

LESSON 1

INTRODUCTION TO HUMAN ANATOMY

6/29/2010

OBJECTIVES

By the end of this lesson, you should be able to:

1. Define anatomy and various anatomical terms
2. Demonstrate understanding of the importance of anatomy as a bases of medicine
3. Describe the general organization of the human body
4. Describe the structure of an animal cell

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INTRODUCTION TO ANATOMY

DEFINITIONS

Anatomy is the study of the structure of the body and the relationship of its parts.

The body is a chemical and physical machine. As such, it is subject to certain laws. These are sometimes called natural laws.

Each part of the body is engineered to do a particular job. These jobs are called **functions**. For each job or body function, there is a particular structure engineered to do it.

In the laboratory, anatomy is studied by dissection (SECT = cut, DIS = apart).

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BODY TYPES

We can group individuals into three major categories. These groups represent basic body shapes.

MORPH = body, body form

ECTO = all energy is outgoing

ENDO = all energy is stored inside

MESO = between, in the middle

1. ECTOMORPH = slim individual
2. ENDOMORPH = broad individual
3. MESOMORPH = body type between the two others, "muscular" type

Ectomorphs, slim persons, are more susceptible to lung infections. Endomorphs are more susceptible to heart disease.

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MEDICAL TERMINOLOGY

Each profession and each science has its own language.

Physicians and other medical professions and occupations have medical terminology.

To work in a medical field, you should know the meanings of terms such as proximal, distal, sagittal, femur, humerus, thorax, and cerebellum.

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Endomorph



Mesomorph



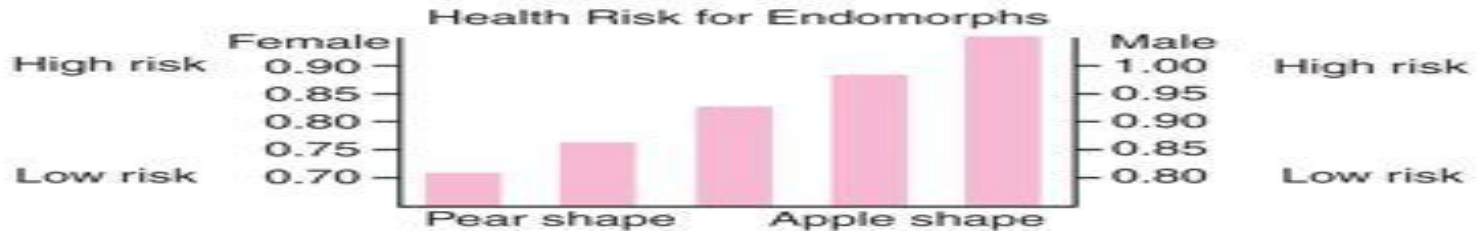
Ectomorph



"Pear-shaped" endomorph



"Apple-shaped" endomorph



KINDS OF ANATOMICAL STUDIES

- **Microscopic anatomy** is the study of structures that cannot be seen with the unaided eye. You need a microscope.
- **Gross anatomy by systems (Systematic Anatomy)** is the study of organ systems, such as the respiratory system or the digestive system.
- **Gross anatomy by regions (Regional Anatomy)** considers anatomy in terms of regions such as the trunk, upper member, or lower member.
- **Neuroanatomy** studies the nervous system.
- **Functional anatomy** is the study of relationships between functions and structures.
- **Comparative Anatomy**
- **Applied Anatomy**
- **Surface Anatomy**

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ORGANIZATION OF THE HUMAN BODY

The human body is organized into cells, tissues, organs, organ systems, and the total organism.

- a. **Cells** are the smallest living unit of body construction.
- b. **A tissue** is a grouping of like cells working together.
- c. **An organ** is a structure composed of several different tissues performing a particular function.
- d. **Organ systems** are groups of organs which together perform an overall function.
- e. **The total organism** is the individual human being.

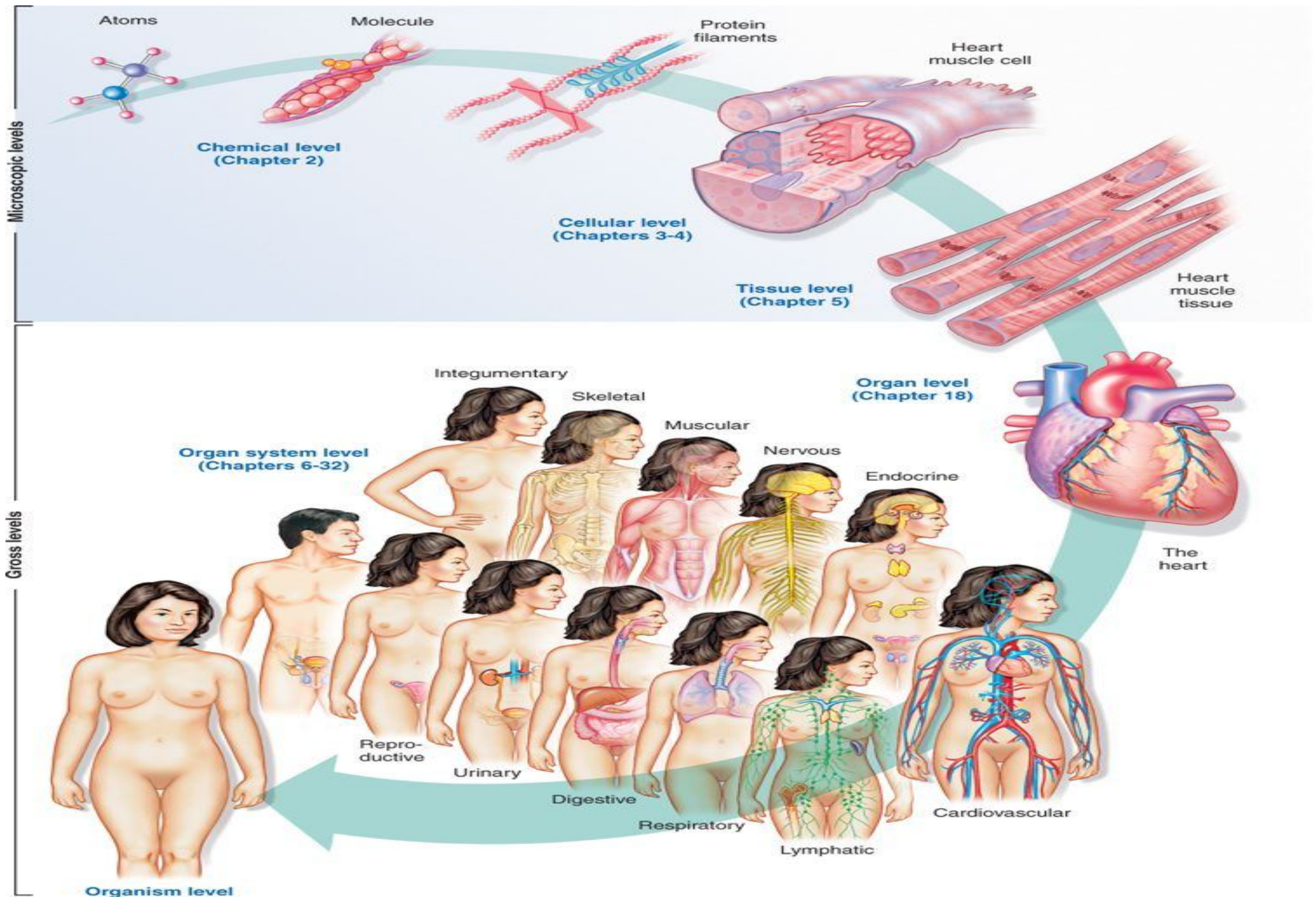
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LEVELS OF STRUCTURAL ORGANIZATION

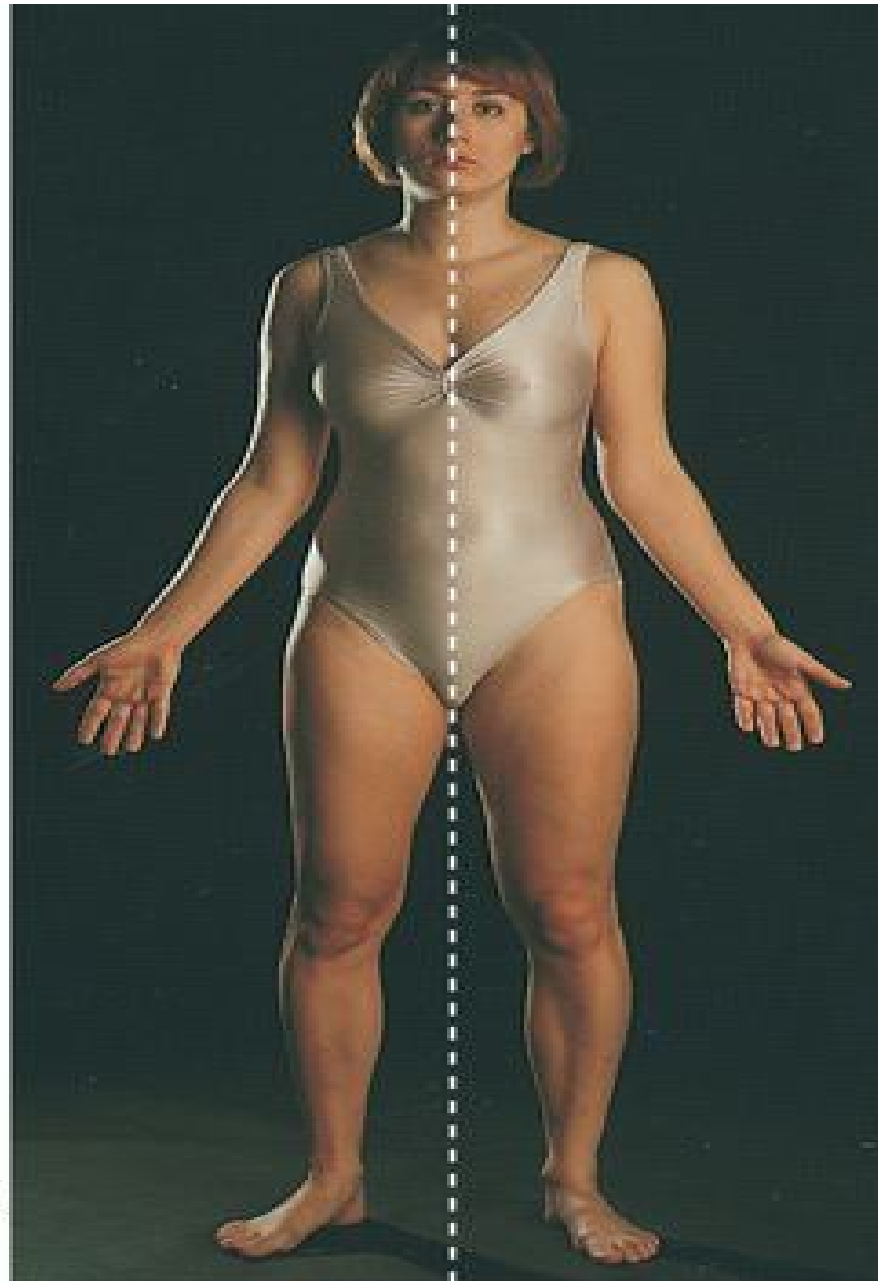
1. Chemical Level
2. Organel level
3. Cellular Level
4. Tissue Level
5. Organ level
6. Organ system level
7. Organism level

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Levels of structural organization



Anatomical Position



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PLANES OF THE BODY

There are three imaginary planes that describe the body

- a. **Sagittal** planes are vertical planes that pass through the body from front to back. The median or midsagittal plane is the vertical plane that divides the body into right and left halves.
- b. **Horizontal (transverse)** planes are parallel to the floor. They are perpendicular to both the sagittal and frontal planes.
- c. **Frontal (coronal)** planes are vertical planes which pass through the body from side to side. They are perpendicular to the sagittal plane.

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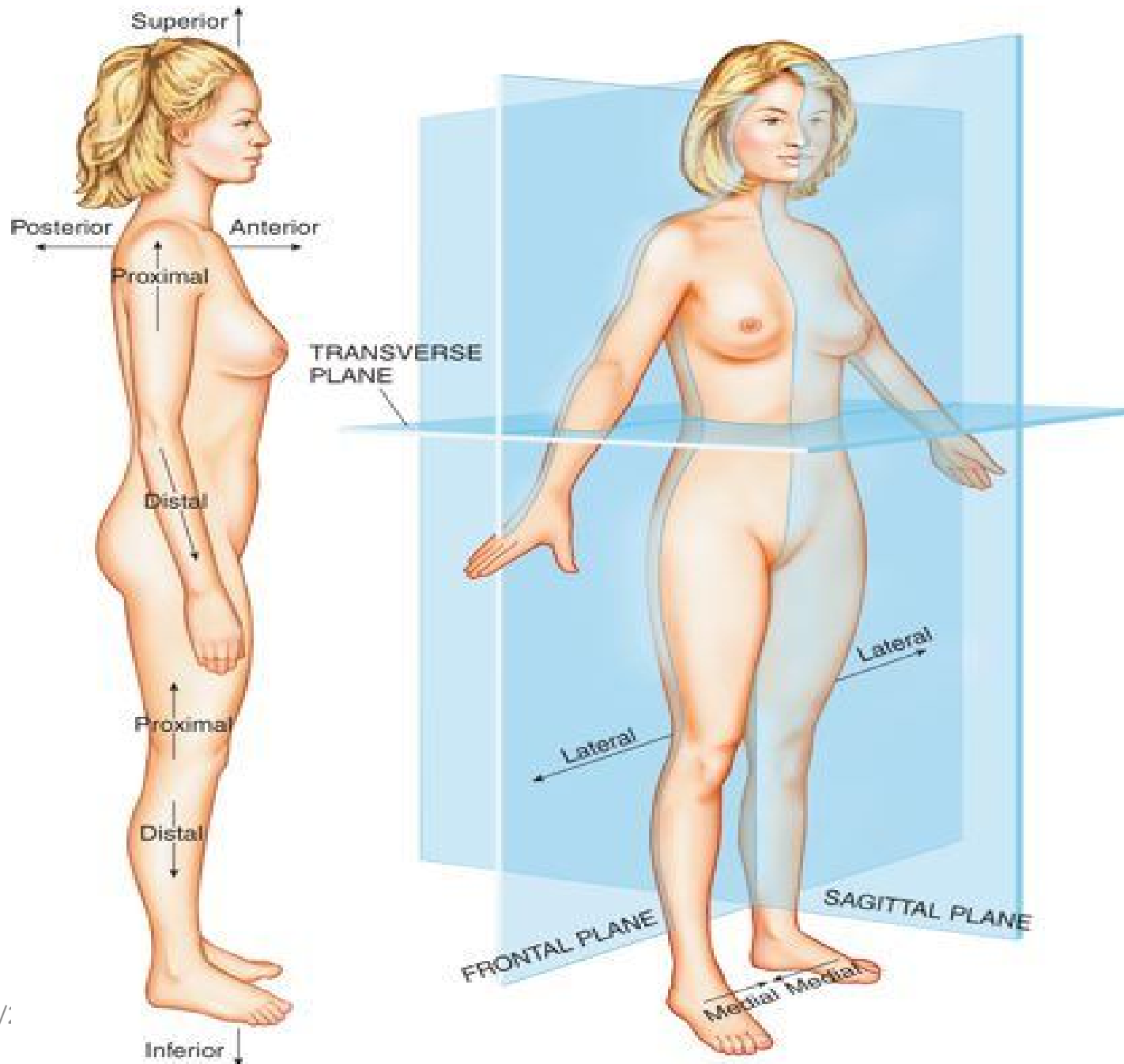
DIRECTIONS

- a. **Superior, Inferior**
- b. **Anterior, Posterior**
- c. **Medial, Lateral**
- d. **Superficial, Deep**
- e. **Proximal, Distal.** Proximal and distal are terms applied specifically to the limbs.

Sometimes proximal and distal are used to identify the "beginning" and "end" of the gut

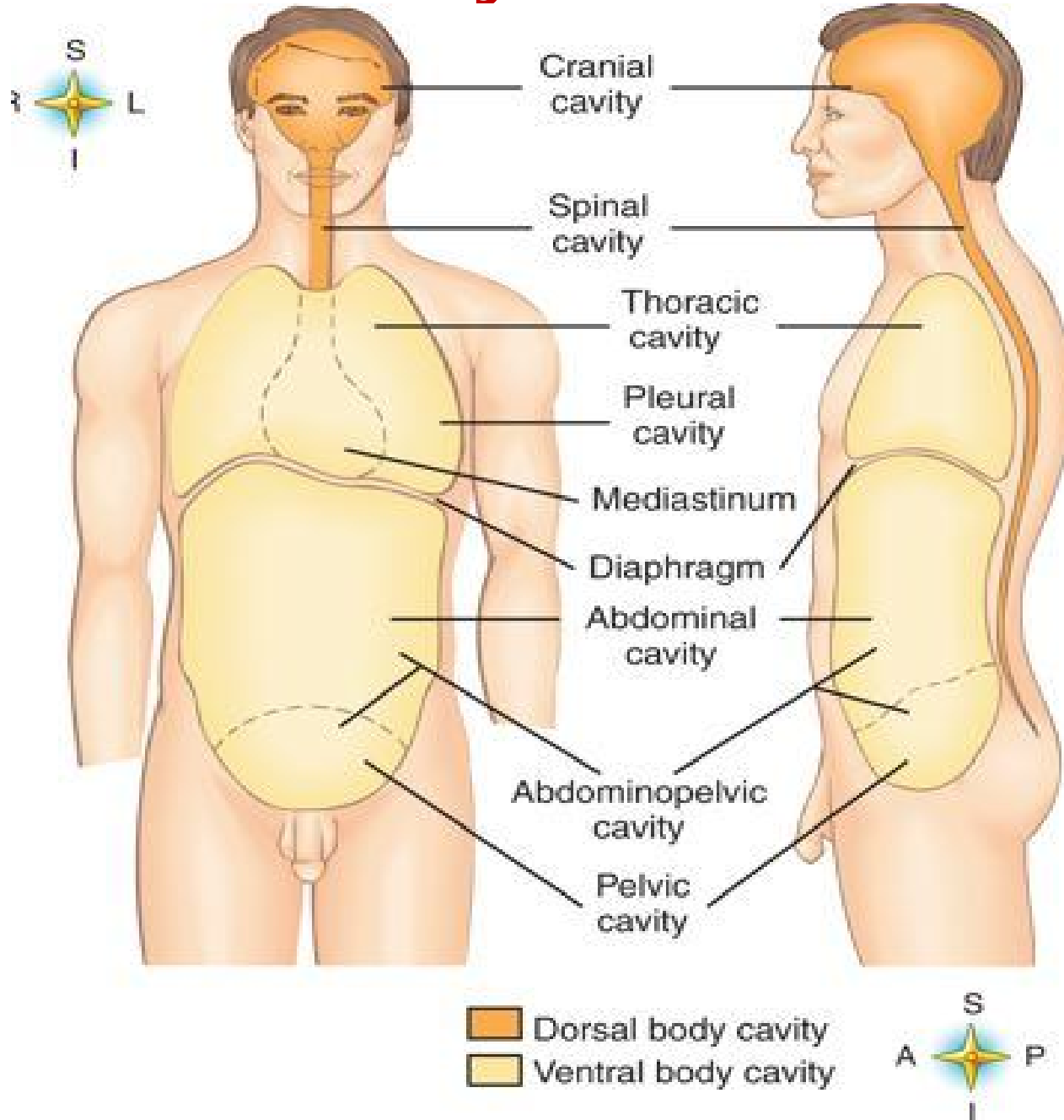
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Directions and Plans of the body



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Body cavities



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REGIONS OF THE HUMAN BODY

The human body is a single, total composite.

Everything works together.

Each part acts in association with ALL other parts. Yet, it is also a series of regions. Each region is responsible for certain body activities. These regions are:

Head and Neck

Torso - The torso includes the **back and trunk**.

Members (Limbs)

(1) Upper member

(2) Lower member

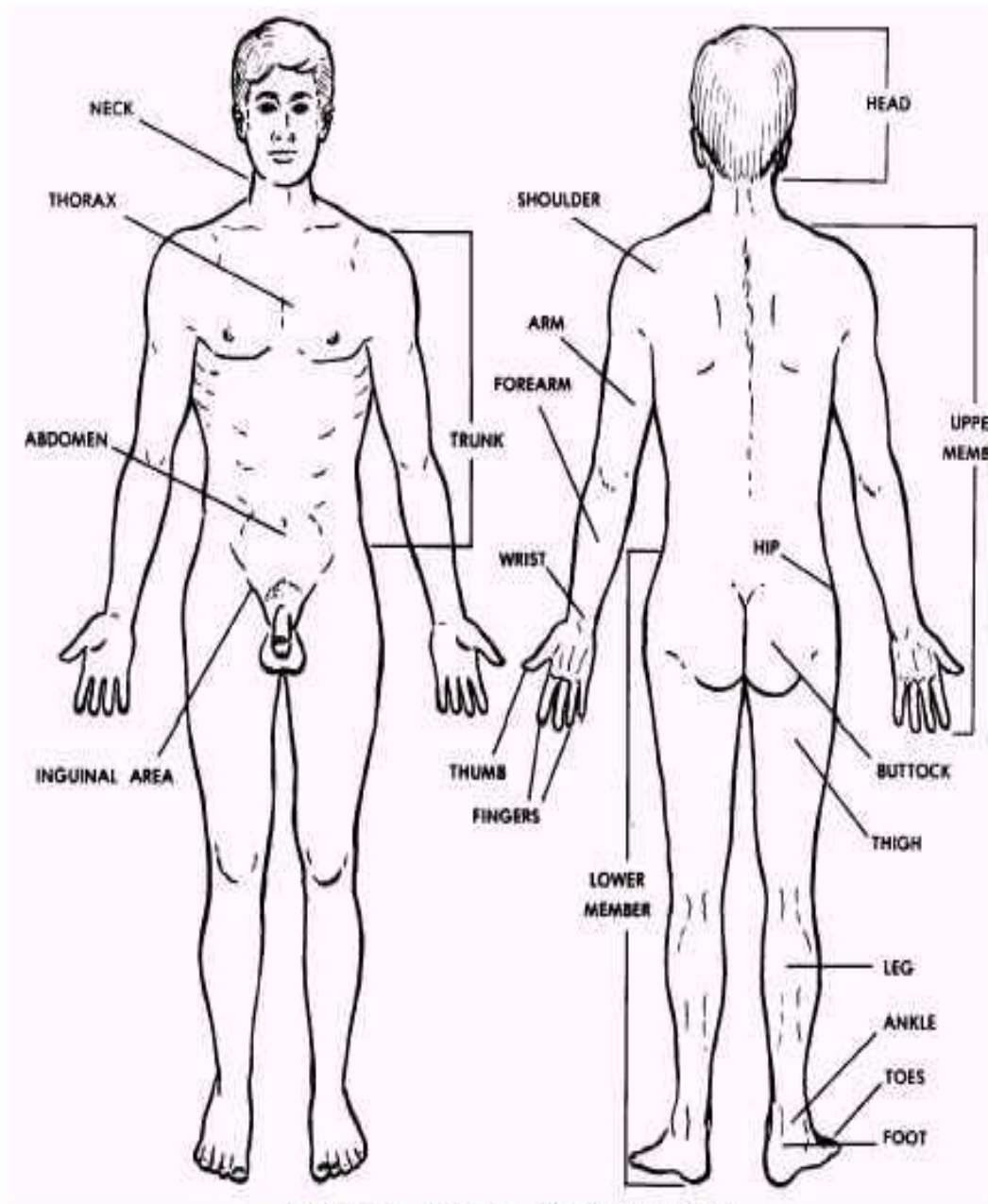
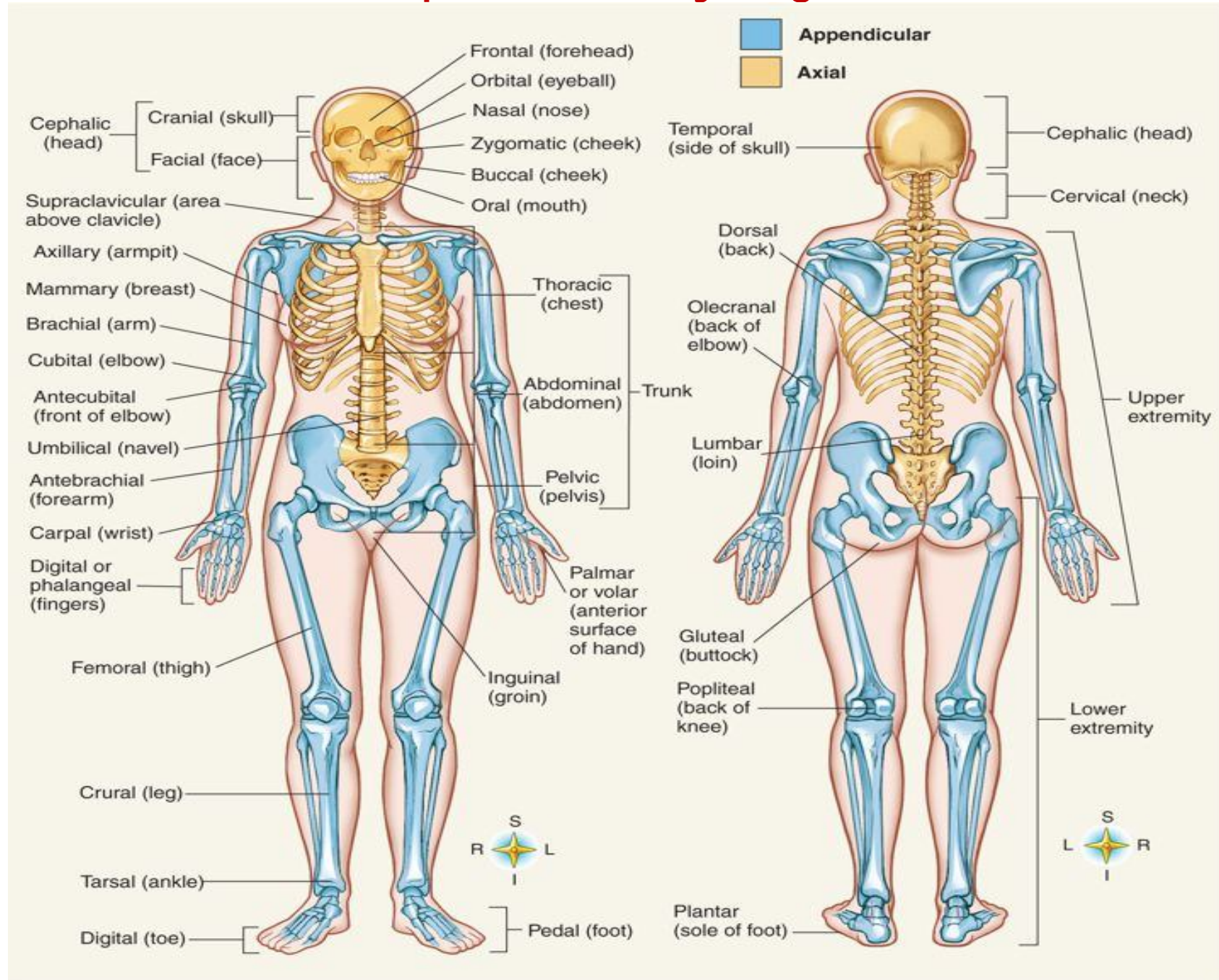


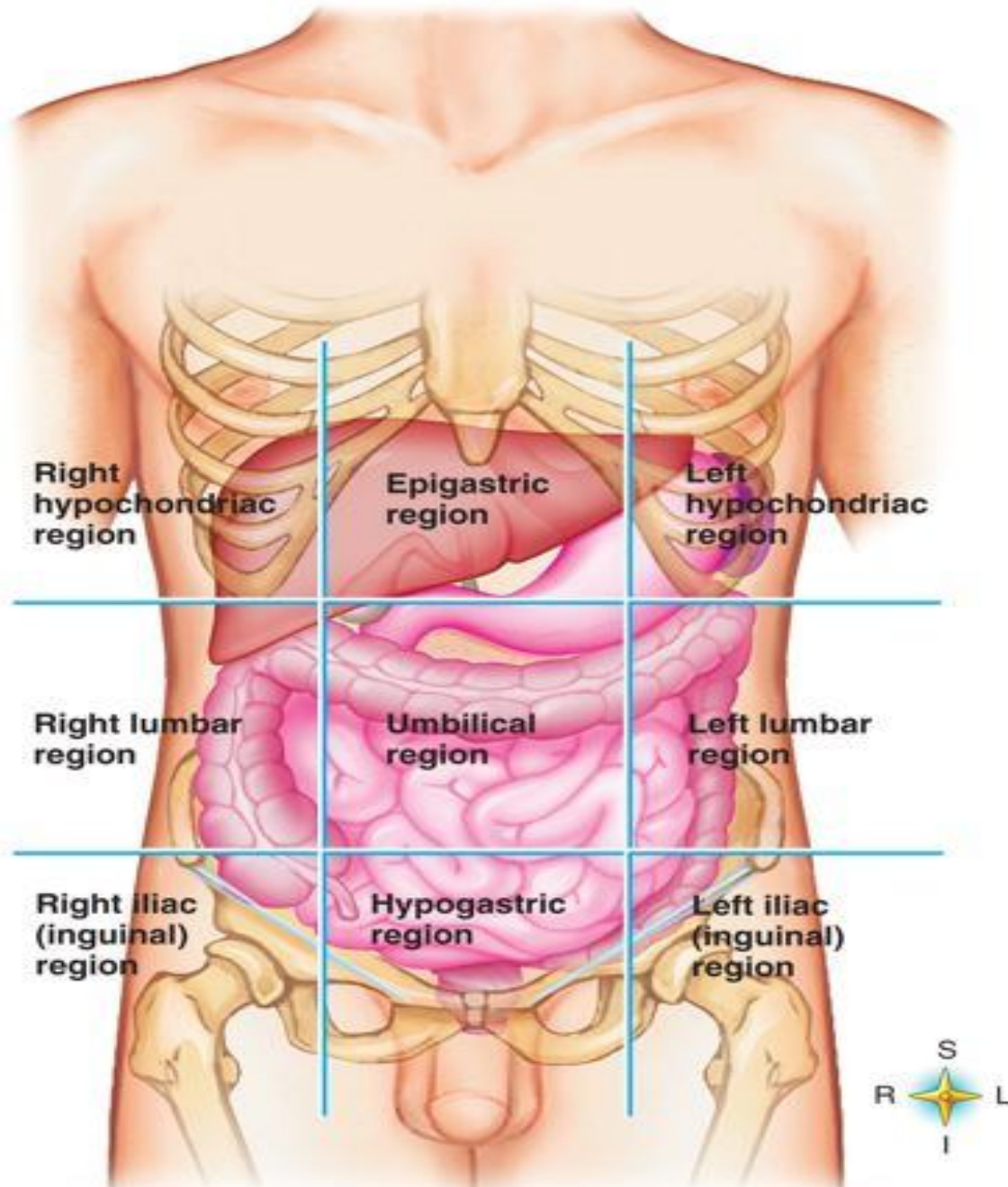
Figure 1-1. Regions of the human body.

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Specific body regions

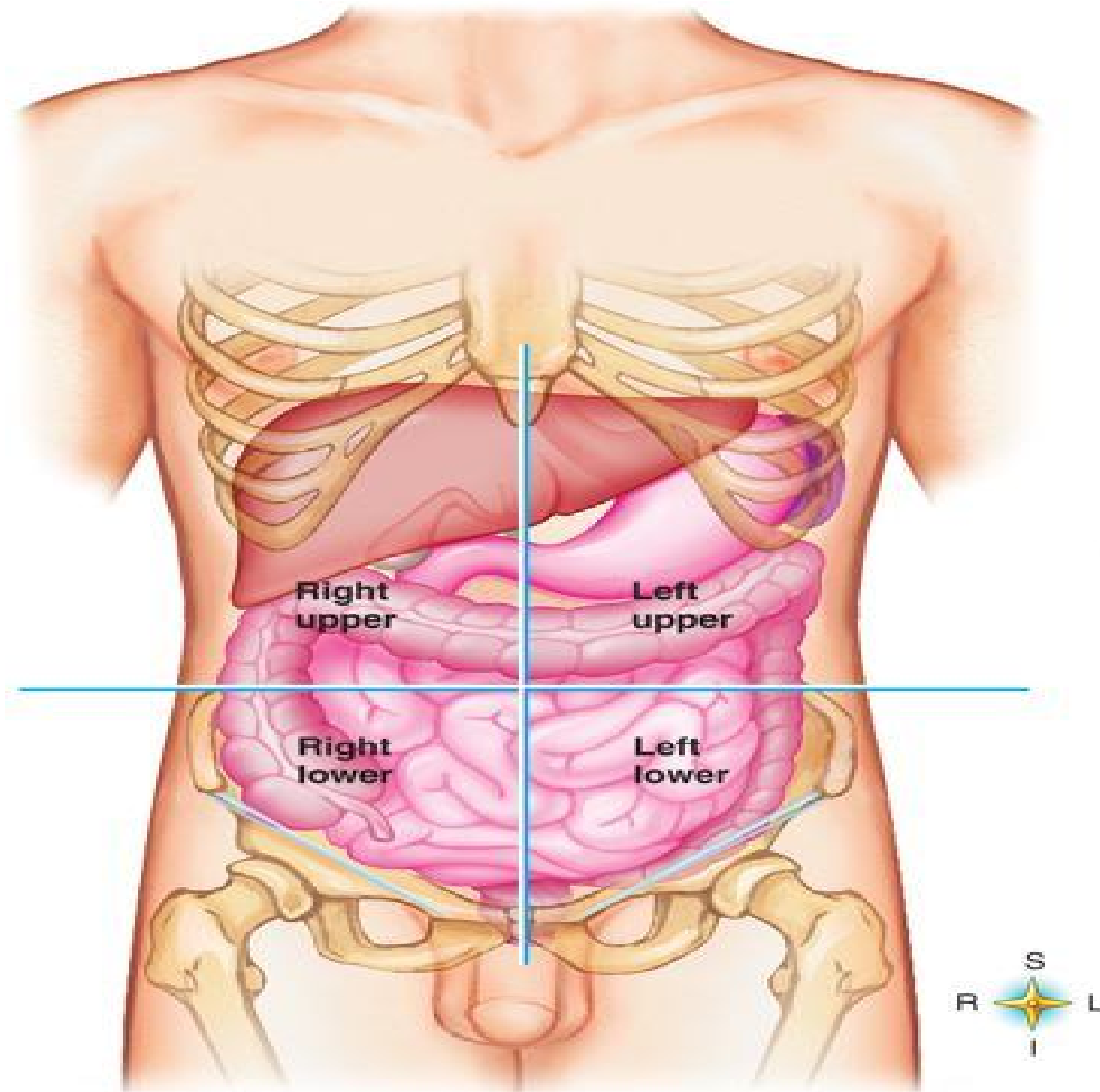


9 abdominal cavity regions



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4 regions of abdominal cavity



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ANATOMICAL TERMINOLOGY

- a. It is necessary to know anatomical/medical terminologies in order to be able to understand and communicate effectively in the medical field
- b. Scientific names have 2 or 3 parts – Prefix, Root or base and Suffix

SUB = below - prefix CUTIS = skin - root SUBCUTANEOUS = below the skin

A second example is the word myocardium.

MYO = muscle prefix CARDIUM = heart root MYOCARDIUM = muscular wall of the heart

A third example is the word tonsillitis.

TONSIL = tonsil (a specific organ) root ITIS = inflammation suffix

TONSILLITIS = an inflammation of the tonsils

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NOMENCLATURE

- a. Names are chosen to describe the structure or process as much as possible. An international nomenclature was adopted for anatomy in Paris in 1955. It does not use the names of people for structures. (The single exception is the Achilles tendon.)
- b. Names are chosen to identify structures properly. They identify structures according to **shape, size, color, function, and/or location**. eg

TRAPEZIUS MUSCLE TRAPEZIUS = trapezoid (shape)

ADDUCTOR MAGNUS MUSCLE AD = toward DUCT = to carry (function) MAGNUS = very large (size)

ERYTHROCYTE ERYTHRO = red (color) CYTE = cell

BICEPS BRACHII MUSCLE BI = two CEPS = head (shape)

BRACHII = of the arm (location)

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POSITIONS & MOVEMENTS

POSITIONS - Supine/Prone/Lateral Positions

MOVEMENTS

Supination / Pronation

Abduction / Adduction

Flexion/Extension

Rotation – medial/lateral

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INTRODUCTION TO CELLS BIOLOGY

A cell is the basic microscopic unit of body organization.

A typical animal cell includes a cell membrane, a nucleus, a nuclear membrane, cytoplasm, ribosomes, endoplasmic reticulum, mitochondria, Golgi apparatus, centrioles, and lysosomes.

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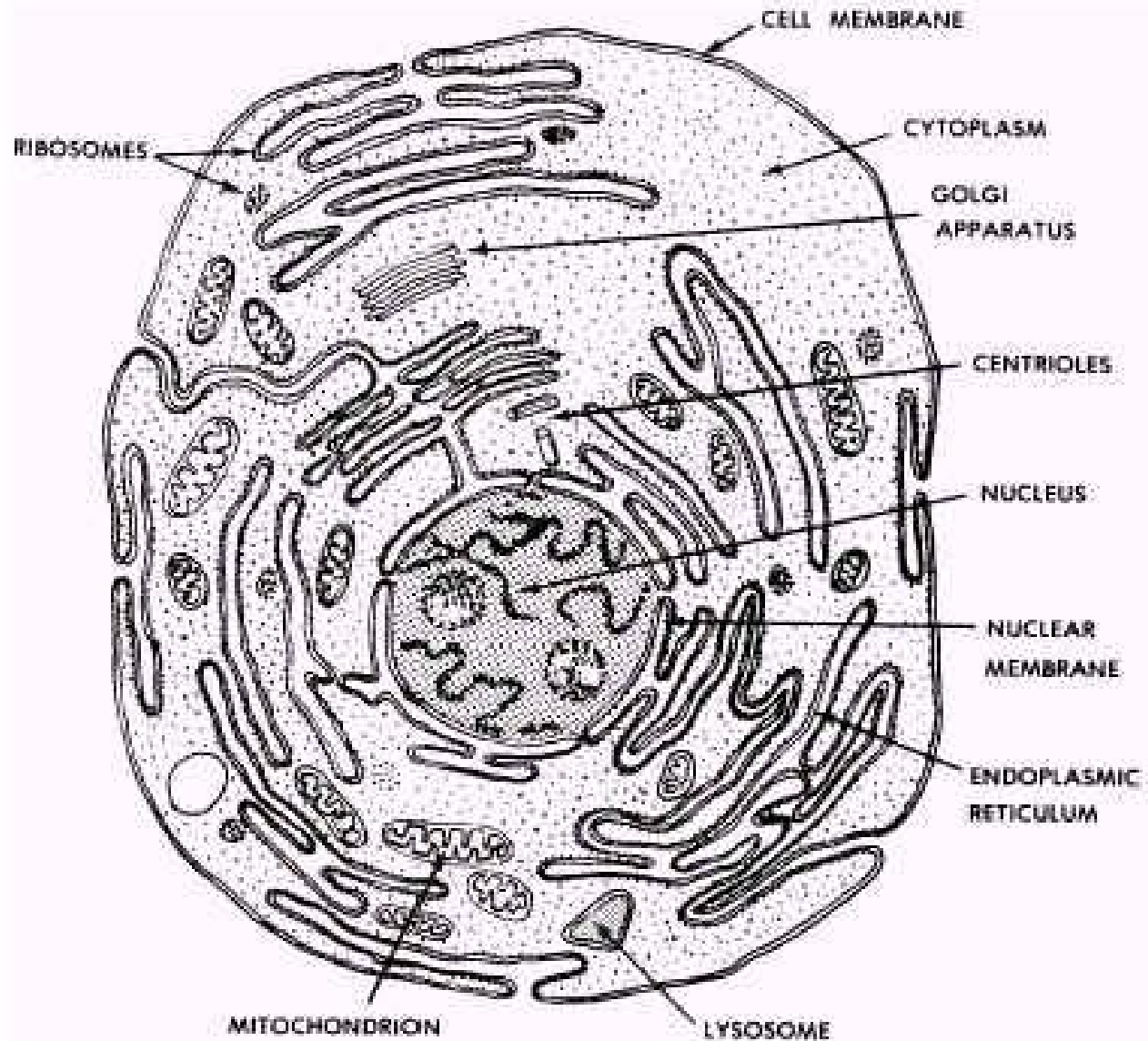


Figure 1-4. A "typical" animal cell (as seen in an electron microscope).

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- a. **Nucleus**. The nucleus plays a central role in the cell. Information is stored in the nucleus and distributed to guide the life processes of the cell. This information is in a chemical form called **nucleic acids**. Two types of structures found in the nucleus are **chromosomes** and **nucleoli**. Chromosomes can be seen clearly only during cell divisions. Chromosomes are composed of both nucleic acid and protein. Chromosomes contain **genes**. Genes are the basic units of heredity which are passed from parents to their children. Genes guide the activities of each individual cell.
- b. **Cell Membrane**. The cell membrane surrounds and separates the cell from its environment. The cell membrane allows certain materials to pass through it (semipermeable) as they enter or leave the cell.
- c. **Cytoplasm**. The semifluid found inside the cell, but outside the nucleus, is called the cytoplasm.

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- d. **Mitochondria (Plural)**. Mitochondria are the "powerhouses" of the cell. The mitochondria provide the energy wherever it is needed for carrying on the cellular functions.
- e. **Endoplasmic Reticulum**. The endoplasmic reticulum is a network of membranes, cavities, and canals. The endoplasmic reticulum helps in the transfer of materials from one part of the cell to the other.
- f. **Ribosomes**. Ribosomes are "protein factories" in the cell. They are composed mainly of nucleic acids which help make proteins according to instructions provided by the genes.
- g. **Centrioles**. Centrioles help in the process of cell division.
- h. **Lysosomes**. Lysosomes are membrane bound spheres which contain enzymes that can digest intracellular structures or bacteria.

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CELL DIVISION (MITOSIS)

Individual cells have fairly specific life spans. Some types of cells have longer life spans than others. During the processes of growth and repair, new cells are being formed. **The usual process of cell division is called mitosis.** There are two important factors to consider:

- a. From one cell, we get two new cells.
- b. The genes of the new cells are identical (for all practical purposes) to the genes of the original cell.

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HYPERTROPHY/HYPERPLASIA

Hypertrophy and hyperplasia are two ways by which the cell mass of the body increases.

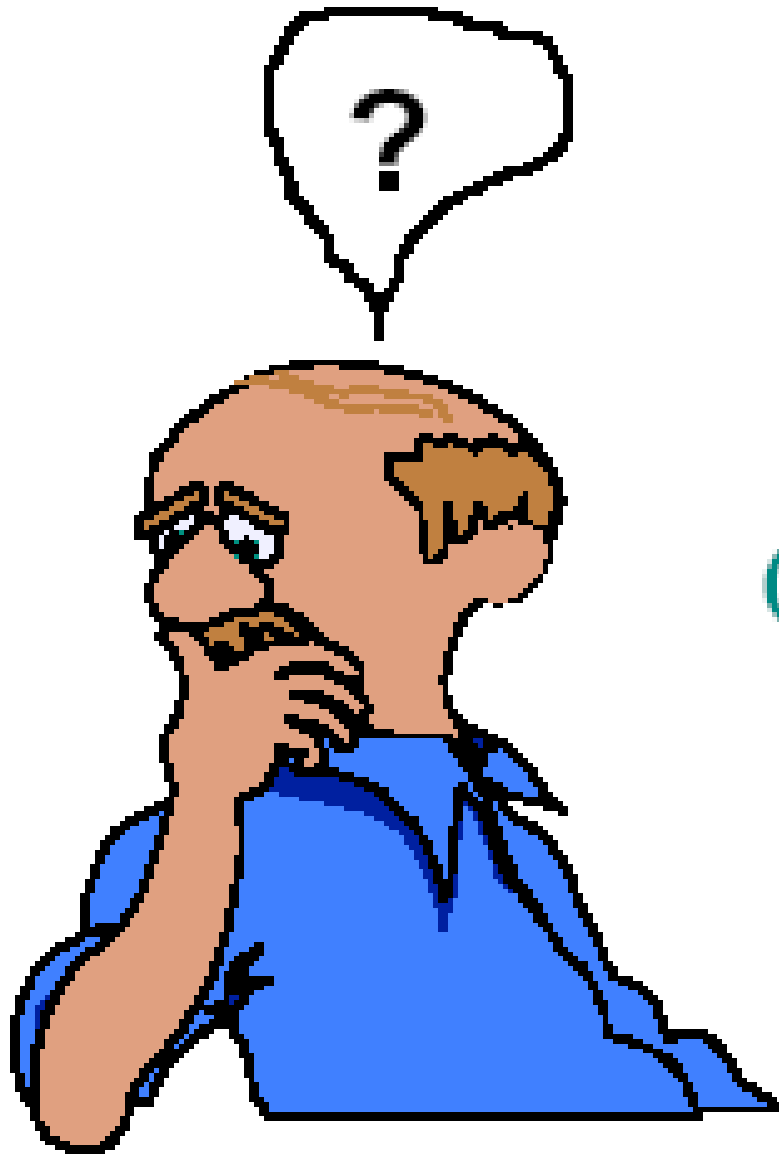
- a. **HYPERTROPHY** - Increase in the size of the individual cells. No new cells are formed. An example is the enlargement of muscles due to exercise by the increased diameter of the individual striated muscle fibers.
- b. **HYPERPLASIA** - there is an increase in the total number of cells. An example of abnormal hyperplasia is cancer.
- c. **ATROPHY** - Loss of cellular mass

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CONCLUSION

- ✓ Anatomy – definition and importance
- ✓ Body types
- ✓ Medical and anatomical terminologies
- ✓ Directions, Positions, Movements
- ✓ Organization of the human body – Regions and levels
- ✓ The cell – Structure
- ✓ Tissues, organs and systems

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Questions?

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