



# CHAPTER 1

Nursing Physiology Lecture 1  
Introduction to the human body

# Levels of Structural Organization

- Anatomy = Study of Structure
- Physiology = Study of function

## 1. Chemical level

- most basic level of organizations
- made up of atoms + molecules

## 2. Cellular Level

- functional units of life
- body is made up of trillions of cells

## 3. Tissue level

- group of cells form tissues

## 4. Organ level

- different tissues together form the same function
- heart, stomach, nerves, eyes
  - ↳ all examples of organs

## 5. System level (organ system)

- ↳ digestive system
- collection of organs to do some complex task

## 6. Organism level

→ MRS INCLUDES

# Human Organ Systems

- Nervous
- muscular
- Skeletal
- Respiratory
- genitourinary
- digestive
- cardiovascular
- lymphatic/immune
- reproductive
- endocrine
- integumentary

## Integumentary System

· largest organ (skin)

↳ Hair, skin, sweat/oil glands, nails

Functions of the integumentary system

- protects, acts as a barrier b/w internal + external environment
- thermoregulation
- eliminates waste
- Vitamin D
- Detects sensation (touch, pain, cold, warm)
- Stores fat + provides insulation

## Skeletal system

→ made of bones, cartilage, joints

functions

- supports + protects body
- provides surface area for muscle attachment
- movement
- red blood cells
- stores minerals + lipids

# Muscular system

- skeletal muscles, smooth muscles, cardiac muscle
- ↳ movement
- maintains posture
- contractions → thermoregulation  
ex: shivering increases body temp

# Nervous system

- brain, sense organs, spine, nerves

## functions

- generates + sends electrical signals (action potentials) to regulate body activities
- detect changes, interpret changes \* homeostasis

# endocrine system

- pineal, pituitary, thymus, hypothalamus, pituitary, adrenal, pancreas, ovaries, testes, thyroid + parathyroid

- regulates body activities by releasing hormones
- hormones = chemical messages transported in blood to tissue or target organ

# Nervous + endocrine function similarly.

action potentials  
aka nerve impulses

↓  
quick + fleeting

↓  
hormones

↓  
slow + long lasting

## cardiovascular system

- blood vessels, blood + heart +
- carries oxygen + nutrients to cells
- removes waste + carbon dioxide from cells
- contains things that help fight disease
  - ↳ WBC

## Lymphatic + Immune System

- fluid, vessels, lymph nodes, spleen, WBC, thymus
- return protein + fluid to blood
- 

## Respiratory System

- nasal cavity, lungs, air passages
- transfers oxygen, removes  $\text{CO}_2$  from blood
- regulates acid-base balance, maintains pH
- make sounds (phonation)

## digestive system

- esophagus, intestines, anus, stomach
- open at both ends. (external to body)
- liver, gall bladder, pancreas
- physical + chemical breakdown of food
- absorb nutrients
- eliminate waste

## Urinary System

- ✓ bladder, ureter, urethra, kidney
- producing, storing, eliminating urine
- eliminate waste
- regulate blood volume + chemical composition
- maintains acid-base + mineral balance
- regulate production of RBC

## reproductive system

female = ovaries, uterus, vagina, mammary glands  
→ oocytes, hormones → produce milk  
continuation of life

male = testes, epididymus, penis, prostate, seminal vesicles  
→ produce sperm

# Basic Life Processes

1. metabolism (catabolism + anabolism)
2. responsiveness to environment
3. movement (organs, finding a better environment, etc)
4. growth
5. differentiation
6. reproduction

# Homeostasis - balance in body's internal environment

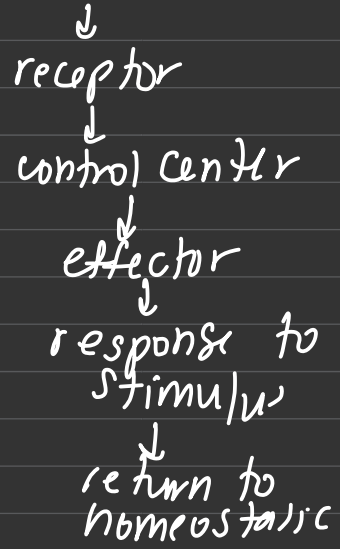
- maintained everywhere
- feedback loops

stimulus → controlled condition

when homeostasis is disrupted

- ↓ disease, disorders, death
- genetics
- air quality
- food
- mental health

↓  
altered condition





# Anatomical Terminology

## Standard anatomical position

- person stands, facing observer
- upper extremities (arms) placed at sides
- palms of hands turned forward
- feet flat on floor

## Regional names

cephalic = head  
cervical = neck  
trunk = middle of body  
lumbar / dorsal = back  
upper limb = arm  
lower limb = leg

superior = top / above

inferior = below / lower

medial = toward inside (mid-line)

lateral = toward outside (away from mid)

proximal = closer to trunk

distal = further from trunk

anterior = front

posterior = back

## Planes & sections

sagittal - divides left & right  
coronal - divides anterior & posterior  
transverse - divides superior & inferior

# Body Cavities

## Cranial cavity

- contains cranial bones + brain
- along posterior side, vertebral canal
  - ↳ contains spinal cord

## Thoracic cavity

↓  
pleural cavity  
↳ lungs

↳ pericardial cavity  
↓  
heart

## Abdominopelvic Cavity

↓  
abdominal cavity

- stomach
- spleen
- liver
- gall bladder
- most of large intestine
- \* serous membrane = peritoneum

↓  
pelvic cavity

- bladder
- rest of large intestine
- reproductive organs
- housed by pelvic bones

serous membranes = double layered membrane,  
lines walls of viscera (organ)  
visceral layer lines organ  
parietal layer = outside layer of membrane

function of serous membrane = reduce friction,  
allow for viscera to move w/o disturbing  
other structures/organs

pericardium = serous membrane of heart

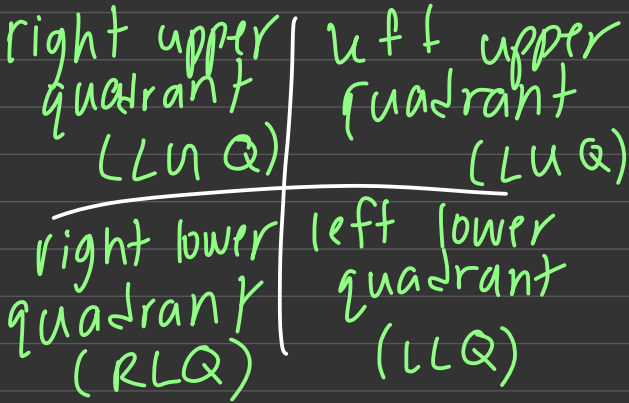
\*retroperitoneal = organs outside (posterior)  
to the peritoneum

1. kidneys
2. colon

abdominal cavities divided into 9 regions

right hypochondriac region	epigastric region	left hypochondriac region
right lumbar region	umbilical region	left lumbar region
right iliac region	hypogastric region	left iliac region

abdomino pelvic cavity is divided into 4 quadrants:



\* when people have a "stomach ache" they are probably having an intestinal ache if the pain is in the lower quadrants