Introduction to Human Anatomy

TULIN SEN ESMER,MD
PROFESSOR OF ANATOMY
ANKARA UNIVERSITY
SCHOOL OF MEDICINE

SENESMER

- **Anatomy;**
  - The study of the structure and shape of the body and body parts & their relationships to one another.
  - The term anatomy comes from the Greek words meaning to cut (tomy) apart (ana)
  - Anatomy-cutting up-dissecting

- **Gross anatomy**(macroscopic anatomy) – the study of large, easily observable structures (by naked eye), such as the heart or bones.

- **Microscopic anatomy** (cytology, histology) – the study of very small structures, where a magnifying lens or microscope is needed.

- **Physiology;**
  - The study of how the body and its parts **work (function)**
  - Physio =natural , ology = the study of.
  - Like anatomy , physiology has subdivisions. For example, neurophysiology explains the working of the nervous system , and cardiac physiology studies the function of the heart.

❖Relationship between Anatomy and Physiology

- Anatomy and Physiology are always related .
- Structure determines what functions can take place.

* For example, the **lungs are not muscular chambers like the heart** and can not pump blood, but because **the walls of lungs are very thin, they can exchange gasses and provide oxygen to the body**.

Levels of Structural Organization

The human body exhibits 6 levels of structural complexity :

1. **Chemical level** , the simplest level of structural ladder .At this level atoms combine to form molecules such as water, sugar, & proteins

2. **Cellular level** the smallest units of living things .

3. **Tissue level** , groups of similar cells that have a common function (4 basic types)

4. **Organ level**, an organ is a structure composed of 2 or more tissue types that performs a specific function .

5. **Organ System** is a group of organs that work together to accomplish a common purpose (each organ has its own job to do)

6. **Organismal level** , represents the highest level of structural organization(total of 11 organ systems)

Levels of Organization

- ***Atoms*** *form molecules…..* ***molecules*** *form organelles (essential for cell function)……* ***organelles*** *form cells……* ***a group of cells*** *with the same structure and function forms a tissue…..two or more different* ***tissues*** *form an organ…..two or more* ***organs*** *form organ systems…..* ***multiple systems*** *form the human body.*

The Specialties of Anatomy

- Anatomy can be divided into gross and microscopic:
  - **Forms of Gross Anatomy**
    - **Surface anatomy** – study of superficial marking
    - **Regional anatomy** – study of specific area
    - **Systemic anatomy** – study of system
    - **Developmental anatomy** – study changes from conception to physical maturity.
  - **Microscopic anatomy includes two major subdivisions**
    - **Cytology** – study of cell
    - **Histology** – study of tissue

❖ **In anatomy courses** the body may be examined by regionally or systematically;

Regional anatomy; thorax, abdomen, pelvis and perineum, lower limb, upper limb, the back, head and neck

Systemic anatomy ; integumentary system, skeletal system, articular system…….

* **Clinical anatomy**; Deals with the important clinical aspects of body regions and systems

* **Comparative Anatomy;** all vertebrates share a basic pattern of organization, most noticeable during embryology.

Homeostasis

- Homeostasis is a **stable internal environment**
- **Every organism** must maintain homeostasis for survival
- Homeostatic regulation is responsible for keeping internal environment within certain limits.

Two general points within homeostasis

- **Autoregulation or intrinsic regulation** – results when cell, organ or system adjusts its activity automatically.
- **Extrinsic regulation** - results from activity of nervous system or endocrine system

Anatomical Position

- When describing body parts it is always assumed that the patient is in ***anatomical position;*** A stance or position commonly used for visual reference points)

  - Standing erect, head, eyes, toes directed forward, heels and toes together, upper limbs hanging by the sides palms facing to the front.

The Language of Anatomy

Directional terms

- **Superior (cranial or cephalad)** – toward the head end or upper part of a structure or body; above
- **Inferior (caudal)** – away from the head end or toward the lower part of a structure or body; below
- **Anterior (ventral)** – toward or at the front of the body; in front of
- **Posterior (dorsal)** – toward or at the backside of the body; behind
- **Medial** – toward or at the midline of the body; on the inner side of
- **Lateral** – away from the midline of the body; on the outer side of

The Language of Anatomy

- **Proximal** – close to the origin of the body part or the point of attachment of a limb to the body trunk.
- **Distal** – farther from the origin of a body or the point of attachment of ato the body trunk.
- **Superficial (external)** – toward or at the body surface.
- **Deep (internal)** – away from the body surface; more internal.

Body planes and sections

A section is a cut made along a plane

- **Sagittal** – cut made along the lengthwise or longitudinal plane of the body dividing it into **left and right parts**

- **Midsagittal (median) plane** – right and left parts are of equal size
- **Frontal (coronal) plane** – cut made along a lengthwise plane that divides the body into **anterior and posterior parts**

- **Transverse plane (cross section-axial-horizontal)** – cut made along a horizontal plane dividing the body or organ into **superior and inferior parts**

Axes

Transvers (Mediolateral) Axis

Vertical (Superoinferior) Axis

Sagittal (Anteroposterior) Axis

Movements

General:

- **Flexion;** decreasing joint angle, the act of bending
- **Extension**; stretching out, the straightening of a limb
- **Abduction**; the movement which separates a limb or other part from the axis, or middle line, of the body
- **Adduction**; moving or pulling an arm or leg toward the median line in the body
- **Internal/External Rotation**; the act of turning around a centre or an axis
- **Circumduction**; the rotation of a limb round an imaginary axis

SPECIFIC: ANKLE & FOOT

Inversion

Eversion

Plantar flexion

Dorsal flexion (dorsiflexion)

SPECIFIC: RADIOULNAR JOINT

Pronation

Supination

SPECIFIC: SHOULDER GIRDLE

- Elevation
- Depression
- Protraction
- Retraction

SPECIFIC: WRIST & HAND

- Radial flexion (radial deviation)
- Ulnar flexion (ulnar deviation)
- Opposition of the thumb

Systematic anatomy

. Integumentary system
. Skeletal system
. Articular system
. Muscular system
. Nervous system
. Circulatory system
. Digestive system
. Respiratory system
. Urinary system
. Reproductive system
. Endocrine system

Body Cavities

- Body cavities are internal chambers holding vital organs
  - Cavities protect vital organs
  - Cavities allow organs to change in shape and size

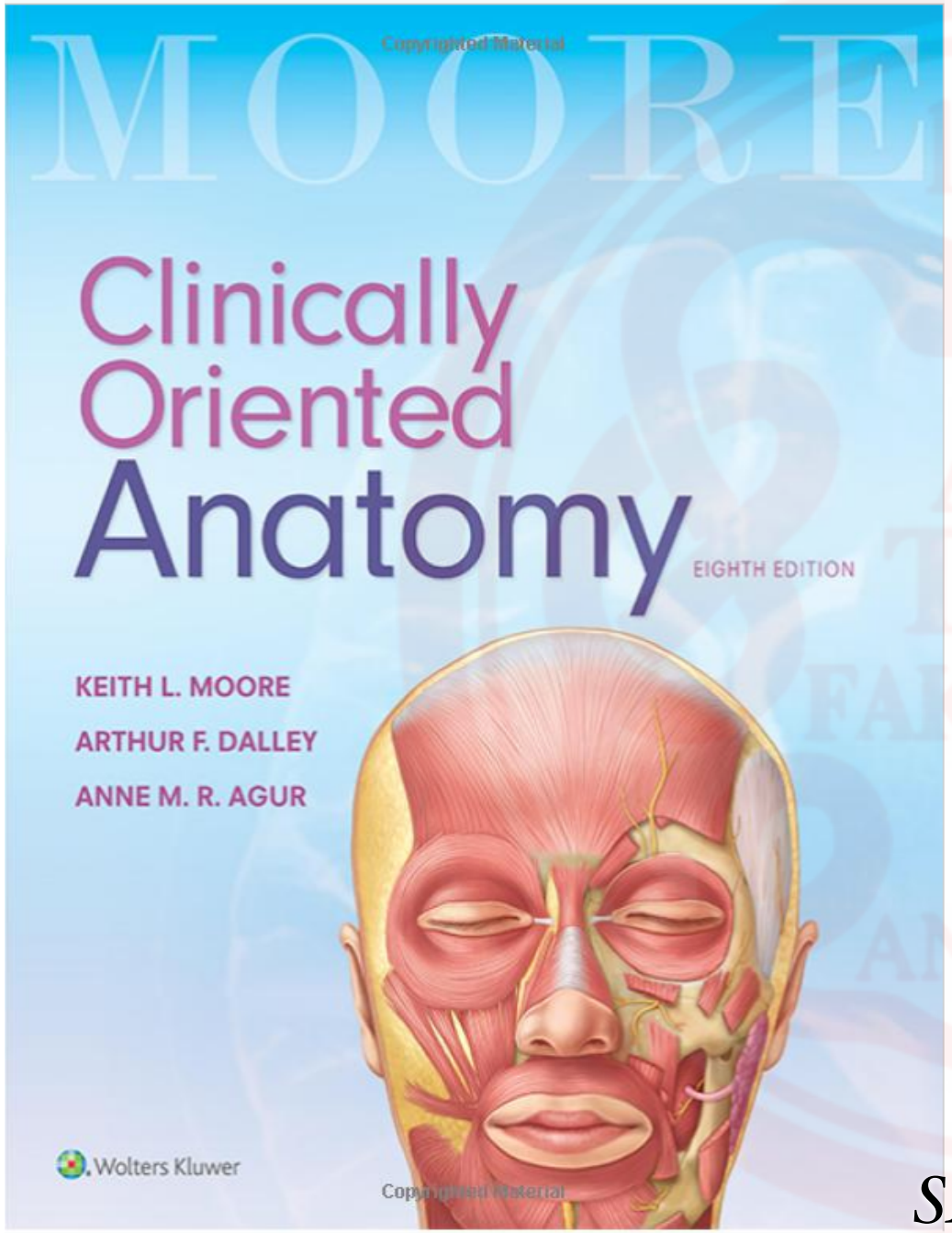
- Two body cavities
  - Dorsal body cavity includes the cranial cavity and the spinal cavity
  - Ventral body cavity includes the thoracic cavity and the abdominopelvic cavity

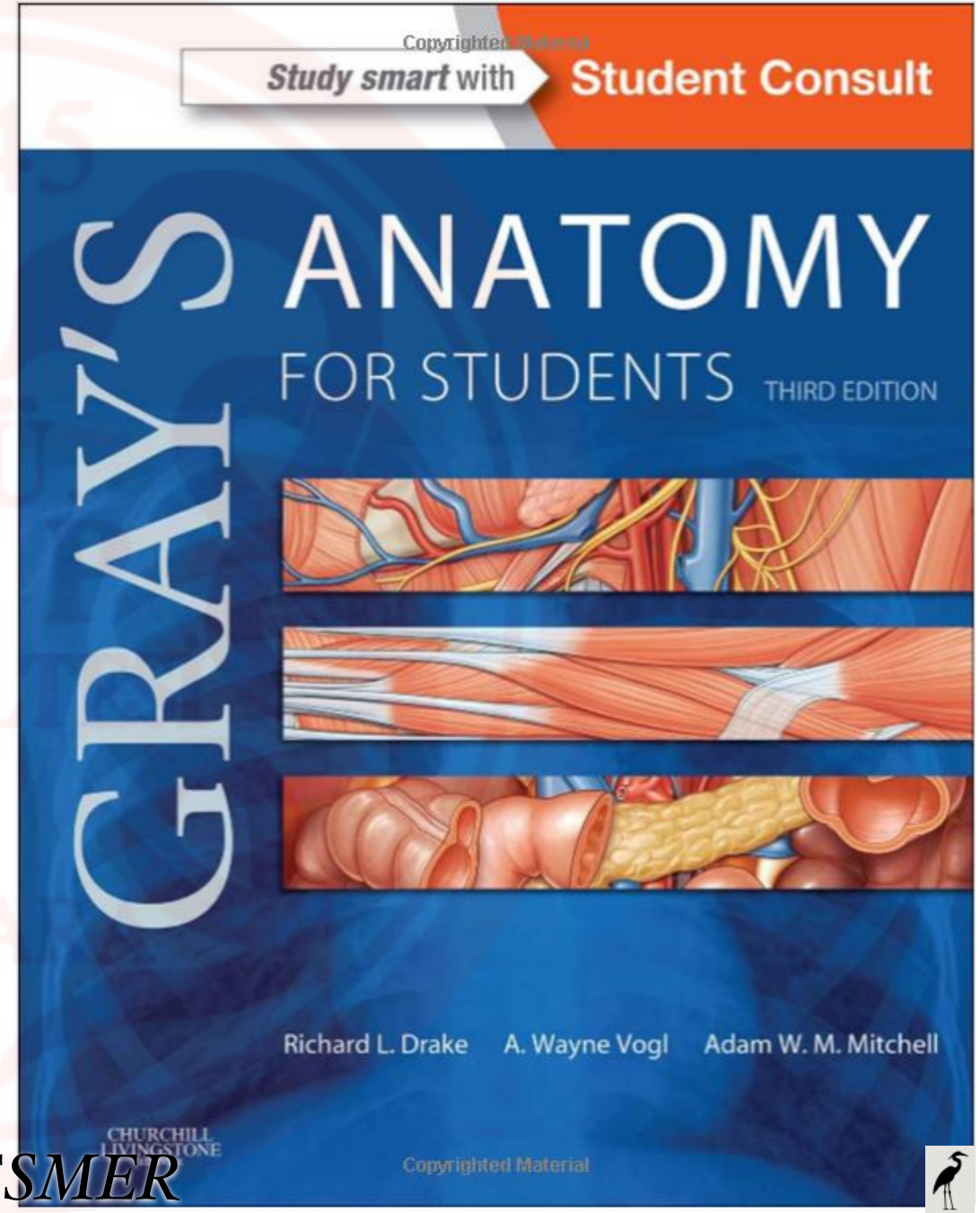
Thoracic Cavities

- The thoracic cavity contains the heart and lungs.
- The thoracic cavity is subdivided into:
- Left and right pleural cavities (each pleural cavity contains one lung) lined by the visceral and parietal pleura
- The mediastinum contains the pericardium (pericardial cavity), another serous membrane that surrounds the heart

Abdominopelvic Cavity

- The abdominopelvic cavity is lined by the peritoneum
  - **The abdominal cavity** extends from the diaphragm to the superior margins of the pelvis
    - Liver, stomach, spleen and most of the large intestine
  - **The pelvic cavity** is bordered by the pelvis, with a floor of muscle
    - Reproductive organs, urinary bladder and the final portion of the large intestine


MOORE
Clinically Oriented Anatomy
EIGHTH EDITION
KEITH L. MOORE
ARTHUR F. DALLEY
ANNE M. R. AGUR
Wolters Kluwer


Study smart with Student Consult
GRAY'S ANATOMY
FOR STUDENTS
THIRD EDITION
Richard L. Drake
A. Wayne Vogl
Adam W. M. Mitchell
CHURCHILL LIVINGSTONE

References

- **Gray's Anatomy For Students**, Drake R.L,Vogl A.W,Mitchell AWM, 3rd Edition, Churchill Livingstone, 2014
- **Clinically Oriented Anatomy**, Moore K.L, Dalley A.F, Agur A.M.R, 8th Edition, Wolters Kluwer, 2018
- **Atlas of Human Anatomy**, Netter F.H., 6th Edition, Elsevier, 2014
- **Atlas of Anatomy**, Gilroy AM., MacPherson B.R, 3rd Edition, Thime, 2016
- **Sobotta Human Anatomy**, Paulsen F, and Waschke J, 15th Edition, Urban & Fischer, 2011