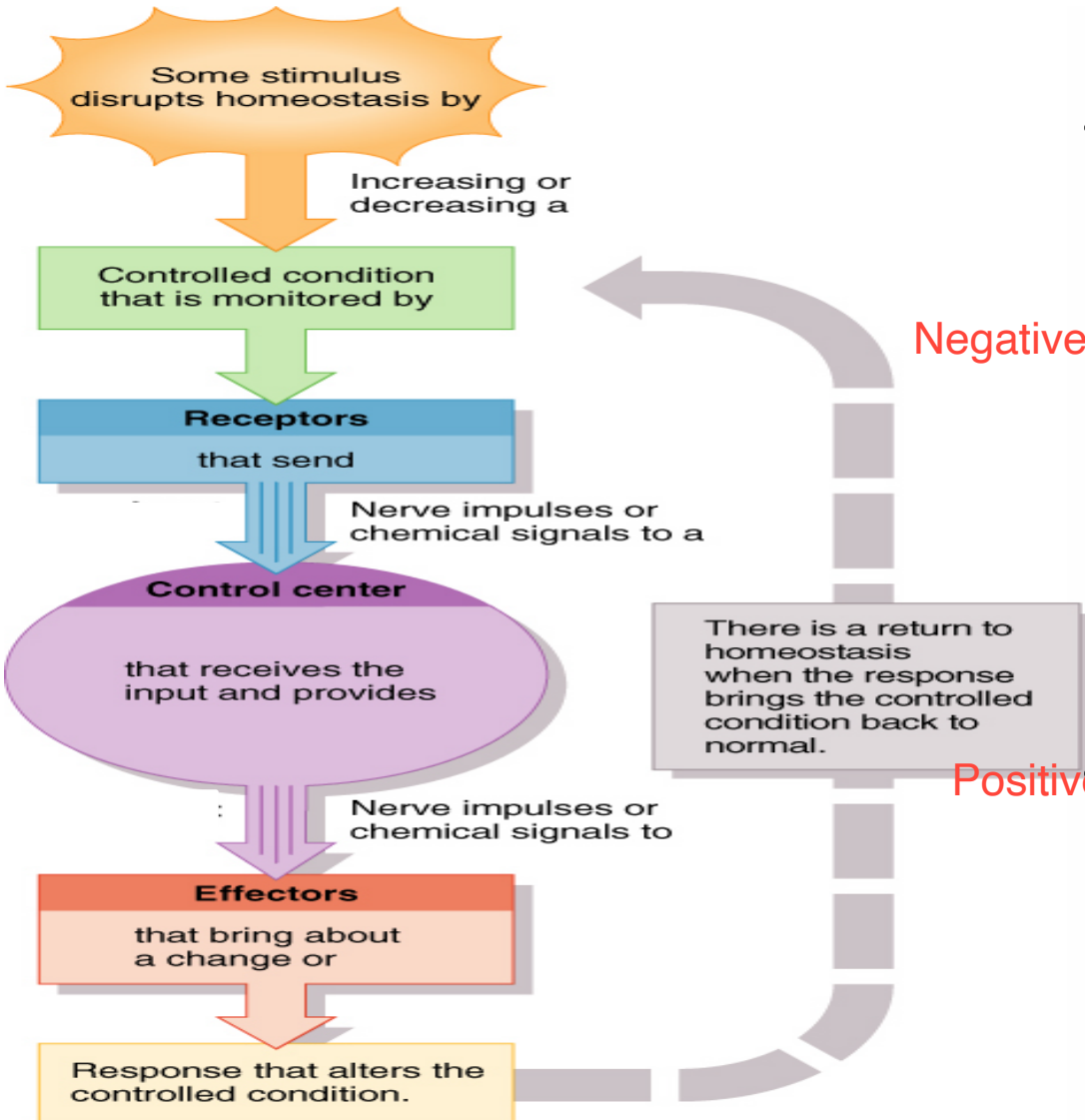
- Maintaining homeostasis requires that the body continuously monitor its internal conditions
- Each physiological condition has a particular set point (the physiological value around which the normal range fluctuates)
- Control centers in the brain and other parts of the body monitor and react to deviations from homeostasis using negative feedback.
- Negative feedback is a mechanism that reverses a deviation from the set point.
- Positive feedback intensifies a change in the body's physiological condition rather than reversing it

Feedback system



- Feedback refers to a circular situation where the status of something is being monitored and reported back to a control centre which may cause some action to change the status.

Negative vs positive feedback systems



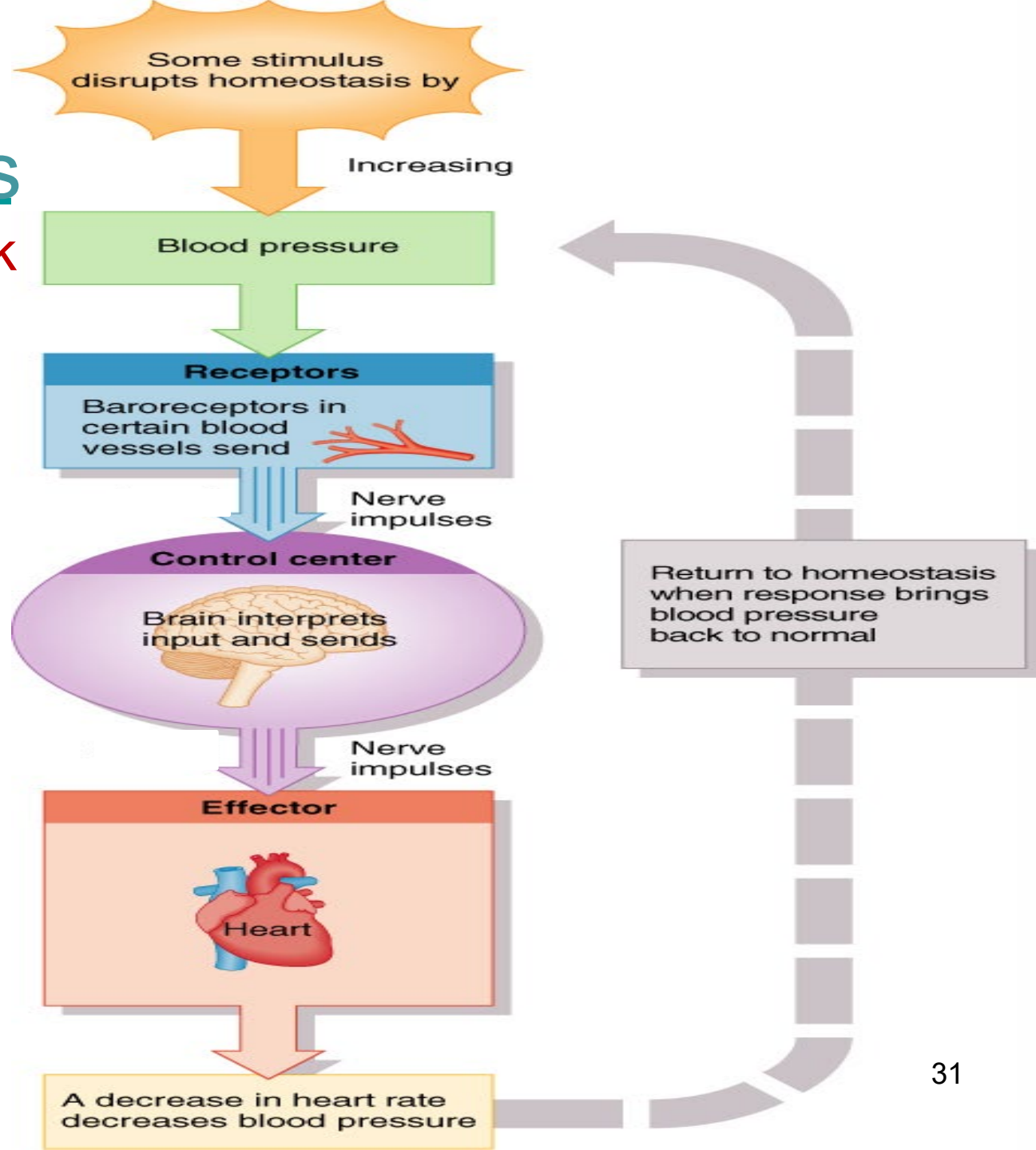
- Two types of feedback systems:

Negative Feedback = the output is the opposite of the input (returns) (i.e. increase leads to a decrease)

Positive Feedback = the output is the same as the input (amplify) (i.e. increase leads to an increase)

Control of homeostasis

negative feedback systems



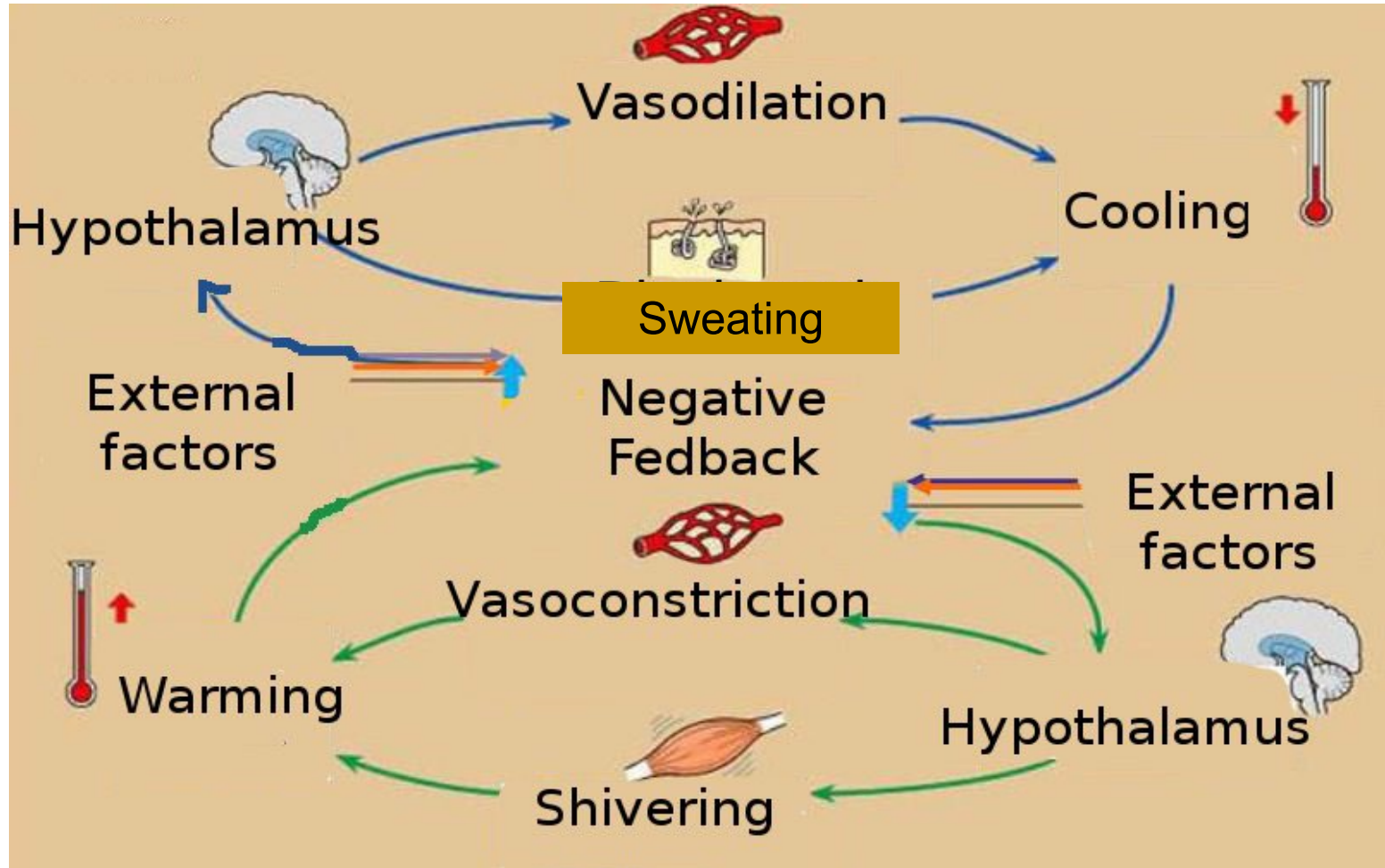
- Negative = the output is the opposite of the input (returns) (i.e. increase leads to a decrease)

Control of homeostasis

feedback system between skin and body
temperature

Control of homeostasis

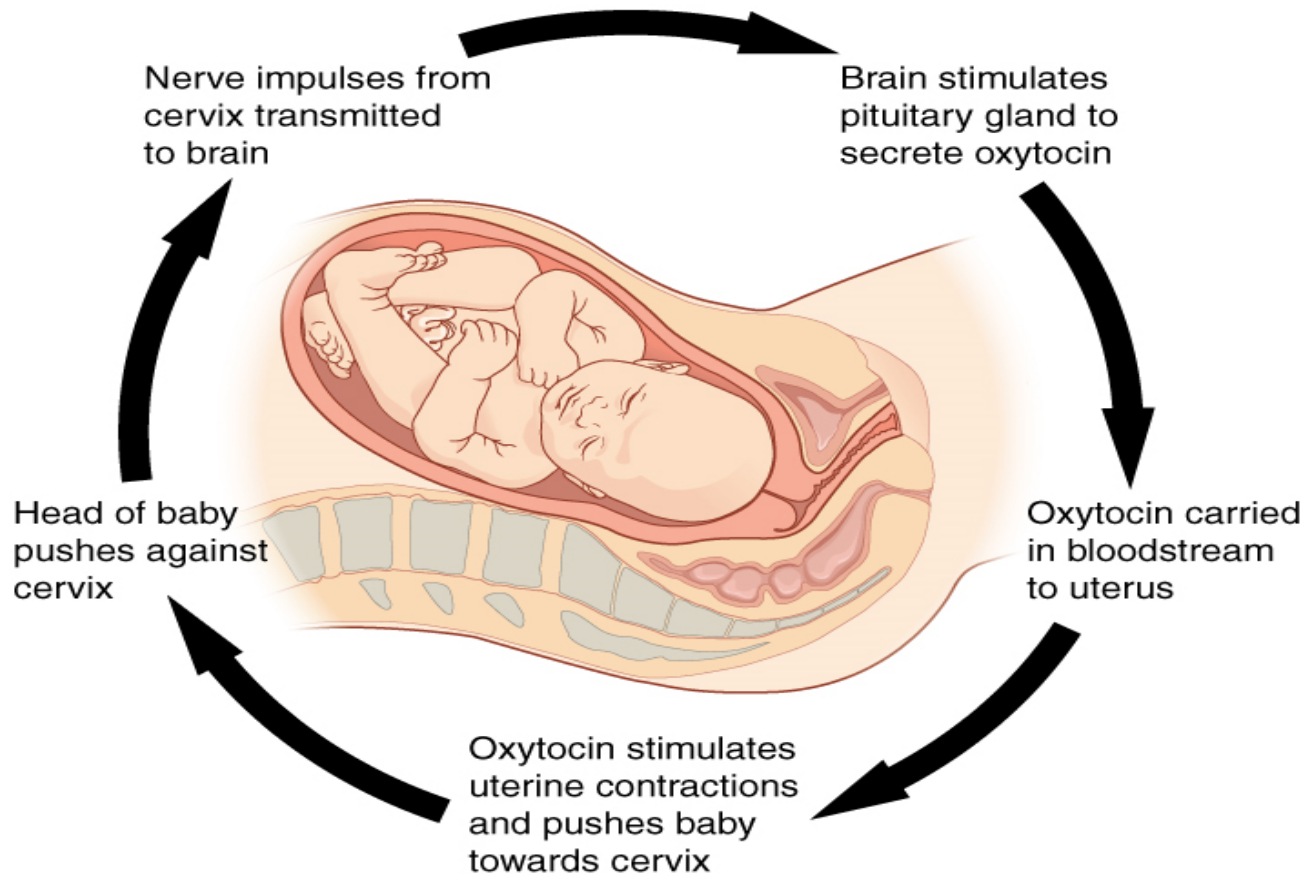
negative feedback systems...body temperature



Control of homeostasis

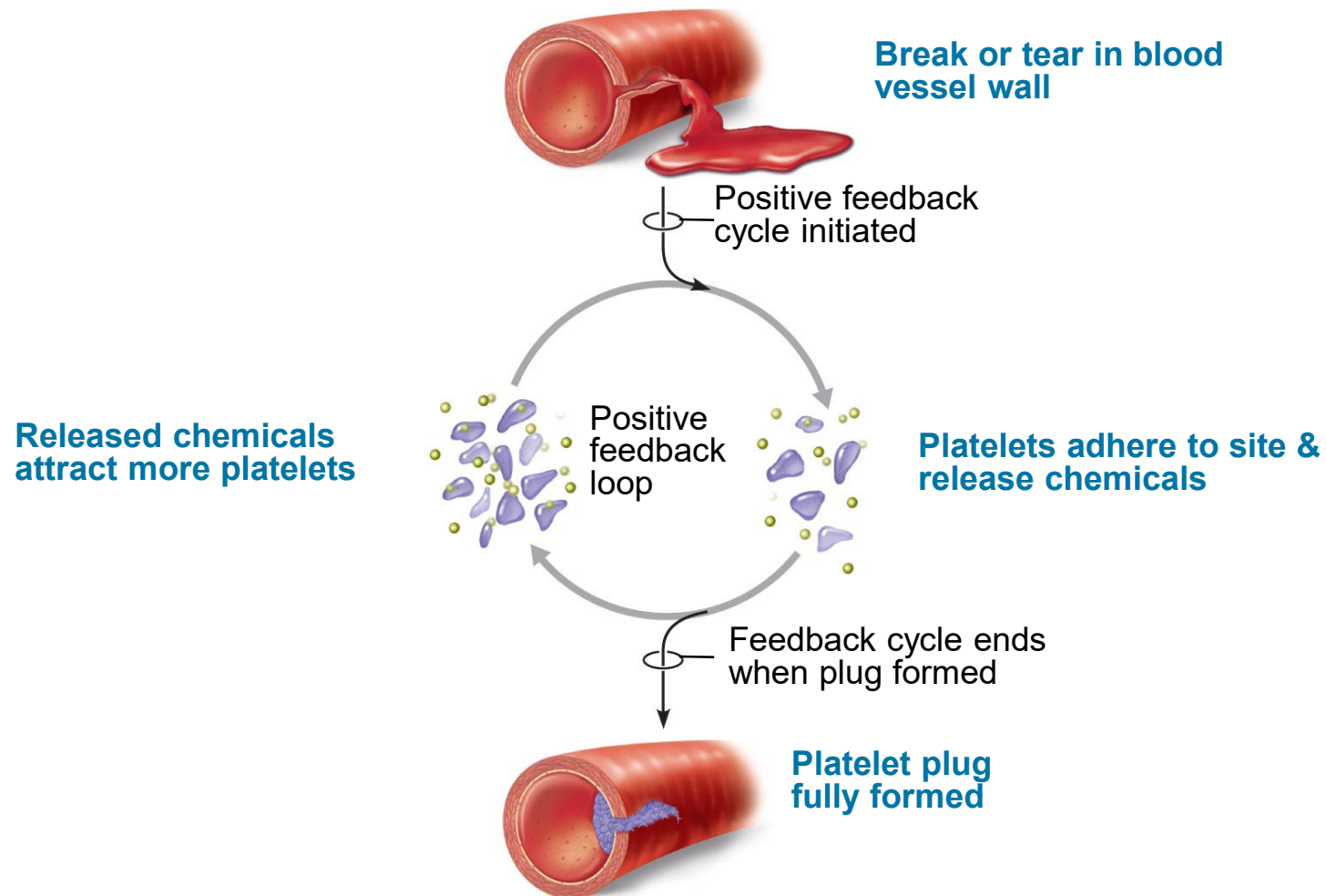
- Positive = the output is the same as the input (amplify)
(i.e. increase leads to an increase)

positive feedback systems: Childbirth



Control of homeostasis

positive feedback systems: formation of platelet plug



Homeostasis

Objectives

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