


## NURSING

---

### Science Lectures



1

## LEARNING OBJECTIVES

---

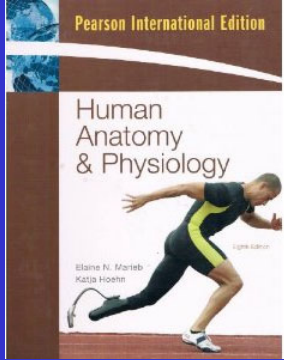
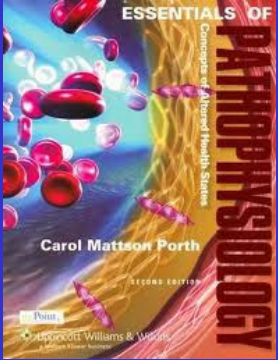
### Lecture 1: Overview of Structure (Anatomy)

- preview orientation and anatomical terminology
- recognize major organ systems of body
- appreciate homeostatic maintenance of normality

body – organs – tissues – cells – organelles - molecules

2

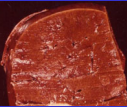

## Textbooks

3

## Integrative approach

---

<p><b>structure</b></p> 	<p>anatomy (gross) histology (cellular) chemical (molecular)</p>
<p><b>function</b></p>  <p>Liver takes up glucose and stores it as glycogen</p>	<p>physiology (molecular) biochemistry (molecular)</p>

4

## Levels of organization



The diagram illustrates the hierarchy of biological organization:

- Chemical level:** Atoms combine to form molecules.
- Cellular level:** Cells are made up of molecules.
- Tissue level:** Tissues consist of similar types of cells.
- Organ level:** Organs are made up of different types of tissues.
- Organ system level:** Organ systems consist of different organs that work together closely.
- Organismal level:** Human organisms are made up of many organ systems.

5

## Need to learn medical terminology

---

Latin/Greek derivation: (historical origins)

**Compound nouns**

**Prefixes**

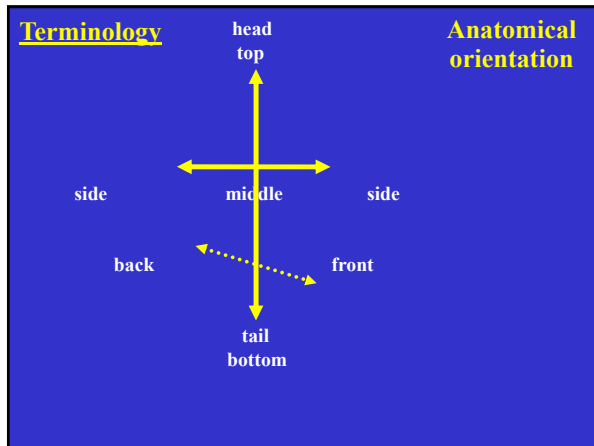
- poly- [many] (polyuria)
- holo- [whole] (holocrine secretion)
- mega- [great, large] (megakaryocyte)
- meso- [middle] (mesoderm)

**Suffixes**

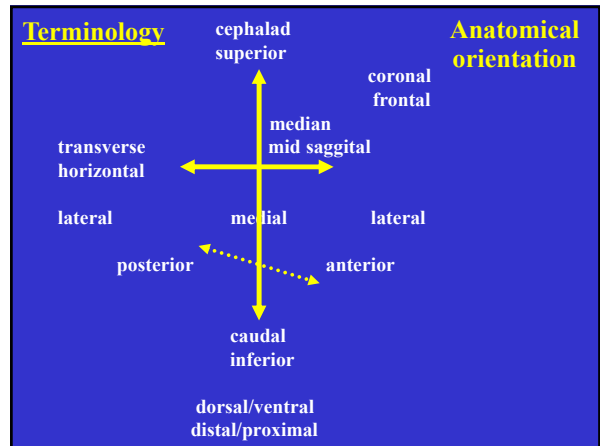
- -uria [urine] (polyuria)
- -phobe [dread, fear] (hydrophobia)
- -ectomy [removal] (tonsilectomy)
- -emia [blood] (leukemia)

Proficiency comes with regular use!

6



7



8

**TABLE 1.1 Orientation and Directional Terms**

TERM	DEFINITION	EXAMPLE
Superior (cranial)	Toward the head end or upper part of a structure or the body; above	The head is superior to the abdomen
Inferior (caudal)	Away from the head end or toward the lower part of a structure or the body; below	The navel is inferior to the chin
Ventral (anterior)*	Toward or at the front of the body; in front of	The breastbone is anterior to the spine
Dorsal (posterior)*	Toward or at the back of the body; behind	The heart is posterior to the breastbone
Medial	Toward or at the midline of the body; on the inner side of	The heart is medial to the arm
Lateral	Away from the midline of the body; on the outer side of	The arms are lateral to the chest
Intermediate	Between a more medial and a more lateral structure	The collarbone is intermediate between the breastbone and shoulder

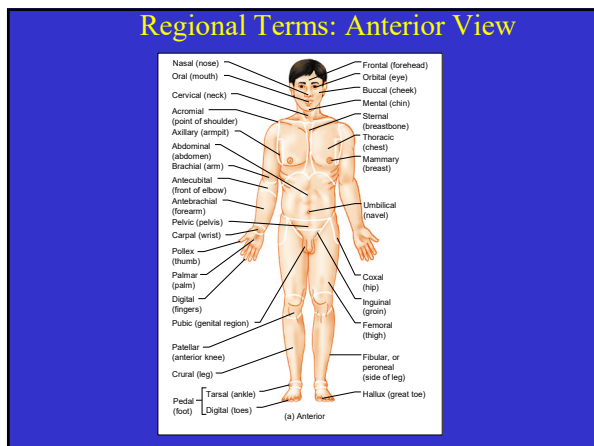
9

**TABLE 1.1 Orientation and Directional Terms**

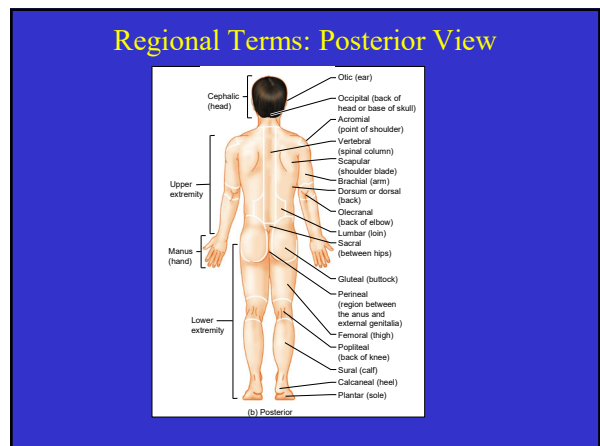
TERM	DEFINITION	EXAMPLE
Proximal	Closer to the origin of the body part or the point of attachment of a limb to the body trunk	The elbow is proximal to the wrist
Distal	Farther from the origin of a body part or the point of attachment of a limb to the body trunk	The knee is distal to the thigh
Superficial (external)	Toward or at the body surface	The skin is superficial to the skeletal muscles
Deep (internal)	Away from the body surface; more internal	The lungs are deep to the skin

\*The terms ventral and anterior are synonymous in humans, but this is not the case in four-legged animals. Whereas anterior refers to the leading portion of the body (abdominal surface in humans, head in a cat), ventral specifically refers to the "belly" of a vertebrate animal and thus is the inferior surface of four-legged animals. Likewise, although the dorsal and posterior surfaces are the same in humans, the term dorsal specifically refers to an animal's back. Thus, the dorsal surface of four-legged animals is their superior surface.

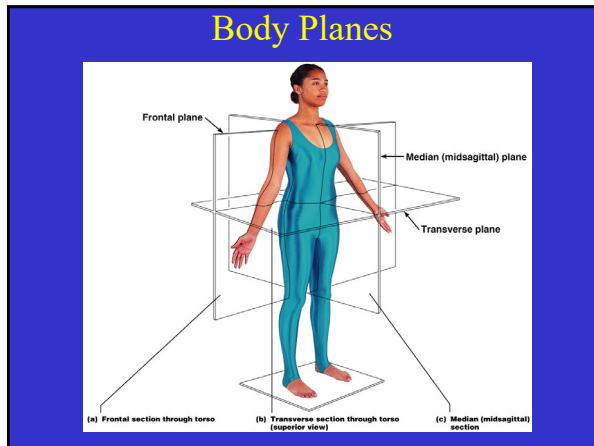
10



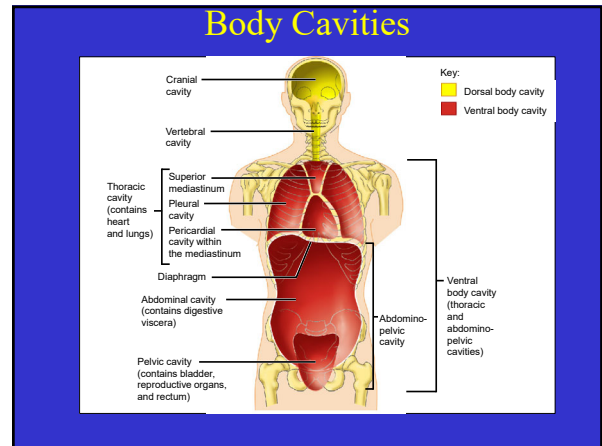
11



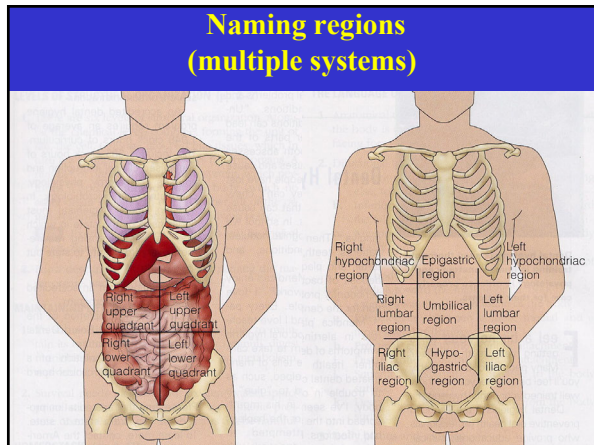
12



13



14



15

### Internal organization

---

**Structure**

- cells
- tissues
- organs
- systems

e.g.

- hepatocytes
- lobules
- liver
- digestive system

**Function**

- molecular
- cellular

- glucose stored as glycogen
- energy reserves

16

### Integumentary system

- protective barrier
  - physical
  - chemical
  - biologic
- thermoregulation
- metabolism e.g. vit D
- sensory receptors (pain, pressure...)
- excretion
- blood reservoir

skin

17

### Skeletal system

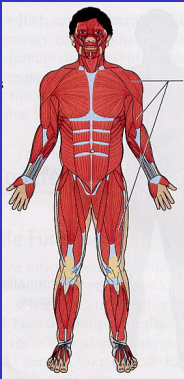
- protects and supports body organs
- provides a framework for muscular action
- site of blood cell formation
- stores minerals

cartilage  
 joints  
 bones

18

### Muscular system

- contractile action (pulling force)
- agonists
- antagonists
- synergists
- fixators
- maintains posture
- produces heat

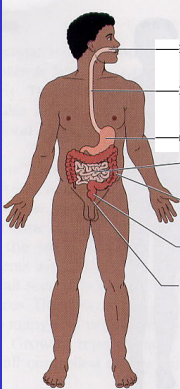


- skeletal muscles

19

### Digestive system

- breaks down food
- absorbs nutrients
- resorbs water
- eliminates waste

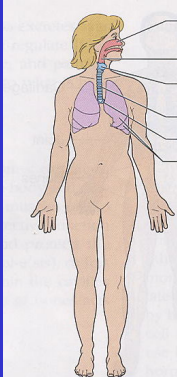


- oral cavity
- oesophagus
- stomach
- small intestine
- large intestine
- rectum
- anus

20

### Respiratory system

- ventilation system
- oxygenates blood
- removes carbon dioxide

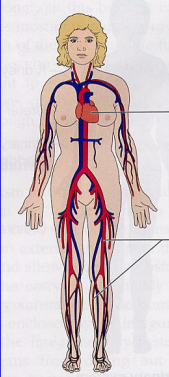


- nasal cavity
- pharynx
- larynx
- trachea
- bronchus
- lung

21

### Cardiovascular system

- pumps and transports blood which carries:
- oxygen
- carbon dioxide
- nutrients
- wastes
- hormones...

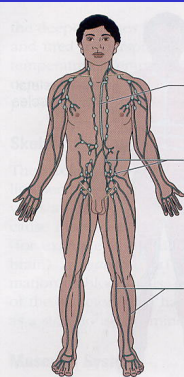


- heart
- blood vessels

22

### Lymphatic system

- collects interstitial fluid and returns it to bloodstream
- filters out debris
- carries white blood cells involved in immune responses

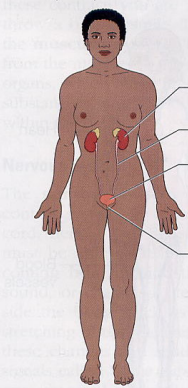


- thoracic duct
- lymph nodes
- lymphatic vessels

23

### Excretory system

- excretes nitrogenous wastes
- regulates water, electrolyte and acid-base balance of blood



- kidney
- ureter
- urinary bladder
- urethra

24

### Nervous system

- fast-acting control
- responsive to internal & external changes
- sensory input
- integration
- motor output

brain  
sensory receptor

spinal cord

nerves

25

### Endocrine system

- secrete hormones
- regulate processes:
  - metabolism
  - growth
  - reproduction

pineal gland  
pituitary gland  
thyroid gland

thymus gland  
adrenal gland  
pancreas

testis (male)  
ovary (female)

26

### Reproductive system

- produce offspring
- haploid gametes
- fertilization
- diploid zygote
- implantation
- embryo/foetal development
- parturition
- lactation

Mammary glands (in breasts)  
Uterine tube  
Ovary  
Uterus  
Vagina

Seminal vesicles  
Prostate gland  
Penis  
Vas deferens  
Testis  
Scrotum

27

### Overview of Physiology

Organ systems are not independent  
⇒ they interact!

28

Essential life functions	Survival needs
<ul style="list-style-type: none"> <li>• ingestion</li> <li>• digestion</li> <li>• excretion</li> <li>• respiration</li> <li>• reproduction/growth</li> <li>• movement</li> </ul>	<ul style="list-style-type: none"> <li>• nutrients</li> <li>• oxygen</li> <li>• water</li> <li>• temperature</li> <li>• atmospheric pressure</li> </ul>

29

### Need to monitor dynamic situation

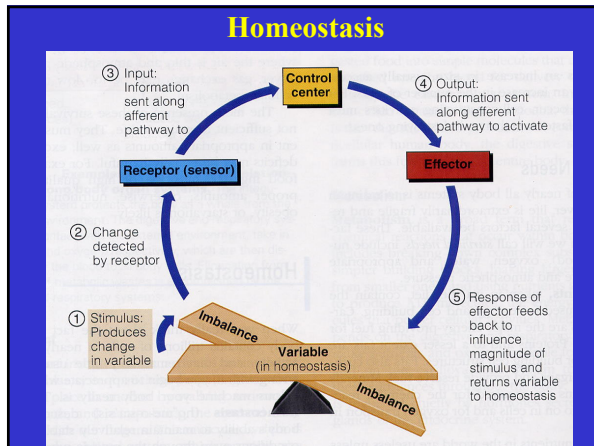
constant monitoring system involves:

- receptors (detect change)
- control centre (interprets signals)
- effectors (responds to change)

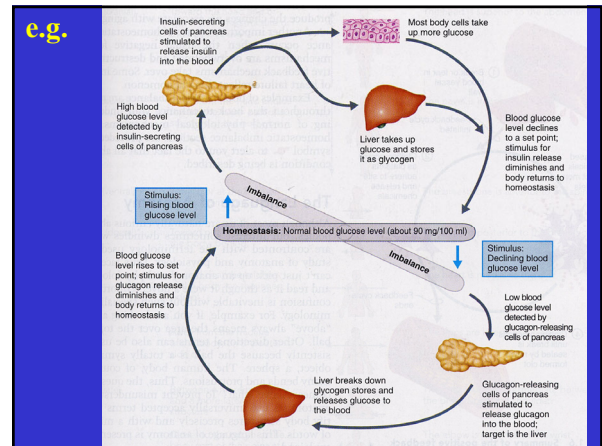
process called **HOMEOSTASIS**  
(functions to maintain right balance)  
(imbalance leads to disease)

- positive feedback (reinforce response)
- negative feedback (opposite response)

30



31



32