



PHYSIOLOGY

FACULTY OF PHARMACEUTICAL SCIENCES

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**LECTURE 1-PART 1 : FUNCTIONAL ORGANIZATION OF THE HUMAN BODY
AND CONTROL OF THE “INTERNAL ENVIRONMENT”**

Objectives

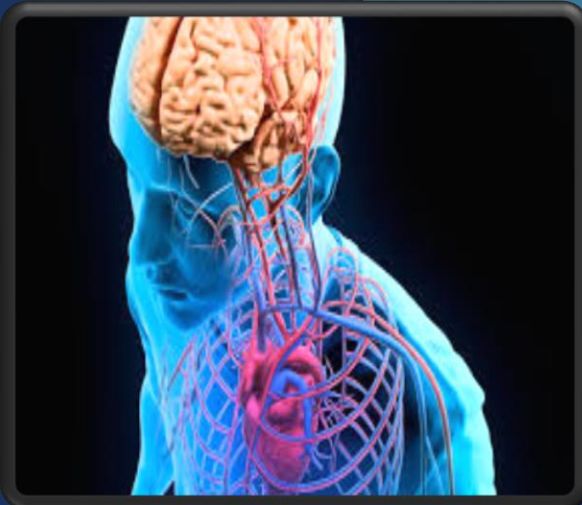
1. Discuss **organization levels of human body.** (Pages 2-5 of the reference).
2. Describe **characteristics of the living human organism.** (Pages 5-8 of the reference).
3. Explore **homeostasis in the human body, including feedback systems and homeostatic imbalances.** (Pages 8-12 of the reference).

General Overview

Branches of science are:

- 1- Anatomy (structures of body parts)
- 2- Physiology (functions of these parts)

Anatomy



Physiology



Physiology

1- Cellular Physiology: Biochemical and biophysical processes occurs within cells.

2- Systemic Physiology: The regulation of physiological processes within the body.

Pathophysiology

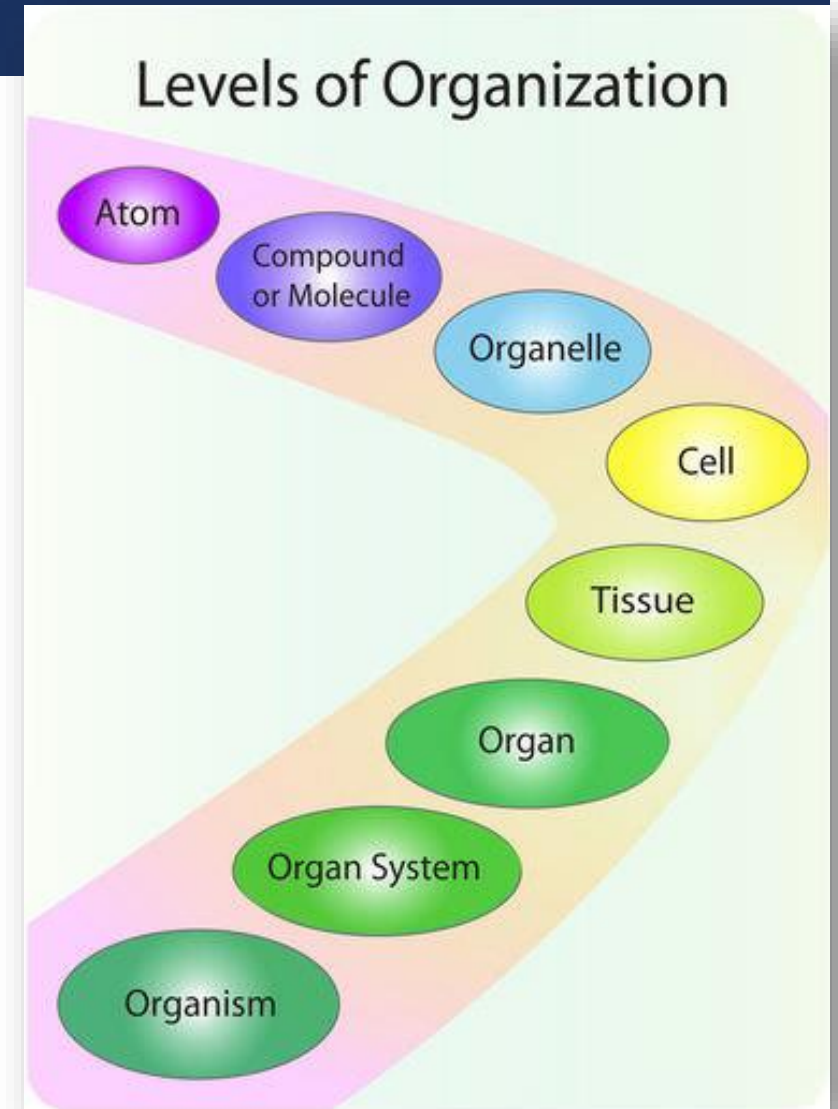
- ❑ The study of disordered body function (i.e., disease).
- ❑ The basis for clinical medicine.

Pharmacology

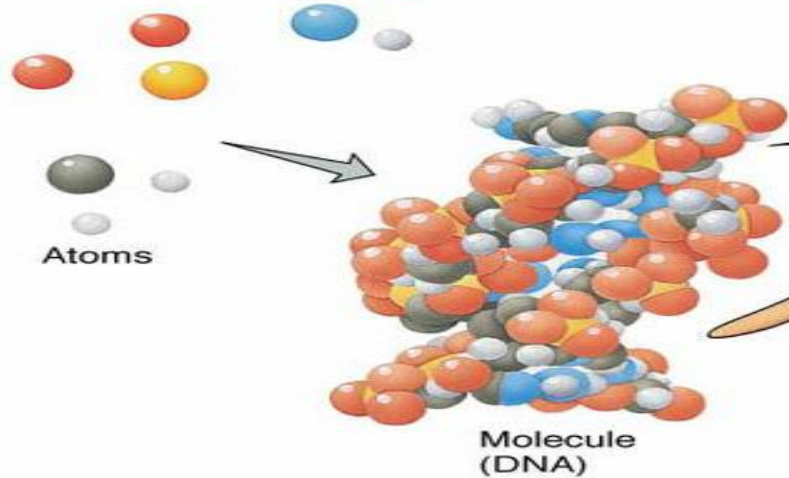
- ❑ The study of the effect of drugs on body processes.

ORGANIZATION LEVELS OF HUMAN BODY

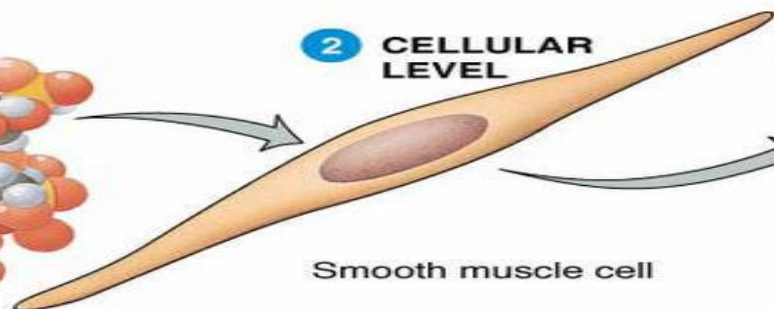
- 1- **Chemical level** (atoms that form molecules).
- 2- **Cellular level** (cells: muscle, nerve and epithelial cells). Cells: the basic structural and functional unit (~100 trillion).
- 3- **Tissue level** (tissues: epithelial, connective, muscular and nervous tissues).
- 4- **Organ level** (organs: stomach, skin, bones, heart, liver, lungs and brain).
- 5- **System level** (systems: cardiovascular, urinary).
- 6- **Organismal level**.



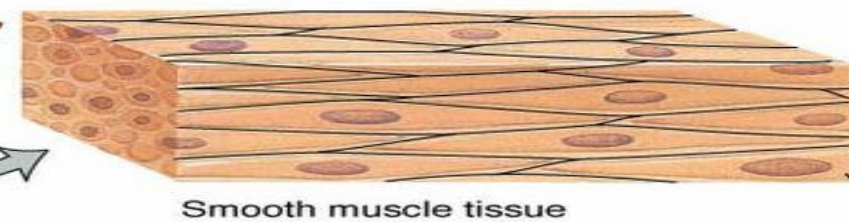
1 CHEMICAL LEVEL



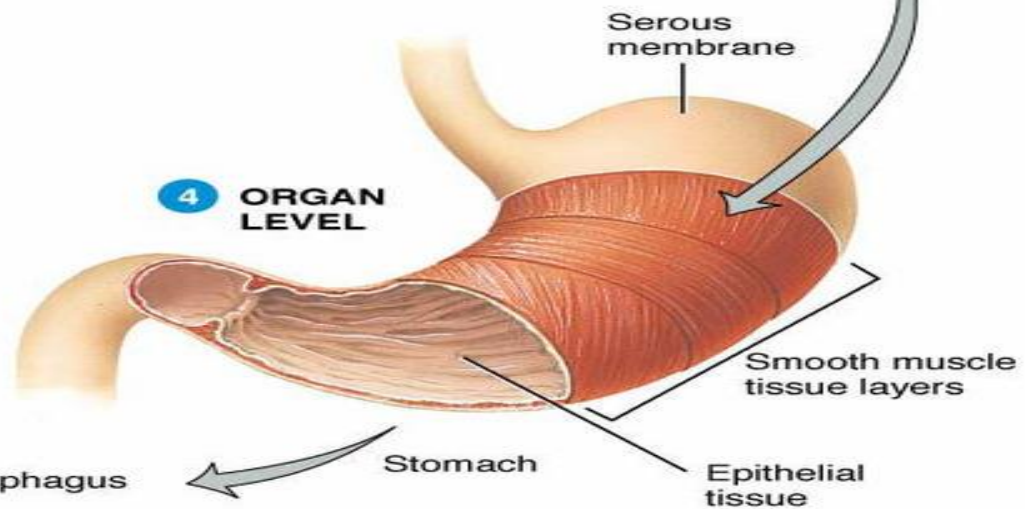
2 CELLULAR LEVEL



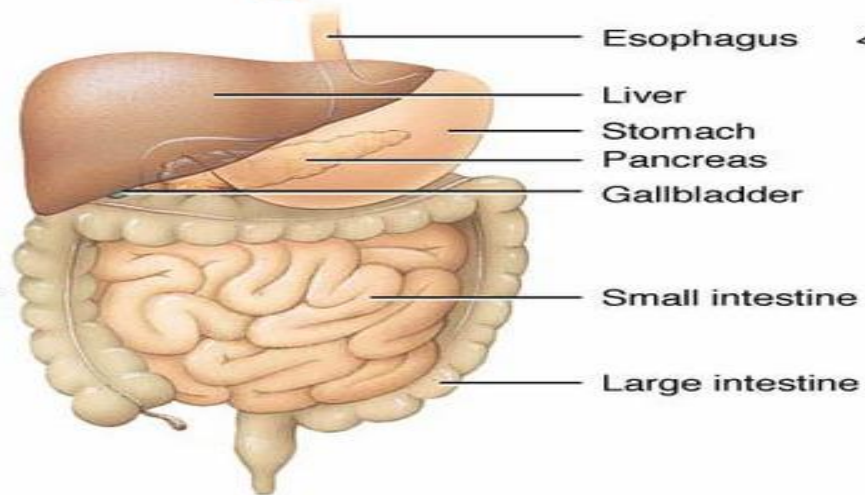
3 TISSUE LEVEL



4 ORGAN LEVEL



5 SYSTEM LEVEL

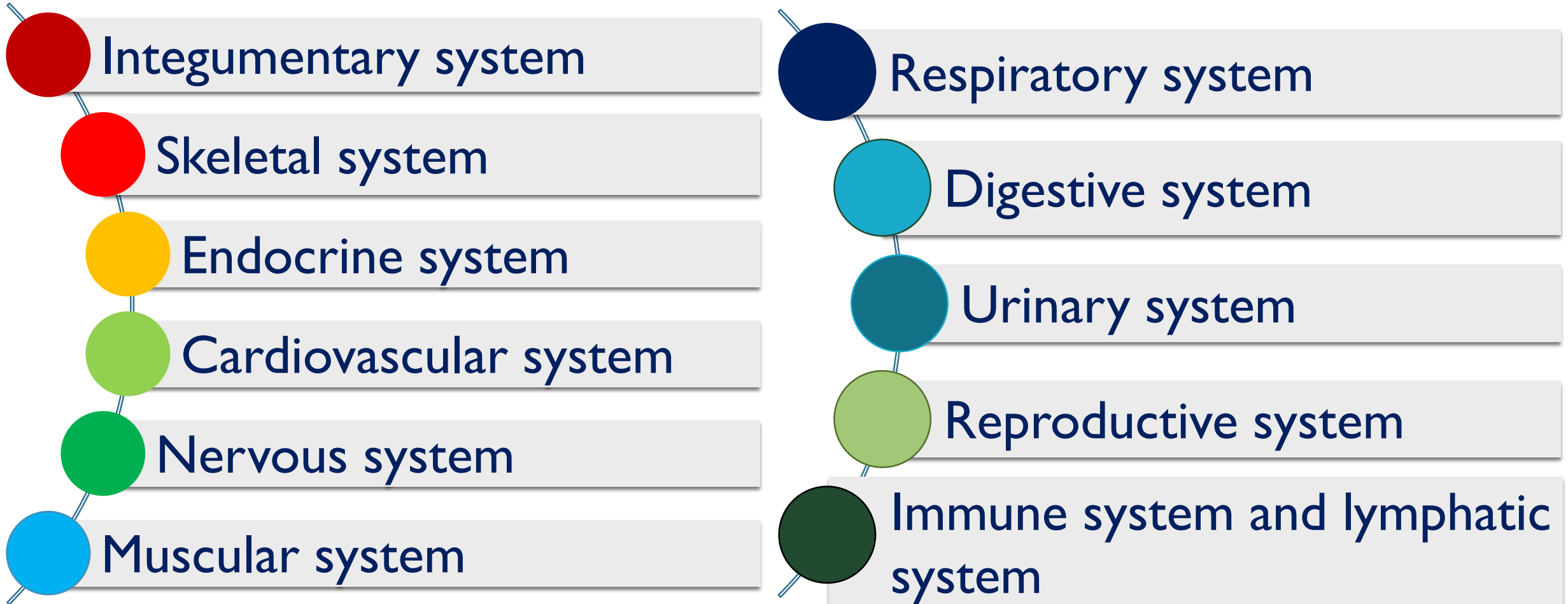


Digestive system



6 ORGANISMAL LEVEL

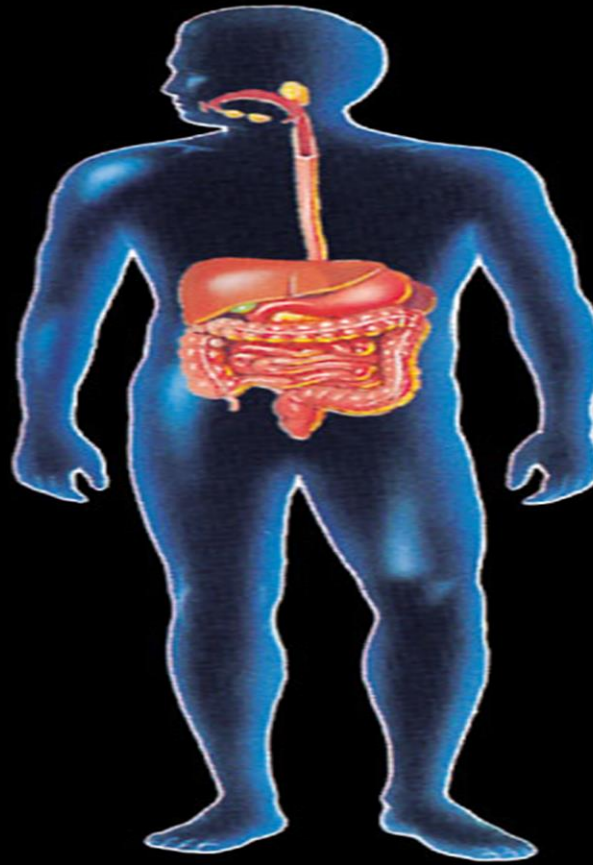
SYSTEMS OF THE HUMAN BODY





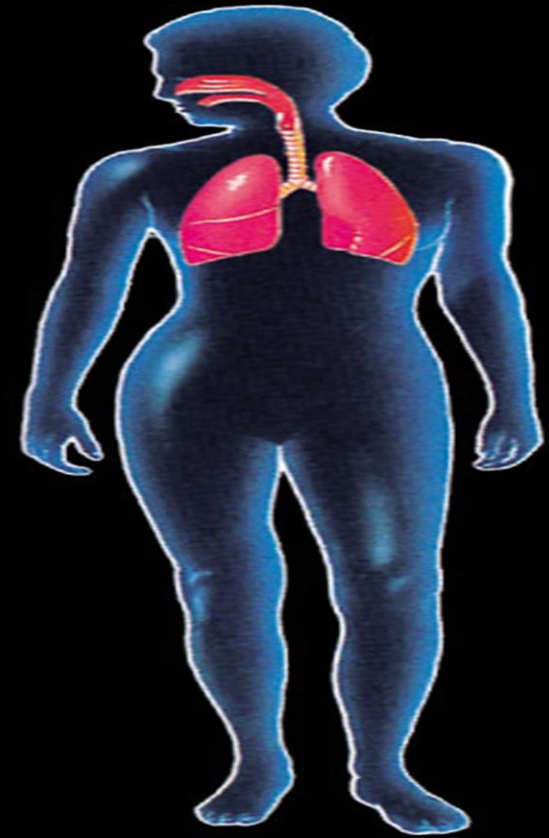
Circulatory system

heart, blood,
blood vessels



Digestive system

mouth, pharynx, esophagus, stomach,
small intestine, large intestine, salivary
glands, exocrine pancreas, liver,
gallbladder



Respiratory system

Nose, pharynx, larynx,
trachea, bronchi, lungs



Urinary system

kidneys, ureters,
urinary bladder,
urethra



Skeletal system

bones, cartilage,
joints



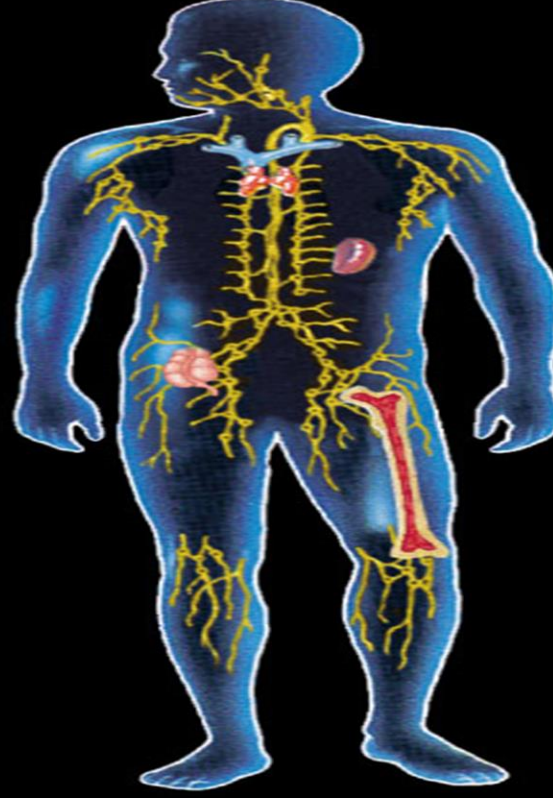
Muscular system

skeletal muscles



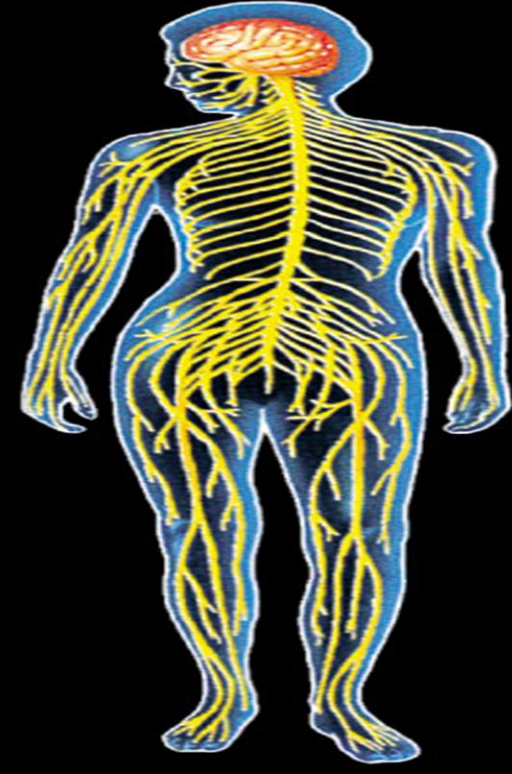
Integumentary system

skin, hair, nails



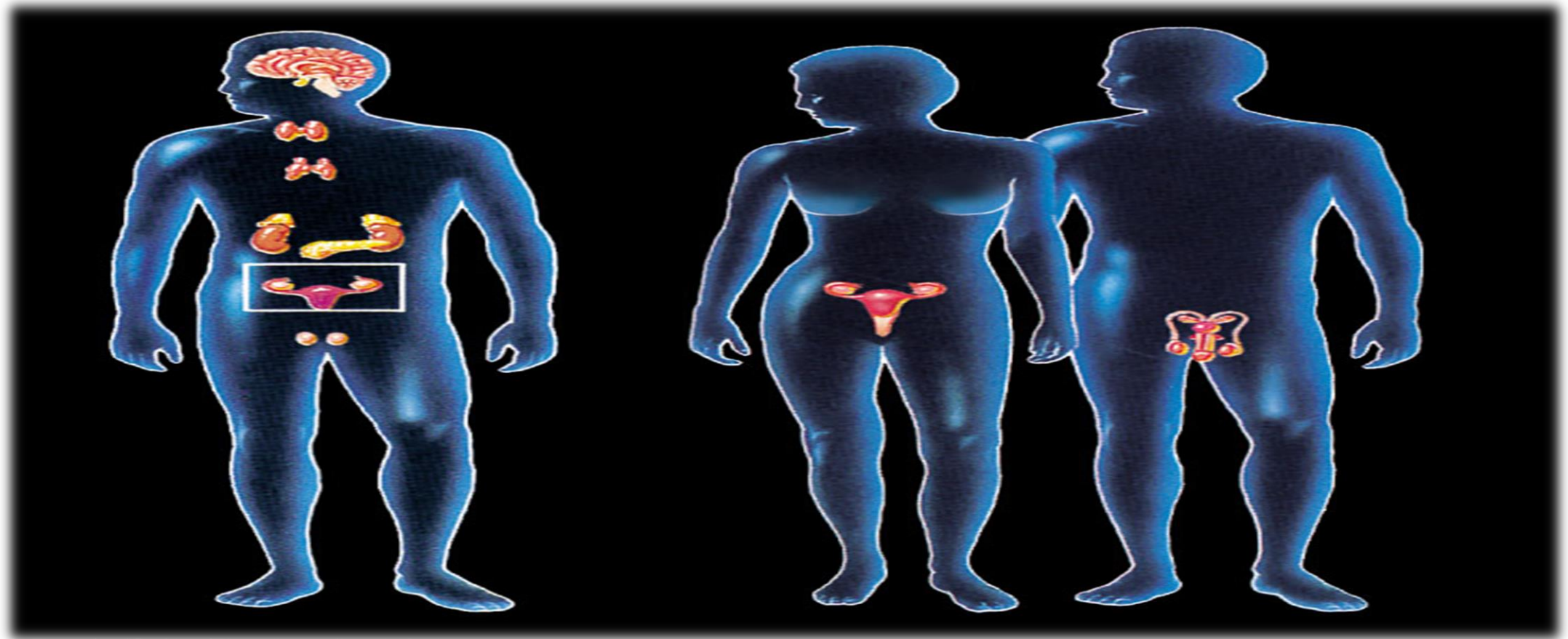
Immune system

lymph nodes, thymus, bone marrow, tonsils, adenoids, spleen, appendix, and, not shown, white blood cells, gut- associated lymphoid tissue, and skin-associated lymphoid tissue



Nervous system

brain, spinal cord, peripheral nerves, and, not shown, special sense organs



© Brooks/Cole, Thomson Learning

Endocrine system

all hormone-secreting tissues, including hypothalamus, pituitary, thyroid, adrenals, endocrine, pancreas, gonads, kidneys, pineal, thymus, and, not shown, parathyroids, intestine, heart, and skin

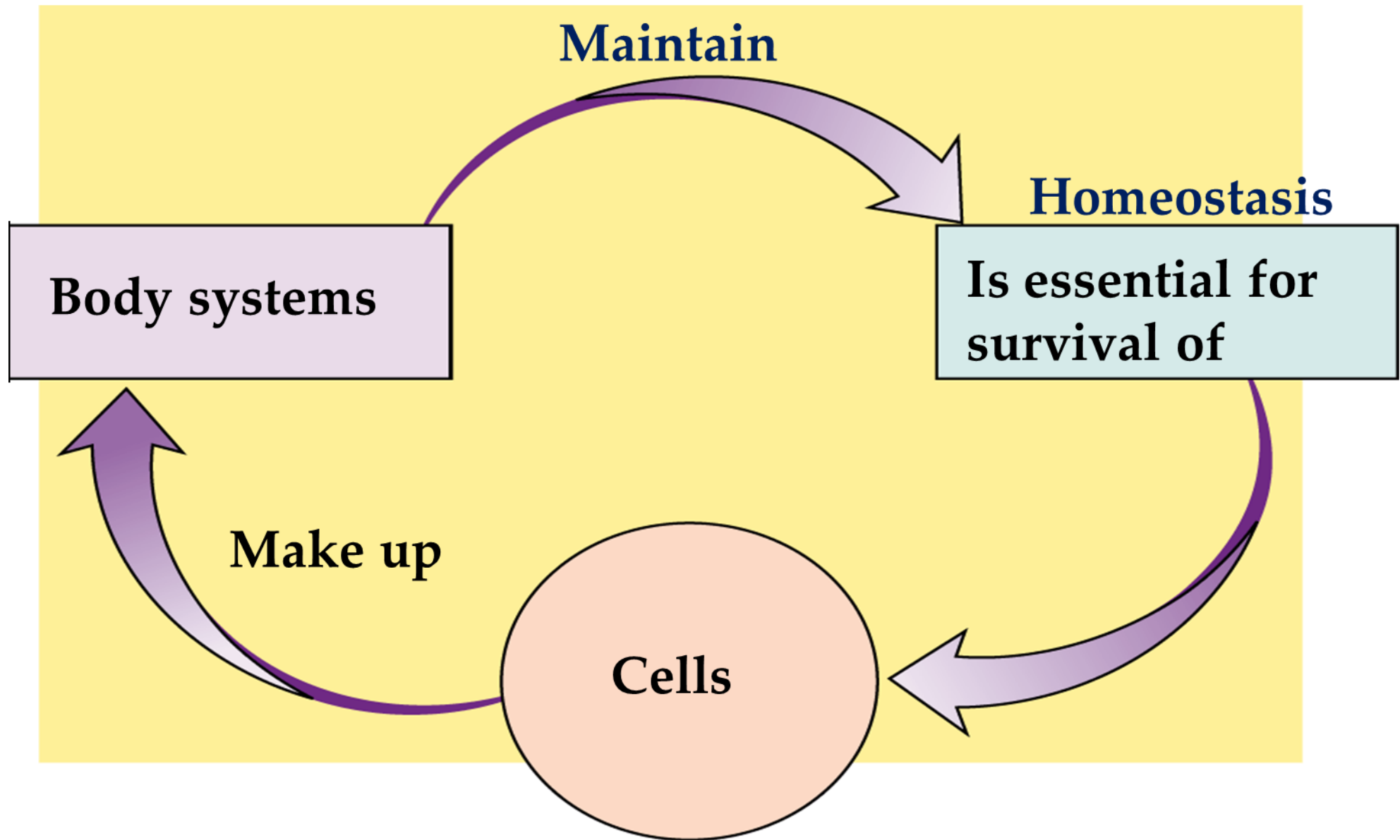
Reproductive system

Male: testes, penis, prostate gland, seminal vesicles, bulbourethral glands, and associated ducts

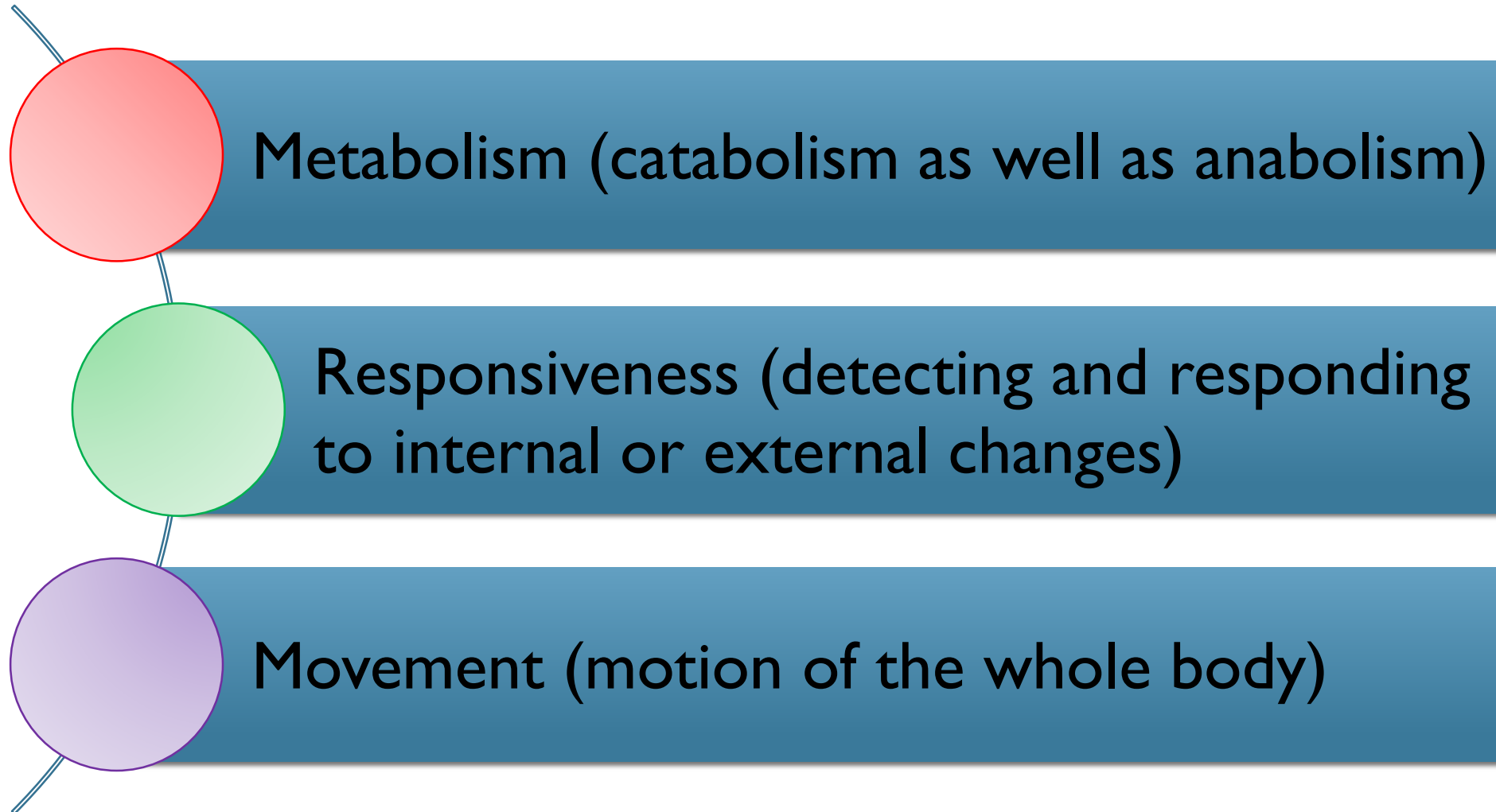
Female: ovaries, oviducts, uterus, vagina, breasts

Human physiology

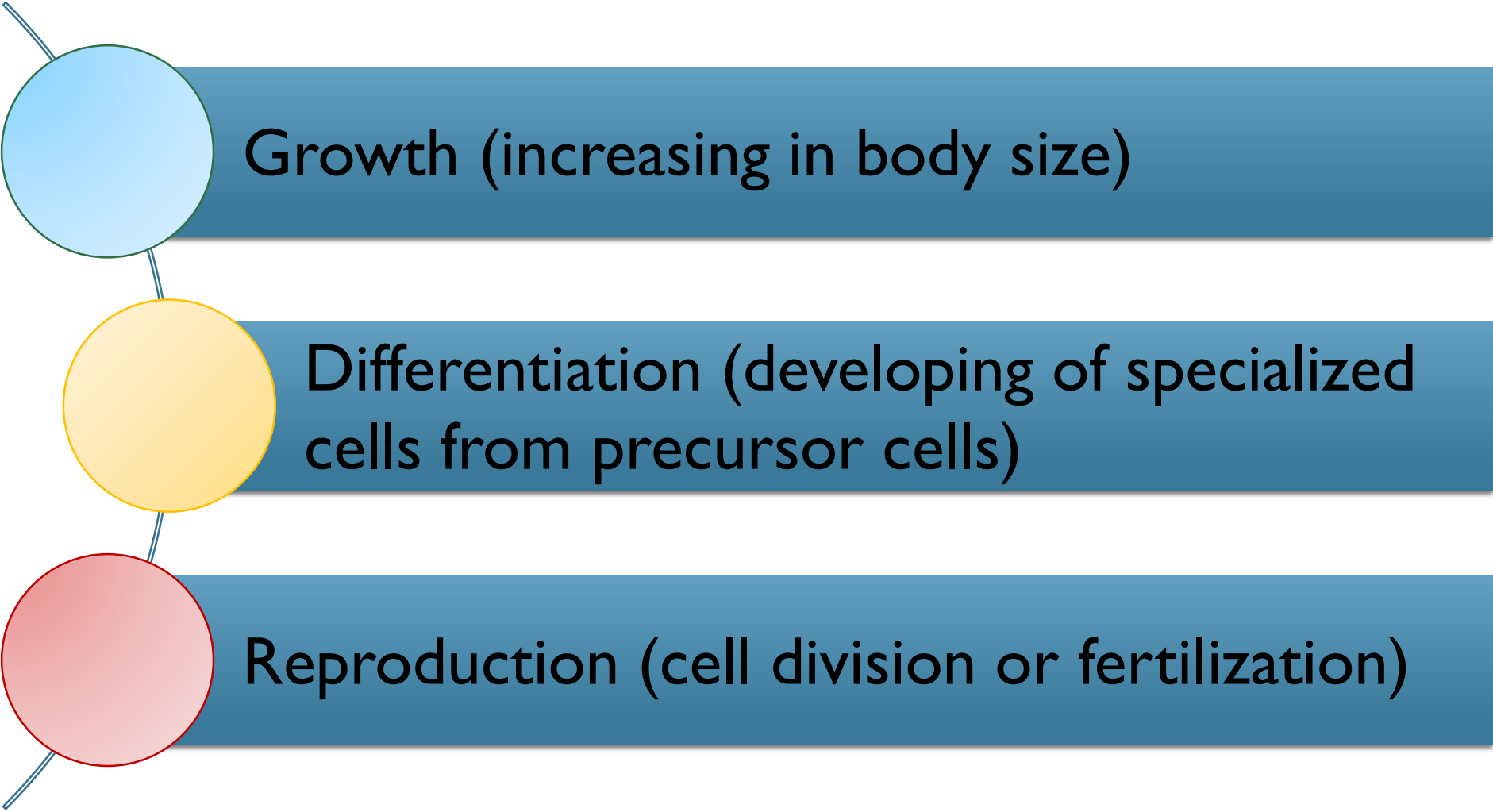
Specific characteristic and mechanisms of the human body that make it a living being. **All organs and tissues perform functions that help to maintain internal environment constant (Homeostasis).**



CHARACTERISTICS OF THE LIVING HUMAN ORGANISM (LIFE PROCESSES)



CHARACTERISTICS OF THE LIVING HUMAN ORGANISM (LIFE PROCESSES)



Growth (increasing in body size)

Differentiation (developing of specialized cells from precursor cells)

Reproduction (cell division or fertilization)

HOMEOSTASIS

Homeostasis is an equilibrium (balance) in the body's internal environment.

Homeostasis and body fluids:

- Maintaining the volume and composition of body fluids.
- The fluid within cells is intracellular fluid (ICF).
- The fluid outside body cells is extracellular fluid (ECF).

HOMEOSTASIS AND BODY FLUIDS

- The ECF that fills the narrow spaces between cells of tissues is known as interstitial fluid.
- The composition of interstitial fluid changes within blood capillaries to provide tissue cells with needed materials, such as glucose, oxygen, etc. Moreover, it removes wastes, such as carbon dioxide from interstitial fluid.

HOMEOSTASIS

Homeostasis in the human body is continually being disturbed,

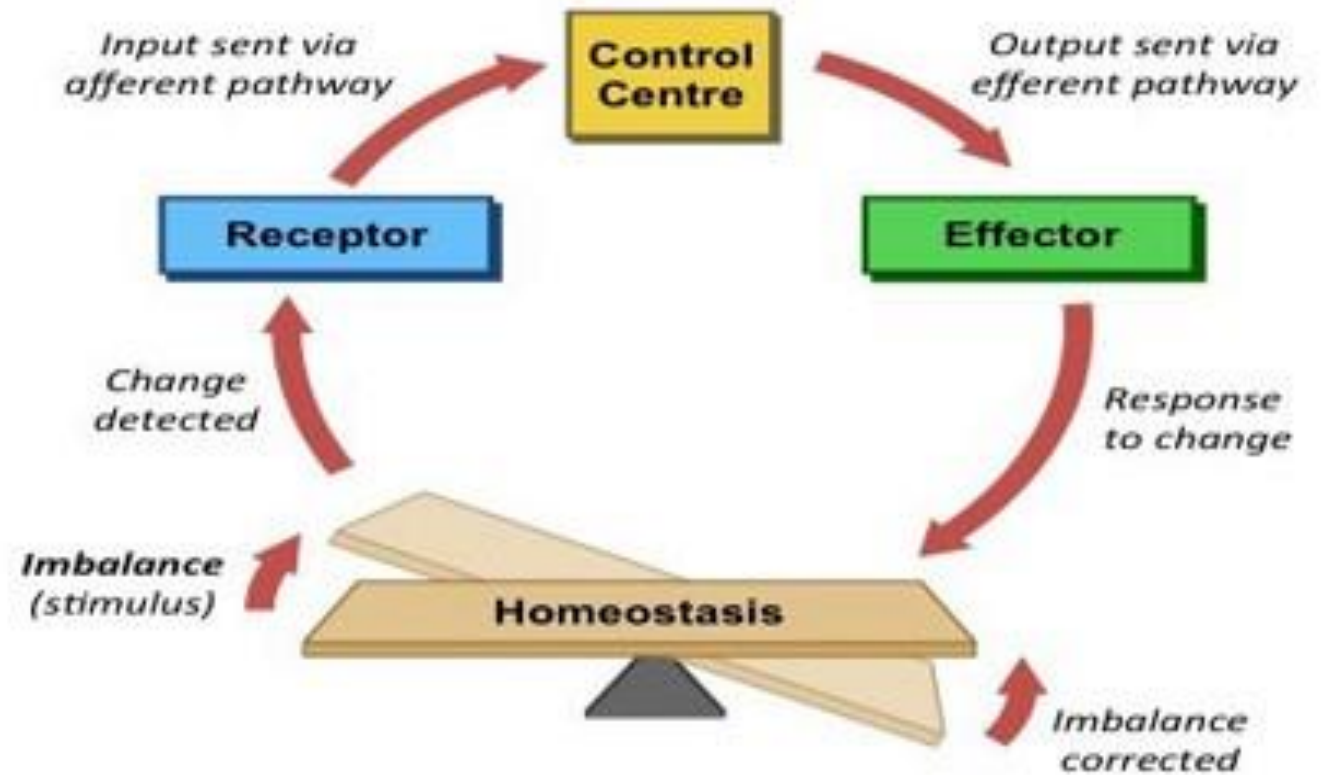
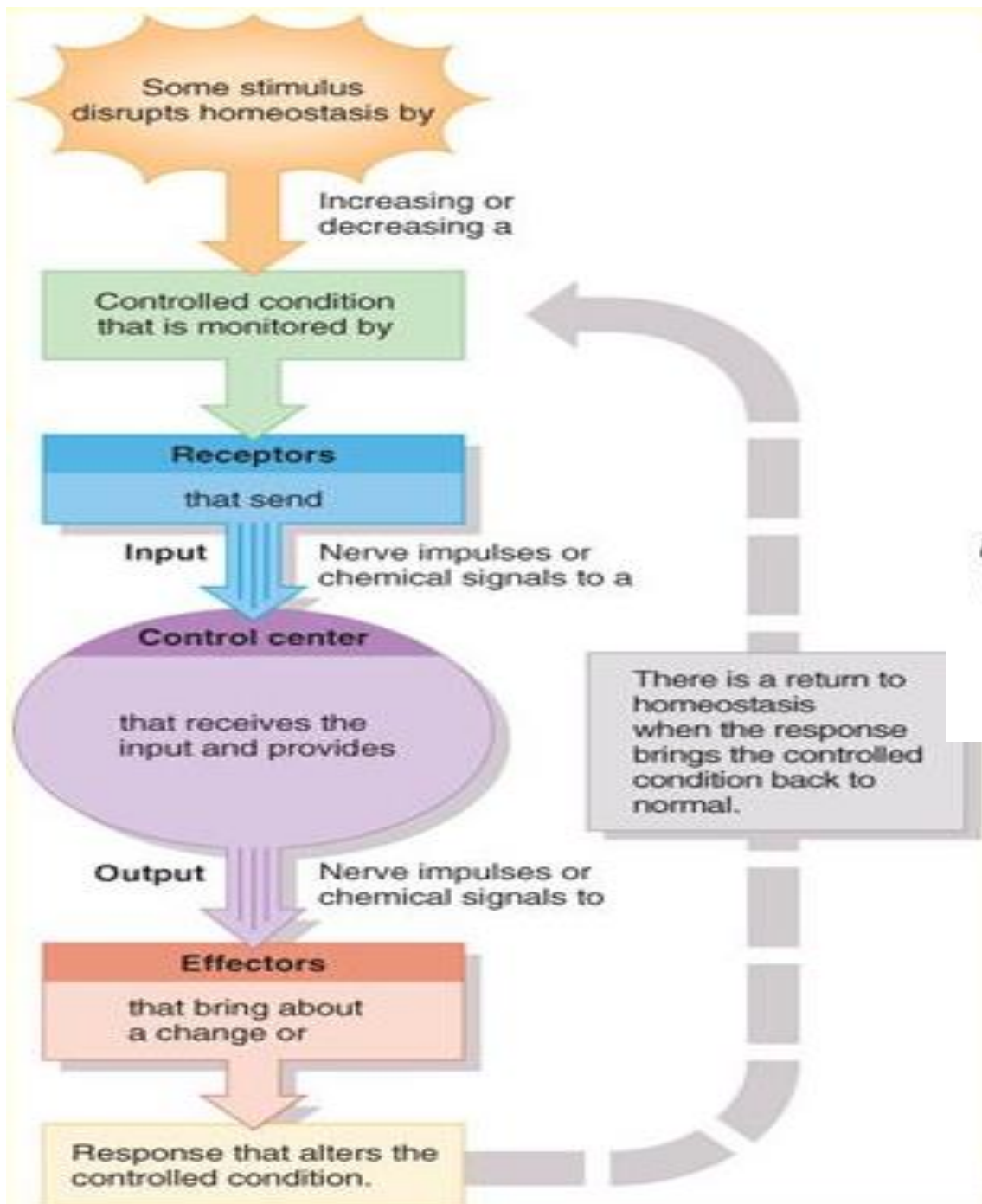
- From the external environment, the internal environment and psychological stresses.
- Can be temporarily or prolonged.
- The body has many regulating systems that can usually return the internal environment back into balance.

HOMEOSTASIS

- Nervous system regulates homeostasis through sending electrical signals known as **nerve impulses** (action potentials) to organs....
Rapid change
- The endocrine system regulates homeostasis through secreting messenger molecules called **hormones** into the blood..... *Slow change*
- Rapid or slow changes work toward the **negative feedback systems**.

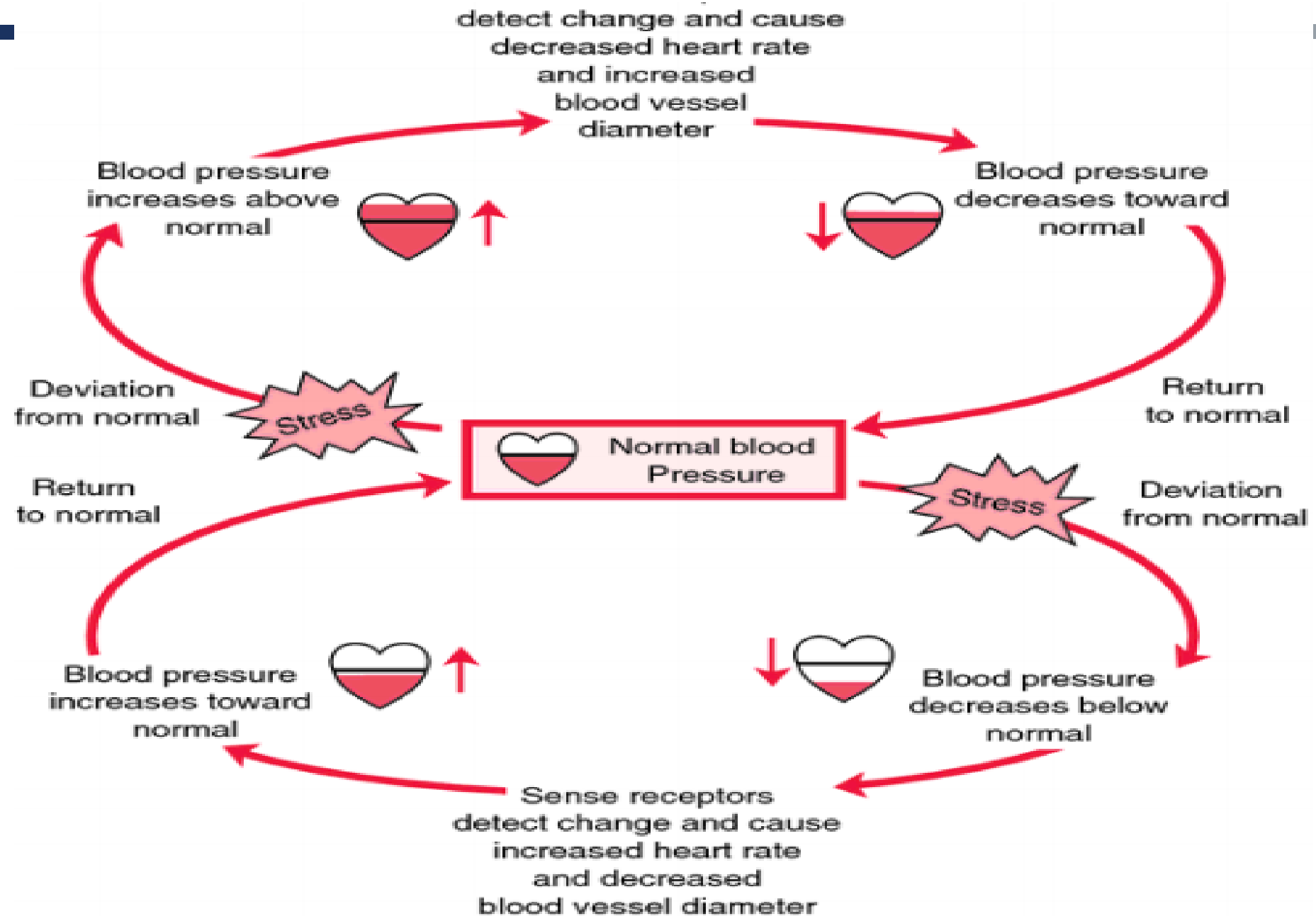
FEEDBACK SYSTEMS

- The internal environment can be regulated through **feedback system or feedback loop that monitored controlled variables** such as body temperature, blood pressure, or blood glucose level. (**Homeostatic reflex that can be innate “built-in” and learned homeostatic reflex.**)
- Changing of a controlled condition is called **stimulus**.
- Basic components of feedback system are a **stimulus, a receptor, a control center, and an effector**.



Group of receptors and effectors communicating with their control center forms a feedback system

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- **The feedback systems can be positive or negative feedback systems.**
 - **A negative feedback system reverses the change in a controlled condition.**
 - **Unlike a negative feedback system, a positive feedback system tends to strengthen or reinforce a change in one of the body's controlled conditions.**
 - **If the action of a positive feedback system is continued, it may produce life-threatening conditions in the body.**
 - **Unlike a positive feedback system, the action of a negative feedback system slows and then stops because the controlled condition returns to its normal state.**



HOMEOSTATIC IMBALANCES

- Disease is a more specific term for an illness that is characterized by a recognizable set of signs and symptoms.
- Local disease affects a specific region of the body.
- Systemic disease affects either the entire body or several parts of it.
- Subjective changes in body functions (**symptoms**) that are not apparent to an observer (i.e. headache, nausea, and anxiety).
- Objective changes that a clinician can observe and measure are called **signs**.



THANK YOU

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