5a A&P:
Introduction to the Human Body - Cells

5a A&P:

Introduction to the Human Body - Cells

Class Outline

5 minutes	Attendance, Breath of Arrival, and Reminders
10 minutes	Lecture: AOIs of the erectors
5 minutes	Active study skills for AOIs of new muscles
25 minutes	Lecture:
15 minutes	Active study skills:
60 minutes	Total

5a A&P:

Introduction to the Human Body - Cells

Class Reminders

Additional Resources

- Log in to ABMP Exam Coach and become familiar with the Terminology sections

Assignments:

- 7a Review Questions (A: 119-130)

Quizzes and Written Exams:

- 6a Kinesiology Quiz (A: 73, and 75-80) Quiz given at the start of the A class!!
  - AOIs of deltoid, traps, lats, teres major, triceps, rhomboids, and erectors
  - Also definitions on A-51: anterior, posterior, lateral, medial, belly, tendon, action, origin, and insertion

Preparation for upcoming classes:

- 6a A&P: Introduction to the Human Body - Tissues
  - Trail Guide: gluteals
  - Salvo: pages 391-398
  - Packet E: 7-10
  - RQ Packet A-129

- 6b Swedish: Technique Review and Practice - Posterior Upper Body
  - Packet F: 29-30

Classroom Rules

Punctuality - everybody's time is precious

- Be ready to learn at the start of class; we'll have you out of here on time
- Tardiness: arriving late, returning late after breaks, leaving during class, leaving early

The following are not allowed:

- Bare feet
- Side talking
- Lying down
- Inappropriate clothing
- Food or drink except water
- Phones that are visible in the classroom, bathrooms, or internship

You will receive one verbal warning, then you'll have to leave the room.

Classroom Rules

Cell Phones – Turn it off!



And put it away!

Bony Landmarks – Introduction to Terminology

Helpful terms to become acquainted with as we get started learning muscle attachments and actions:

- **Condyle**
  Rounded projection that forms a joint .
- **Fossa**
  Shallow depression in a bone.
- **Head**
  Rounded end of a bone. Example: head of the humerus.
- **Process**
  General term for any prominence or prolongation from a bone.
- **Tuberosity**
  Large , rounded rough projection.

Bony Landmarks – Introduction to Terminology



Humerus

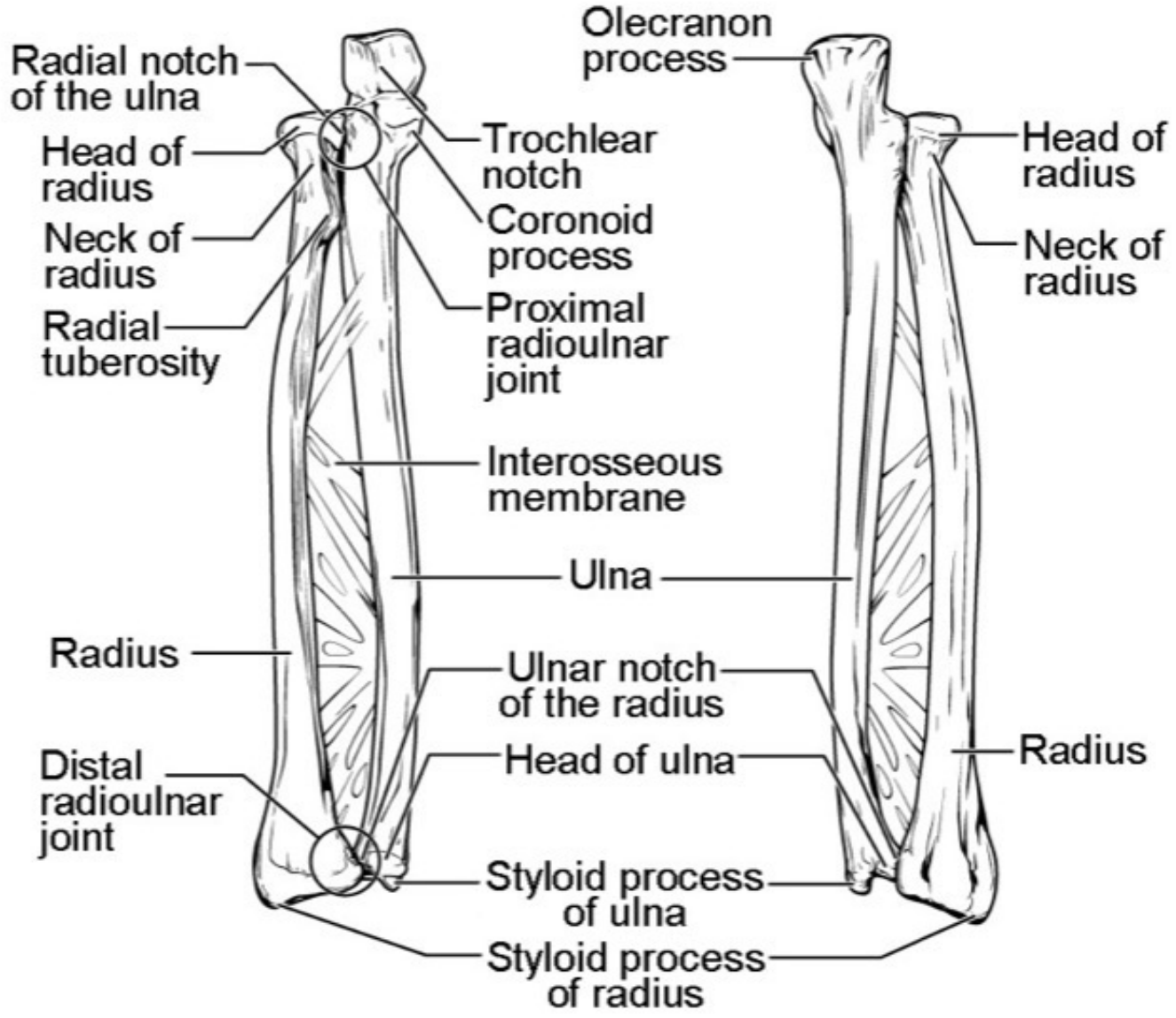
Anatomical neck
Greater tubercle
Head
Greater tubercle
Lesser tubercle
Surgical neck
Intertubercular groove (sulcus)
Deltoid tuberosity
Body (shaft)
Lateral supracondylar ridge
Olecranon fossa
Lateral epicondyle
Radial fossa
Coronoid fossa
Capitulum
Medial epicondyle
Olecranon of ulna
Head of radius
Trochlea
Head of radius
Coronoid process of ulna

Anterior view

Posterior view

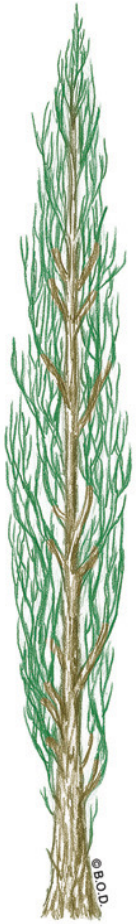
Bony Landmarks – Introduction to Terminology

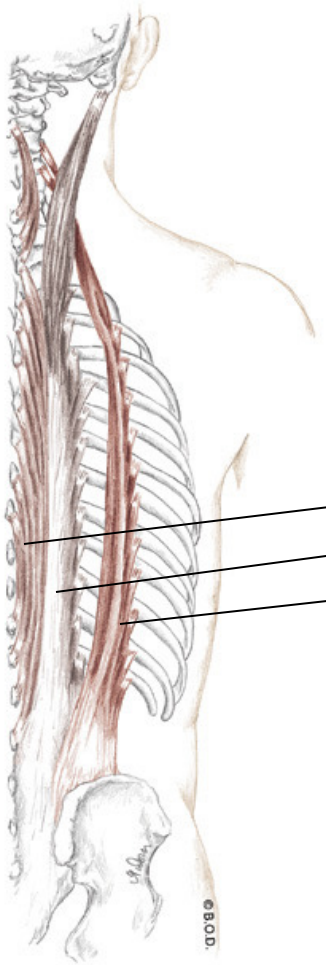




Erector Spinae Group

Trail Guide, Page 196





Posterior View

The erector spinae group runs from the sacrum to the occiput.

Erectors have a dense, layered arrangement similar to that of a poplar tree.

The erector group consists of the:

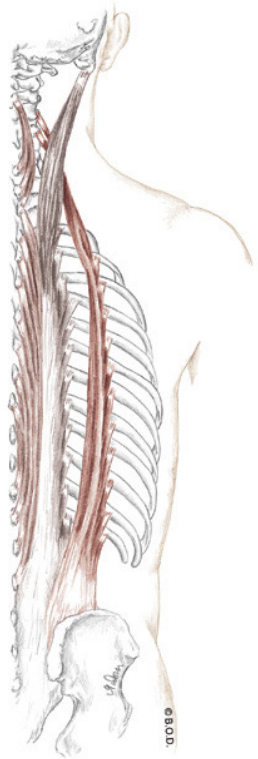
- Spinalis
- Longissimus
- Iliocostalis

When do you use your erectors?

Actions of the erector spinae group



Lateral flexion of the vertebral column to the same side



Erector spinae group
Posterior View



Extension of the vertebral column

Spinalis, page 197

A *Unilaterally*:

Laterally flex vertebral column to the same side

Bilaterally:

Extend the vertebral column

O Spinous processes of:

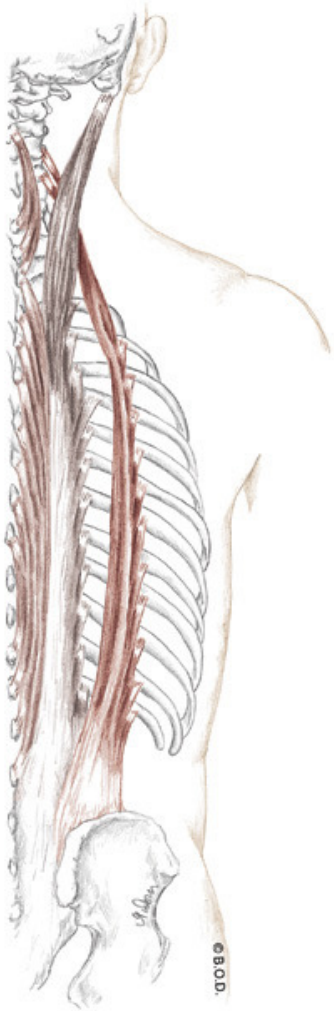
- C7 vertebrae
- Upper lumbar vertebrae
- Lower thoracic vertebrae

Ligamentum nuchae

I Spinous processes of:

- Upper thoracic vertebrae
- Cervical vertebrae





Posterior View

Spinalis, page 197

A *Unilaterally*:
Laterally flex vertebral column to the same side

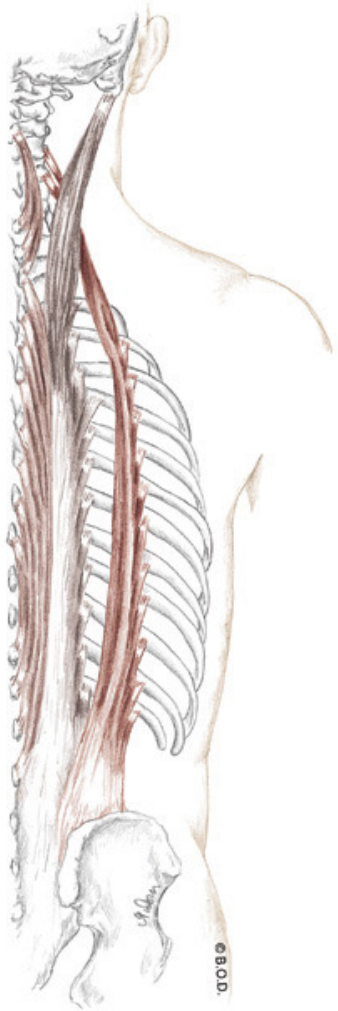
Bilaterally:
Extend the vertebral column

O Spinous processes of:
- C7 vertebrae
- Upper lumbar vertebrae
- Lower thoracic vertebrae

Ligamentum nuchae

I Spinous processes of:
- Upper thoracic vertebrae
- Cervical vertebrae





Posterior View

Spinalis, page 197

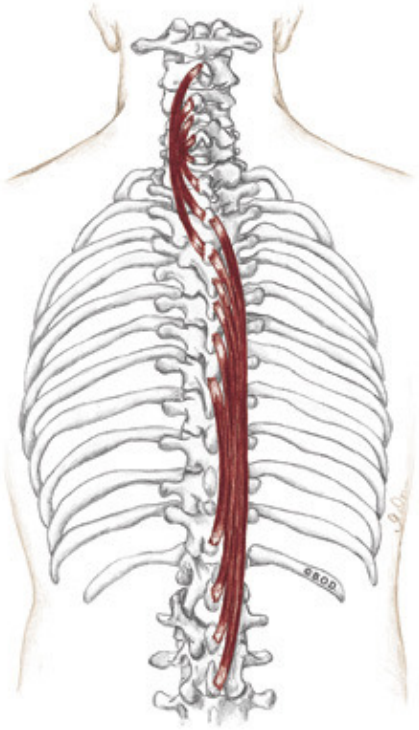
A *Unilaterally*:
Laterally flex vertebral column to the same side

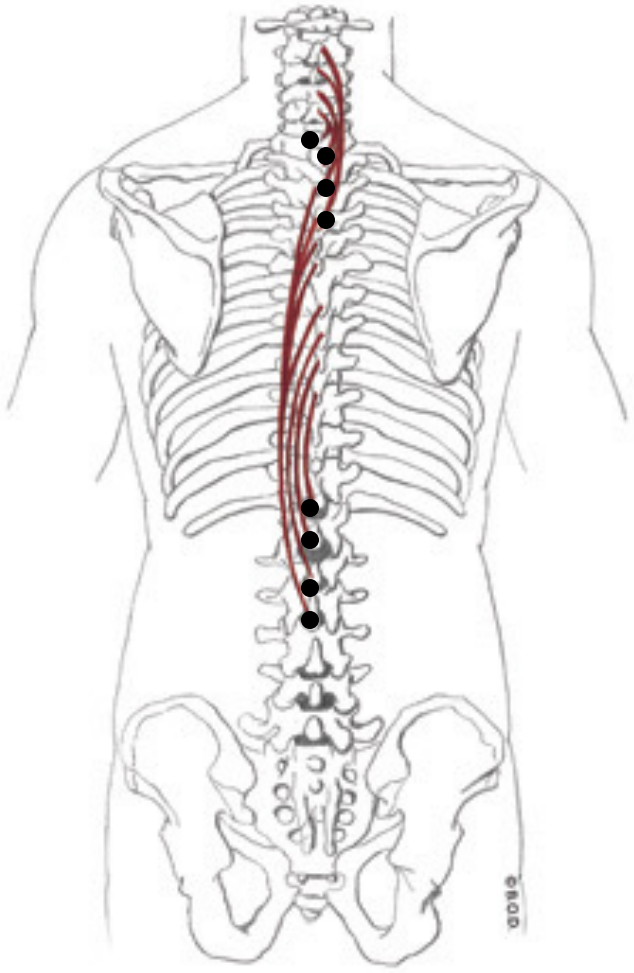
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- Upper lumbar vertebrae
- Lower thoracic vertebrae

Ligamentum nuchae

I
Spinous processes of:
- Upper thoracic vertebrae
- Cervical vertebrae





Posterior View

Spinalis, page 197

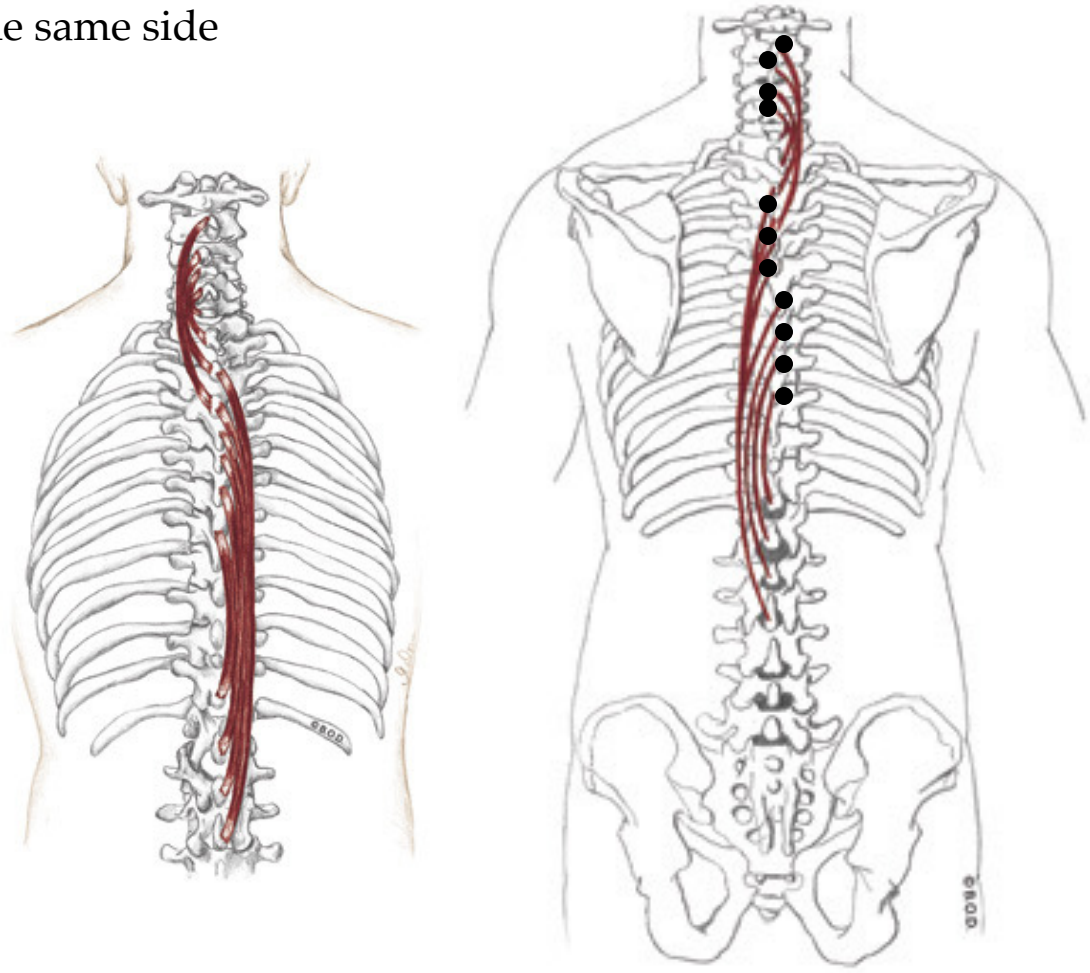
A *Unilaterally*:
Laterally flex vertebral column to the same side

Bilaterally:
Extend the vertebral column

O Spinous processes of:
- C7 vertebrae
- Upper lumbar vertebrae
- Lower thoracic vertebrae

Ligamentum nuchae

I Spinous processes of:
- Upper thoracic vertebrae
- Cervical vertebrae



Posterior View

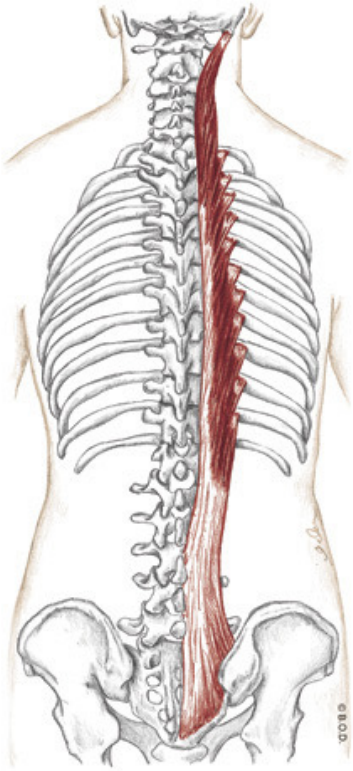
Longissimus, page 198

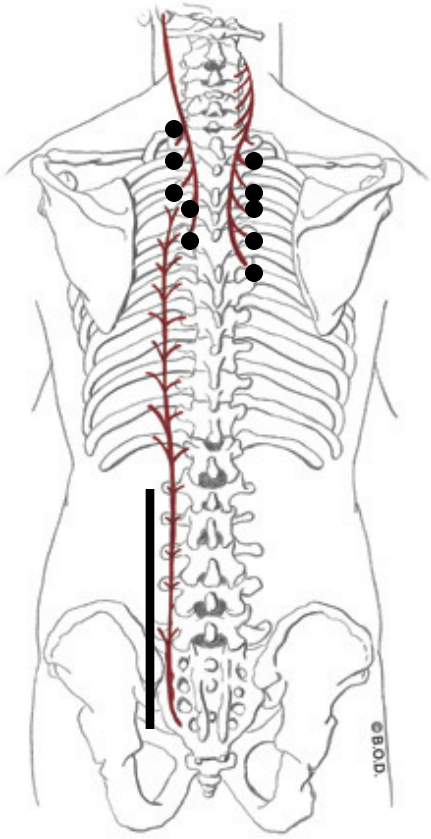
A *Unilaterally*:
Laterally flex vertebral column to the same side

Bilaterally:
Extend the vertebral column

O
Common tendon (thoracis)
Transverse processes of upper five thoracic vertebrae (cervicis and capitis)

I
Lower nine thoracic ribs (thoracis)
Lower nine thoracic transverse processes (thoracis)
Cervical transverse processes (cervicis)
Mastoid process of temporal bone (capitis)





Posterior View

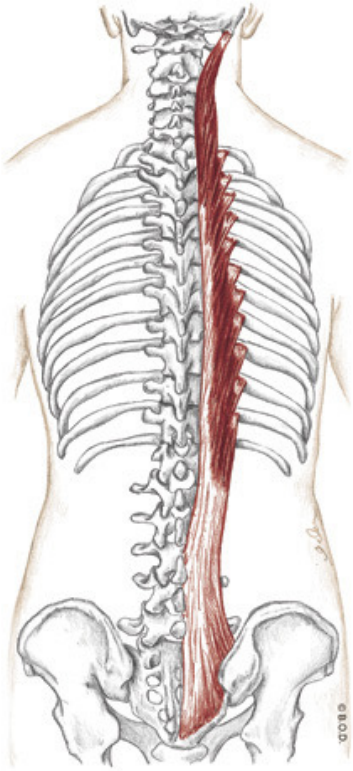
Longissimus, page 198

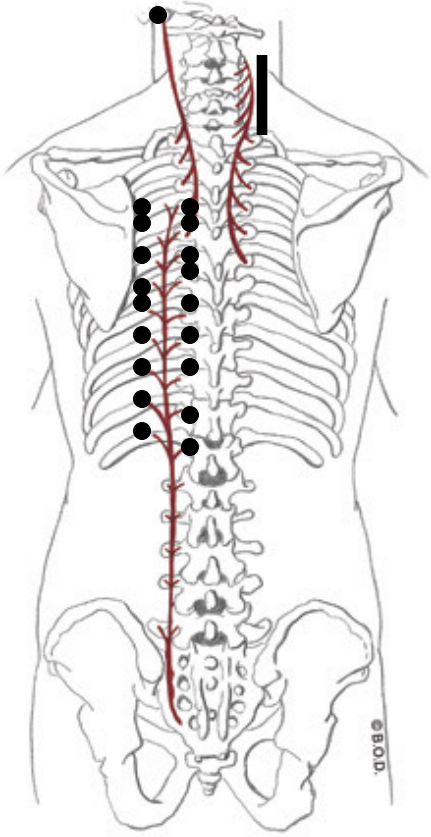
A *Unilaterally*:
Laterally flex vertebral column to the same side

Bilaterally:
Extend the vertebral column

O Common tendon (thoracis)
Transverse processes of upper five thoracic vertebrae (cervicis and capitis)

I Lower nine thoracic ribs (thoracis)
Lower nine thoracic transverse processes (thoracis)
Cervical transverse processes (cervicis)
Mastoid process of temporal bone (capitis)





Posterior View

Iliocostalis, page 198

A

Unilaterally:
Laterally flex vertebral column to the same side

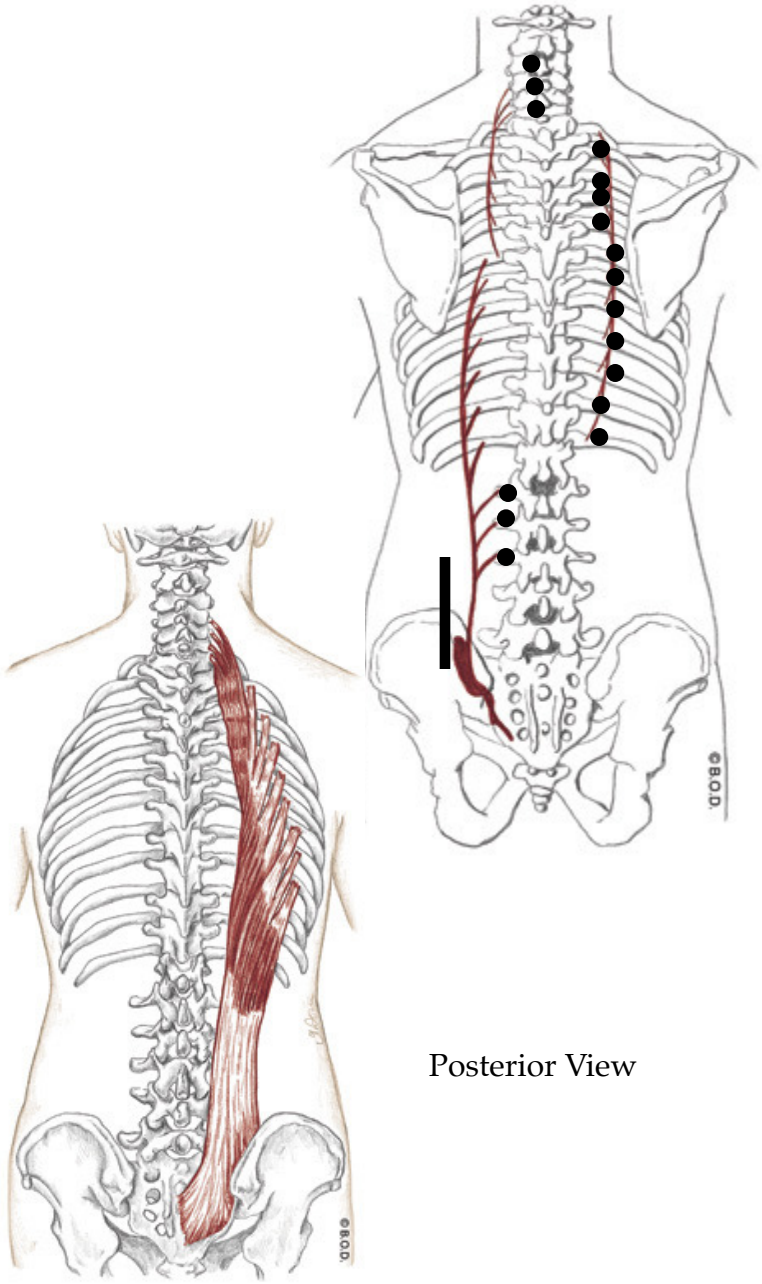
Bilaterally:
Extend the vertebral column

O

Common tendon (lumborum)
Posterior surface of ribs 1-12 (thoracis and cervicis)

I

Transverse processes of lumbar vertebrae 1-3 (thoracis)
Posterior surface of ribs 6-12 (lumborum)
Posterior surface of ribs 1-6 (thoracis)
Transverse processes of lower cervicals (cervicis)



Posterior View

Iliocostalis, page 198

A

Unilaterally:
Laterally flex vertebral column to the same side

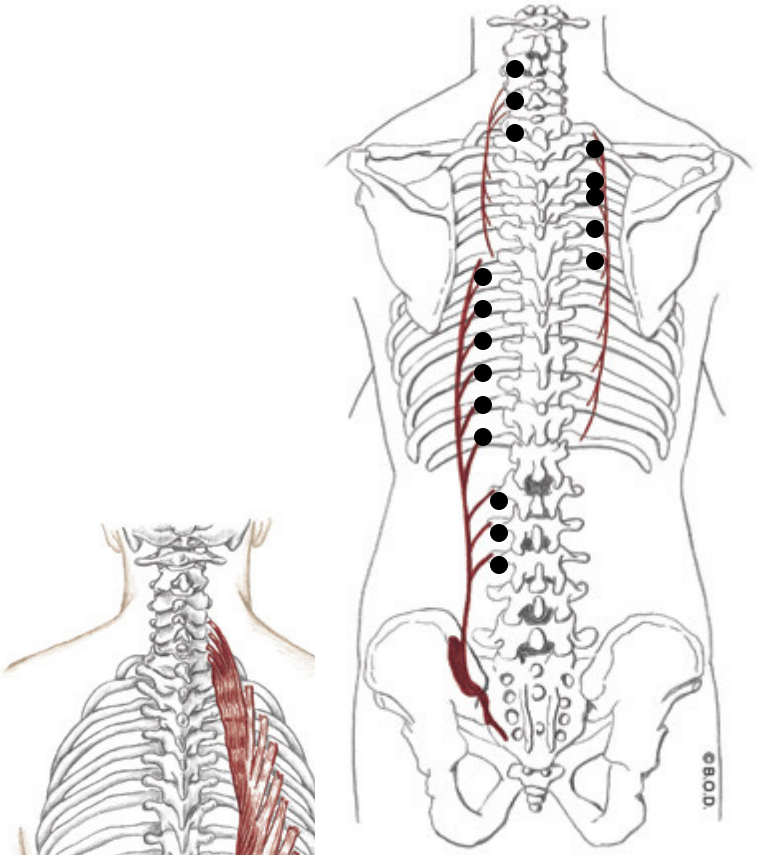
Bilaterally:
Extend the vertebral column

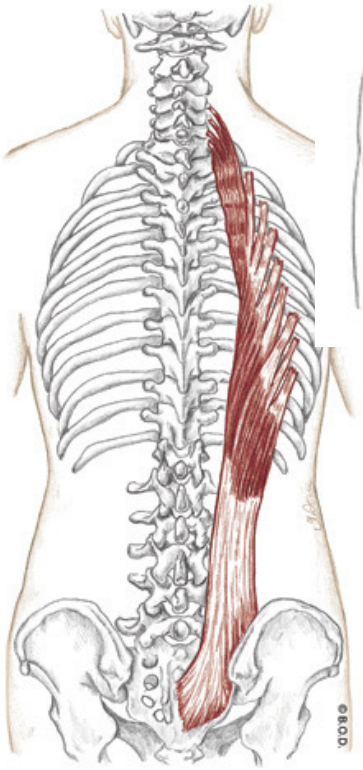
O

Common tendon (lumborum)
Posterior surface of ribs 1-12 (thoracis and cervicis)

I

Transverse processes of lumbar vertebrae 1-3 (thoracis)
Posterior surface of ribs 6-12 (lumborum)
Posterior surface of ribs 1-6 (thoracis)
Transverse processes of lower cervicals (cervicis)





Posterior View

More Knowledgeable Other

MKO A person who has a better understanding or a higher ability level than the learner, with respect to a particular task, process, or concept. Examples: instructors, assistant instructors, and classmates!

Possible subjects

- Anatomy & Physiology
- Business
- Massage
- Et cetera . . .

5a A&P:

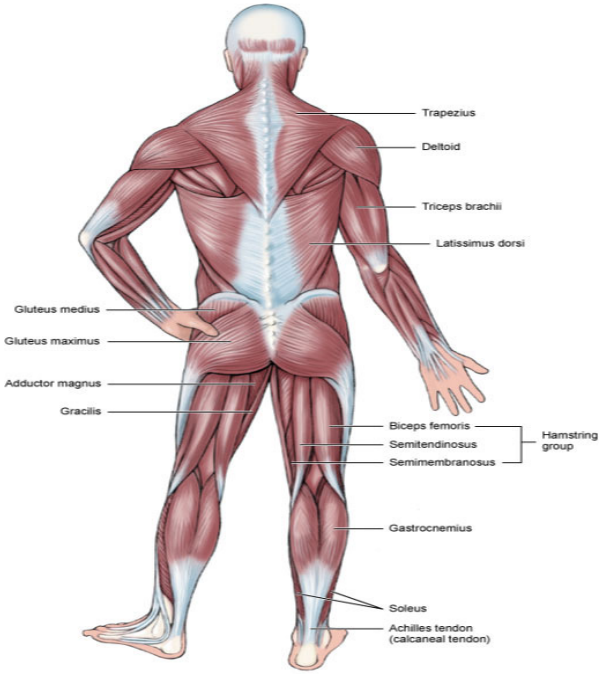
Introduction to the Human Body - Cells

E-3

Anatomy and Physiology

Anatomy and Physiology

Anatomy The study of the __structures__ of the human body and their positional relationship to one another.



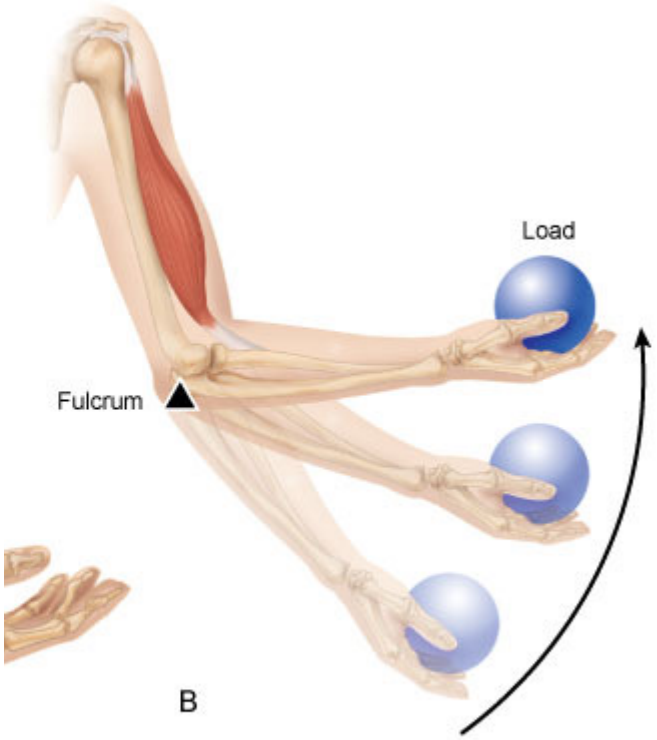
B **Posterior View**

From Herlihy B: *The human body in health and illness*, ed 4, St. Louis, 2011, Saunders.

Fig. 21-41. **cont'd.**

Anatomy and Physiology

Physiology The study of how the body and its individual parts __function__ in normal body processes.



Anatomy and Physiology

Pathology (AKA: pathophysiology) The study of the process of ___disease___.

Fill in the Blanks

1. Anatomy = _____.

2. Physiology = _____.

3. Pathology = _____.

Fill in the Blanks

1. Anatomy = __structure__.

2. Physiology = __function__.

3. Pathology = __disease__.

Terminology

Vocabulary Builder: Prefixes

PREFIX	MEANING	EXAMPLE
Cyto-	cell	cytoplasm
Endo-	within, inside	endocytosis
Trans-	across, over, beyond, through	transcytosis

Levels of Organization

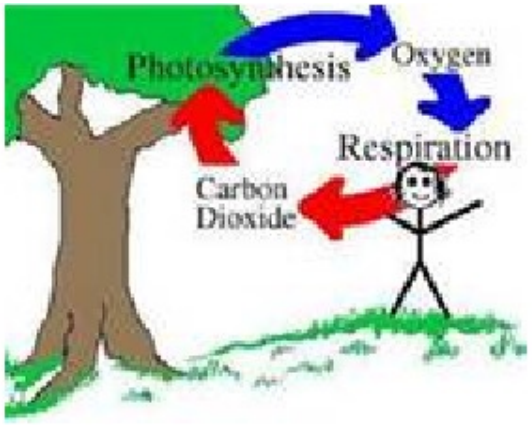
Chemical level
Cellular level
Tissue level
Organ level
Organ System level
Organism level

Levels of Organization

Chemical level Chemical elements that make up the body.

Examples: *water*, *oxygen*, iron, and *DNA*.







Levels of Organization

Cellular level Cells are composed of organelles. Perform functions vital to life.

Examples: skins cells, blood cells, muscle cells, and nerve cells.

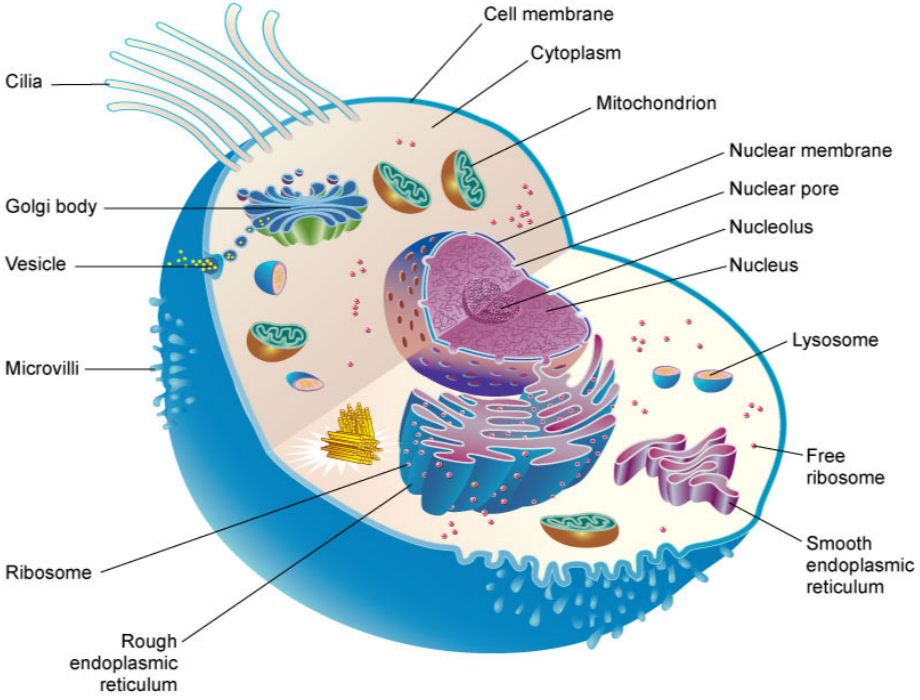


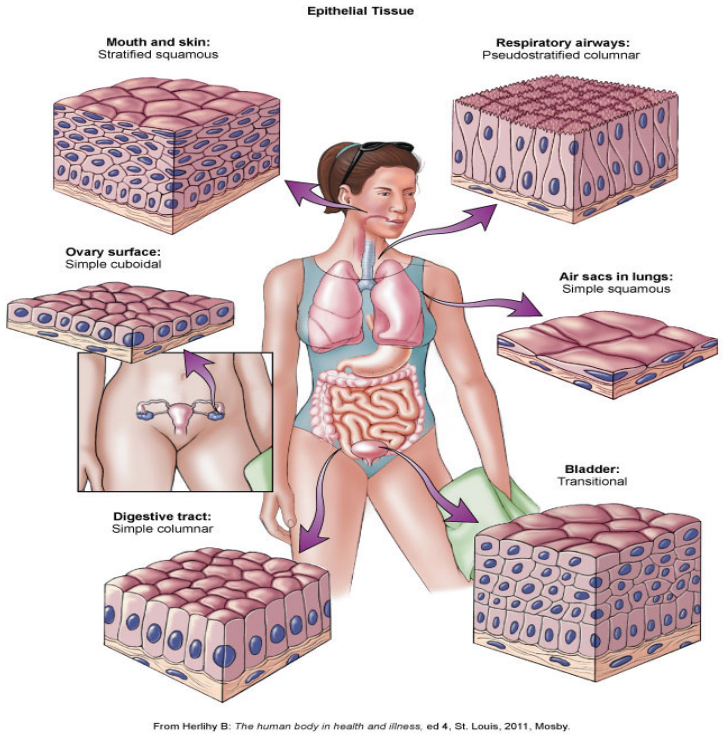
Fig. 18-2. A cell.

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Levels of Organization

Tissue level Group of __cells__ that perform specific functions.

Examples: *epithelial*, connective, muscle, and nervous.



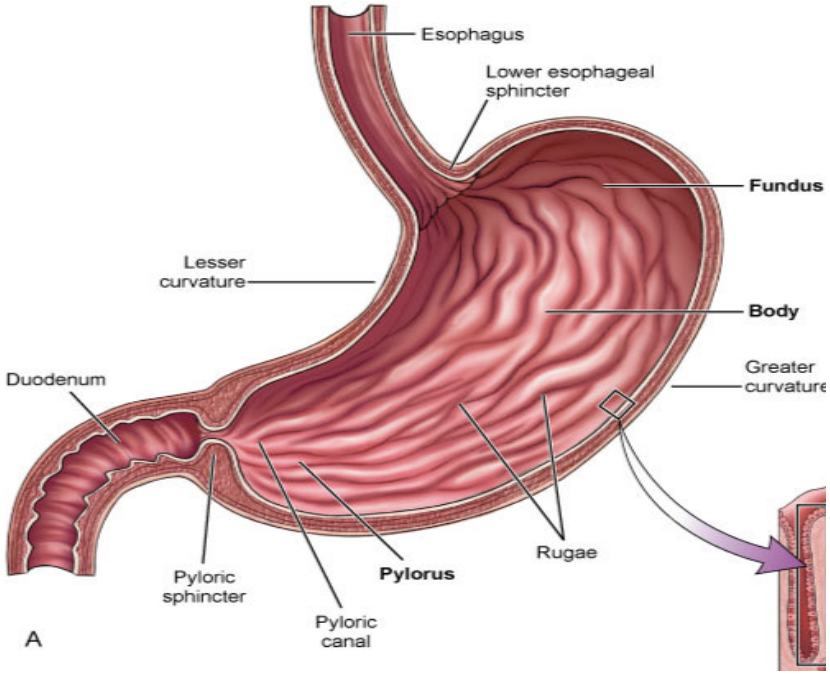
From Herlihy B: *The human body in health and illness*, ed 4, St. Louis, 2011, Mosby.

Fig. 18-9. Types of locations of epithelium.

Levels of Organization

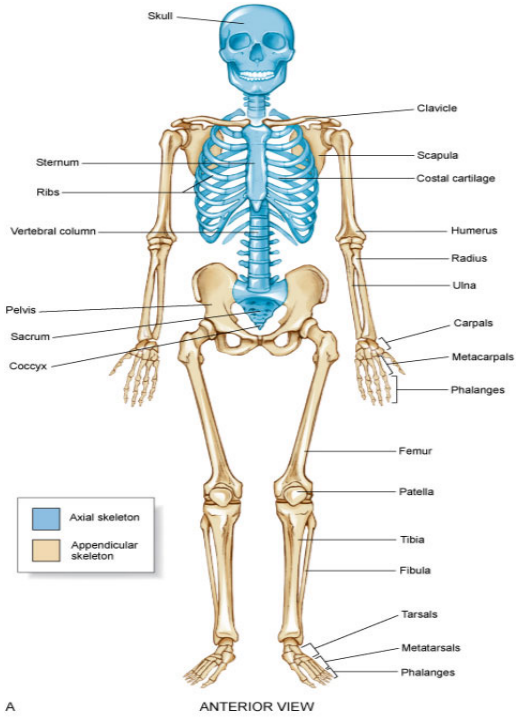
Organ level Two or more specialized groups of __tissues__, with specific functions.

Examples: *stomach*, brain, and lungs.



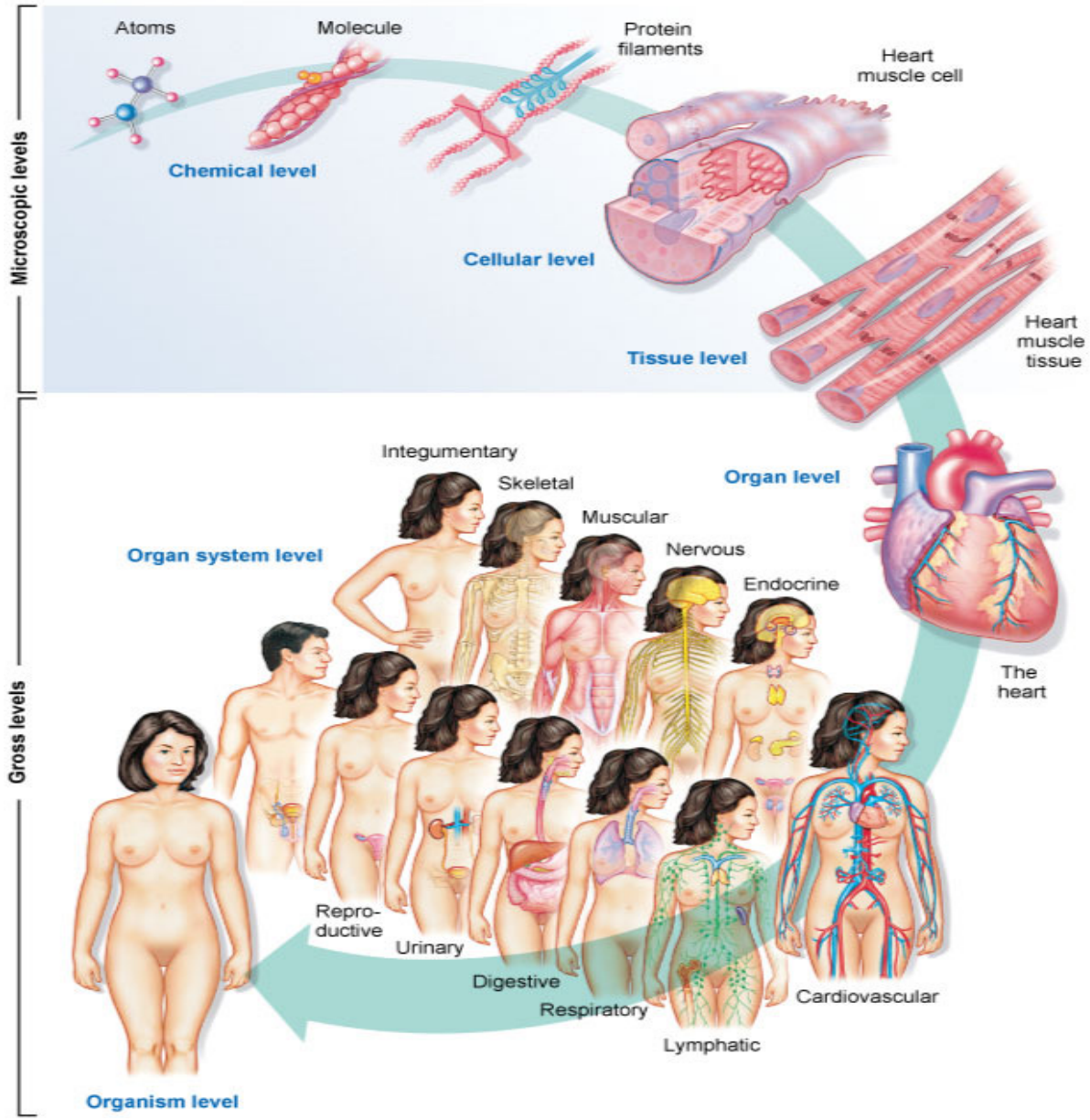
Levels of Organization

Organ system level Related organs with complementary functions arrange themselves into organ systems that can perform certain necessary tasks. Examples: skeletal, muscular, cardiovascular, and lymphatic.



Levels of Organization

Organism level Highest level of organization, representing living entities composed of several organ systems. The total of all structures and functions is a living individual.


Microscopic levels
Gross levels
Atoms
Molecule
Protein filaments
Heart muscle cell
Chemical level
Cellular level
Tissue level
Heart muscle tissue
Integumentary
Skeletal
Muscular
Nervous
Endocrine
Organ level
Organ system level
The heart
Repro-ductive
Urinary
Digestive
Respiratory
Cardiovascular
Lymphatic
Organism level

Response Moment



House (organism level)

Response Moment



Rooms (organ system level)

House (organism level)

Response Moment



Walls (organ level)

Rooms (organ system level)

House (organism level)

Response Moment

Wood and nails (tissue level)

Walls (organ level)

Rooms (organ system level)

House (organism level)



Response Moment

Cellulose and steel (cellular level)

Wood and nails (tissue level)

Walls (organ level)

Rooms (organ system level)

House (organism level)



Response Moment

Carbon, hydrogen, oxygen, and iron (chemical level)

Cellulose and steel (cellular level)

Wood and nails (tissue level)

Walls (organ level)

Rooms (organ system level)

House (organism level)



Fill in the Blanks

1. Chemical elements = _____ level

2. Perform functions vital to life = _____ level

3. Groups of cells = _____ level

4. Groups of tissues = _____ level

5. Related organs = organ _____ level

6. Highest level of organization = _____ level

Fill in the Blanks

1. Chemical elements = __chemical__ level

2. Perform functions vital to life = __cellular__ level

3. Groups of cells = __tissue__ level

4. Groups of tissues = __organ__ level

5. Related organs = organ __system__ level

6. Highest level of organization = __organism__ level

Cell Anatomy

Cell
Cell membrane
Cytoplasm
Organelle

Cell Anatomy

Cell Fundamental unit of all living organisms and the simplest form of life, that can exist as a self-sustaining unit.

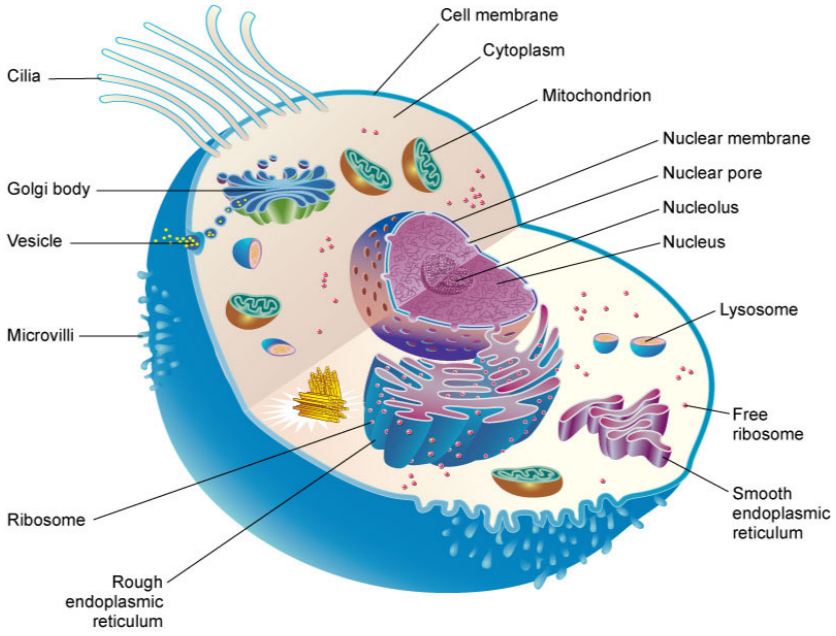


Fig. 18-2. A cell.

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Cell Anatomy

Cell membrane Semi-permeable membrane that separates cytoplasm from the surrounding external environment. Governs exchange of __nutrients__ and waste materials.

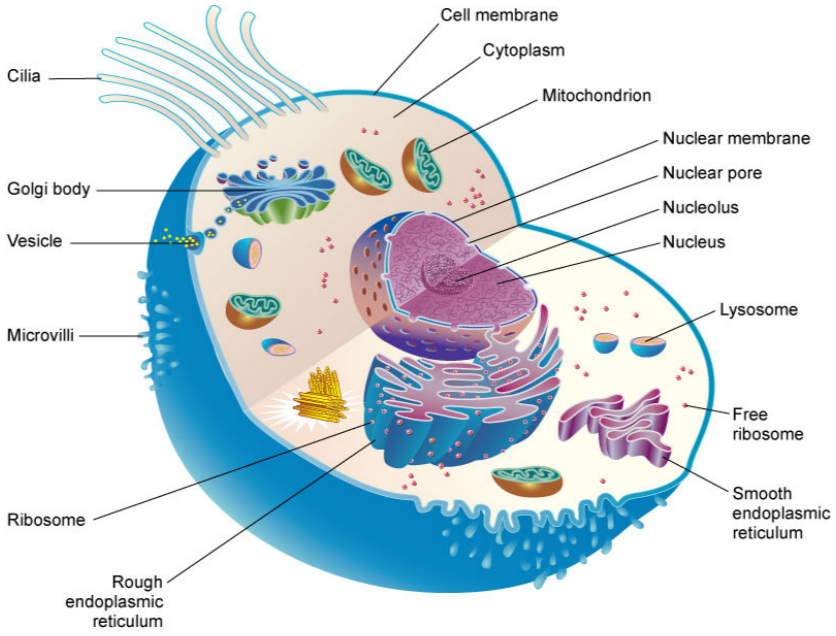


Fig. 18-2. A cell.

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Cell Anatomy

Cytoplasm Gel-like fluid within the cell membrane in which organelles float.

Provides cellular __nutrition__ and supports organelles.

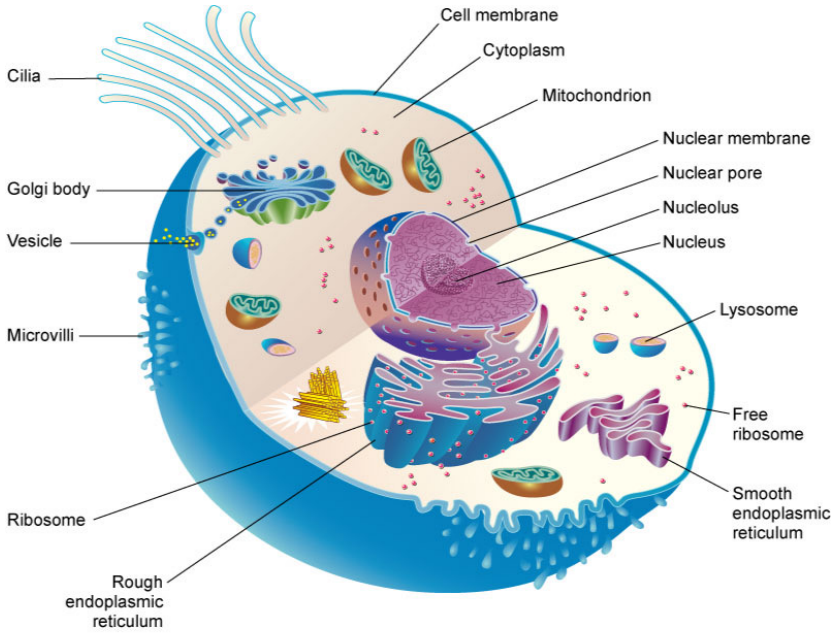


Fig. 18-2. A cell.

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Cell Anatomy

Organelle Cellular structures that possess distinct __structures__ and functions.

The organs of a cell.

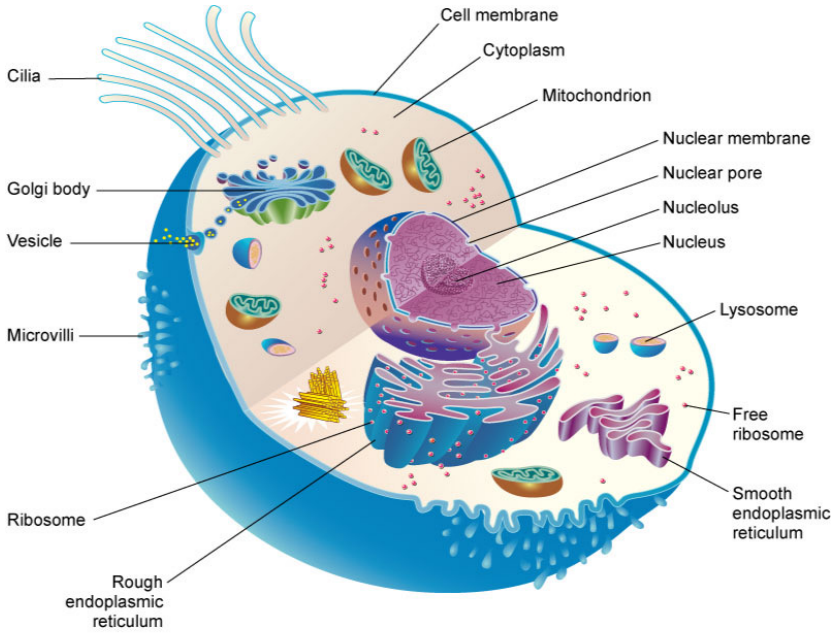


Fig. 18-2. A cell.

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Let's draw what we know!

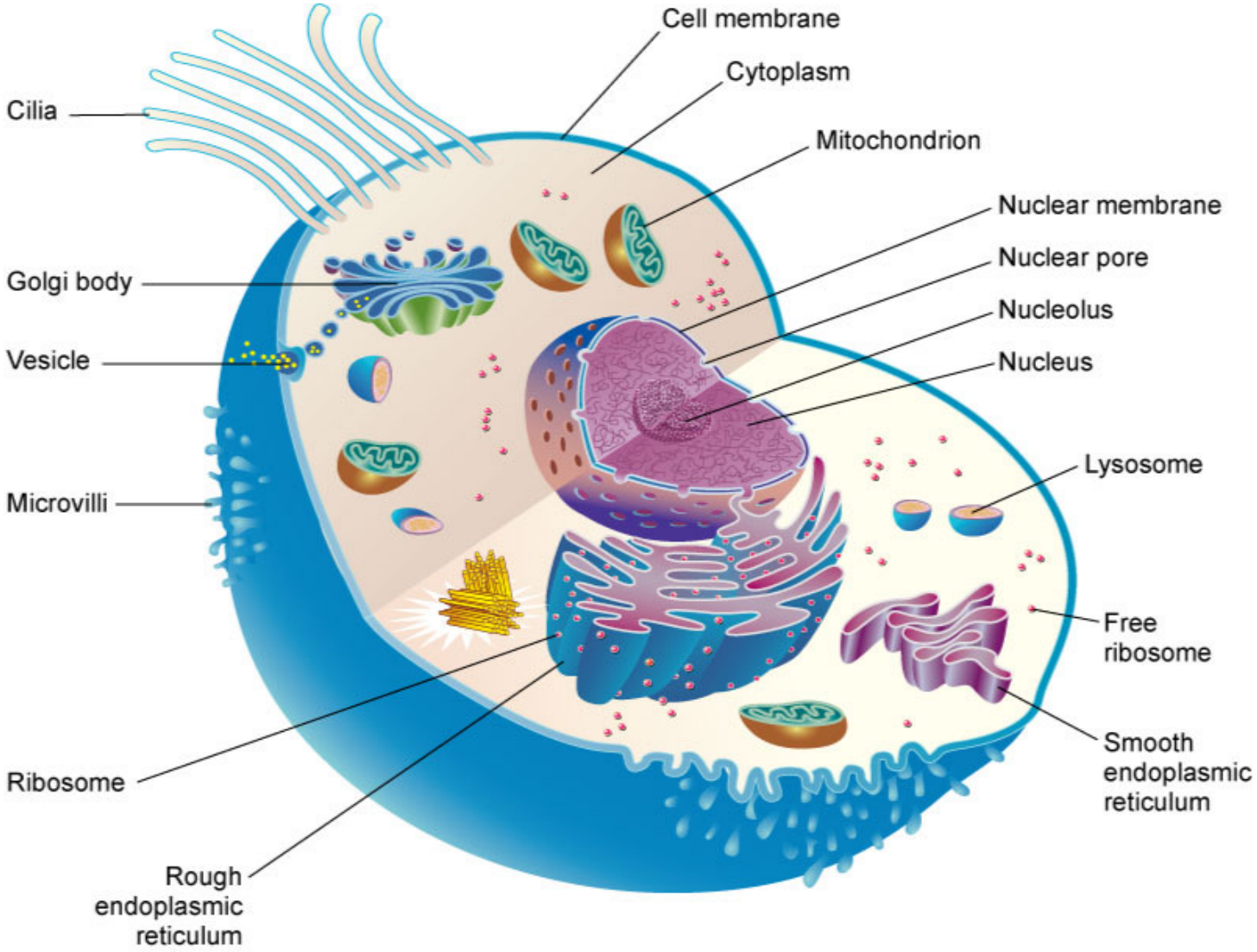


Fig. 18-2. A cell.

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Cell Anatomy

Nucleus Control center of the cell. Directs nearly all metabolic activities. Contains DNA and RNA.

Cell Anatomy

Ribosome Synthesizes __proteins__.

Cell Anatomy

Mitochondrion (p. mitochondria) "__Power__ plant" of the cell.

Responsible for cellular respiration. Provides most of the cell's ATP.

Cell Anatomy

Lysosome Engulfs and digests bacteria, cellular __debris__ and other organelles.

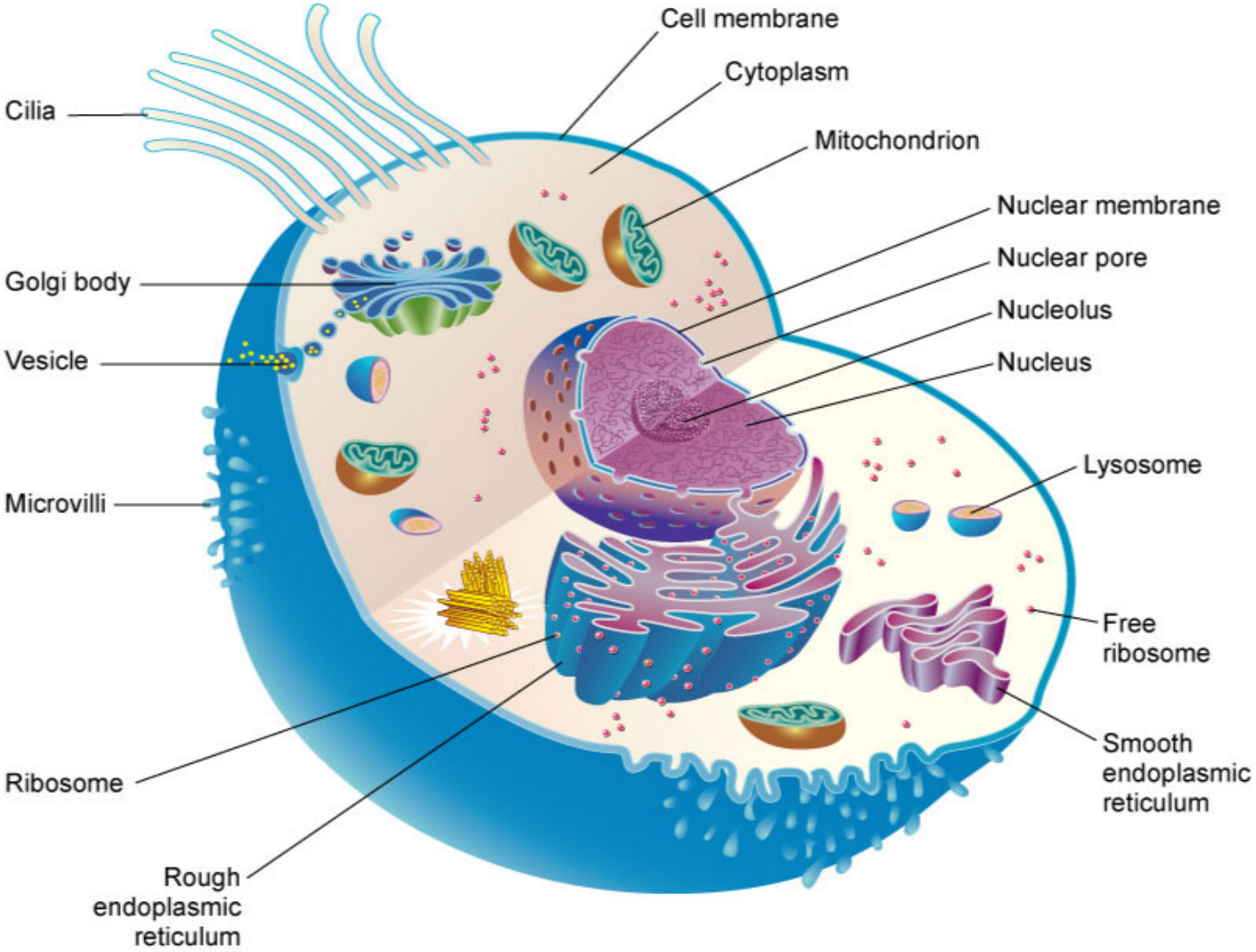


Fig. 18-2. A cell.

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Fill in the Blanks

1. Nucleus = _____center

2. Ribosome = synthesizes _____.

3. Mitochondrion = _____plant

4. Lysosome = engulf and _____.

Fill in the Blanks

1. Nucleus = __control__ center

2. Ribosome = synthesizes __proteins__.

3. Mitochondrion = __power__ plant

4. Lysosome = engulf and __digest__.

Cell Physiology

Adenosine triphosphate

Passive cell process

Active cell process

Cell Physiology

Adenosine triphosphate (AKA: ATP) The body's energy storage molecule.

Cell Physiology

Passive cell process

- Diffusion
- Filtration
- Osmosis

Active cell process

- Active transport pumps
- Active transport vesicles

Cell Physiology

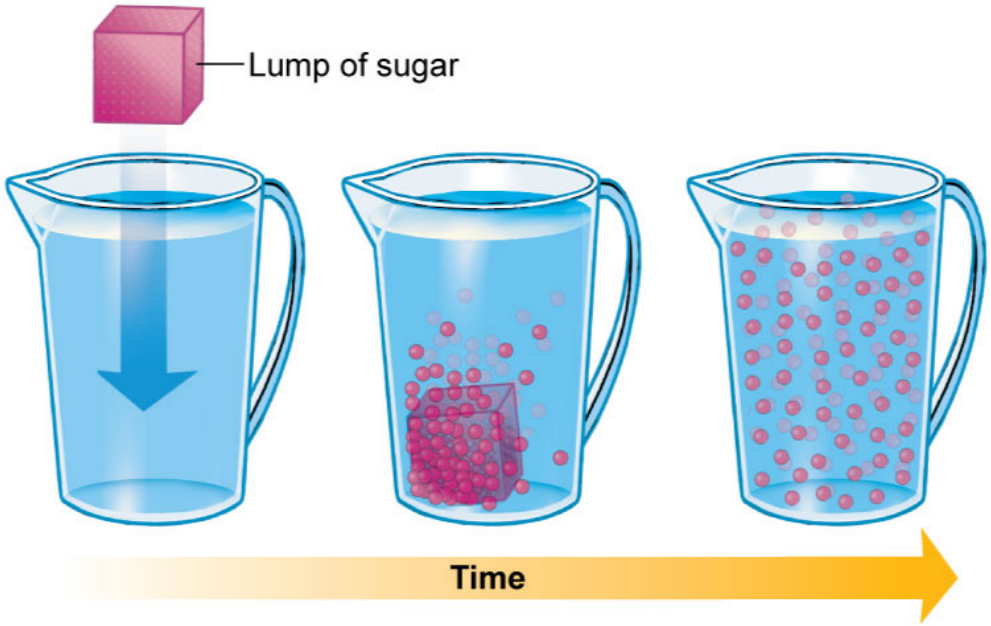
Passive cell process Movement of substances across the cell membrane by means of pressure and concentration without the expenditure of ATP.

Types: diffusion, filtration, and osmosis.



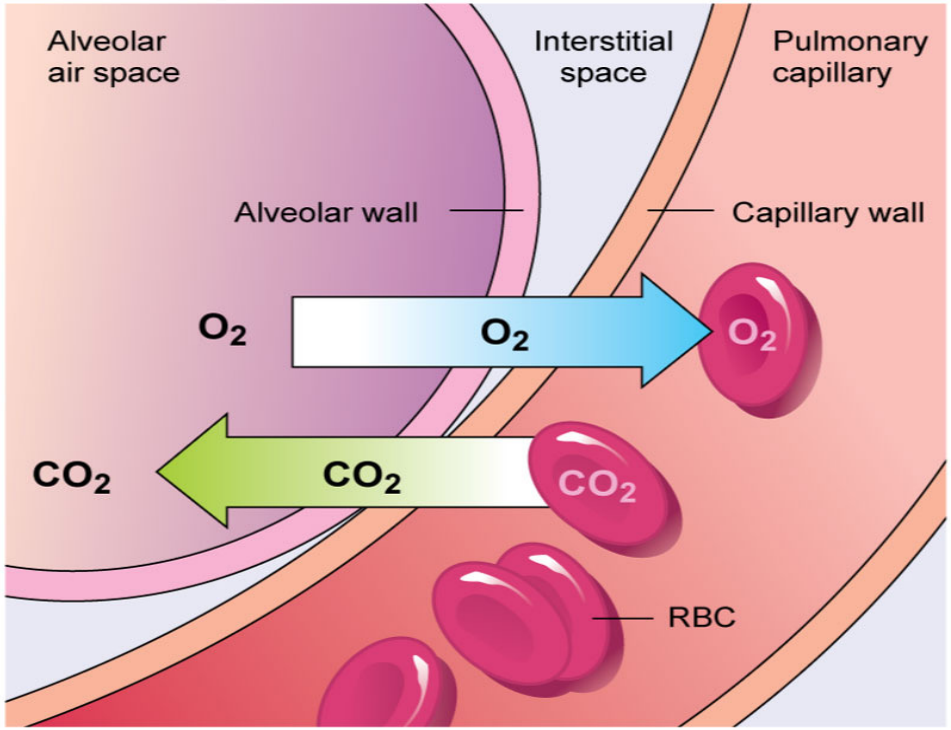
Cell Physiology

Diffusion Movement of molecules from an area of higher concentration to an area of lower concentration, a process that continues until the distribution of particulates is equal in all areas.



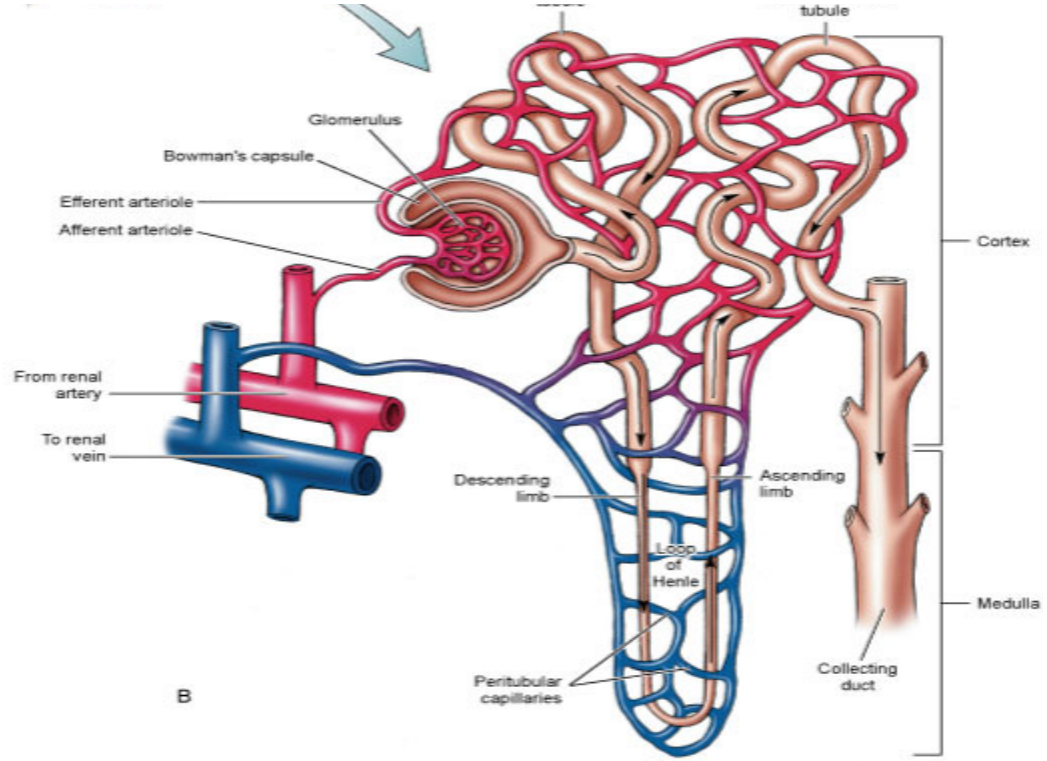
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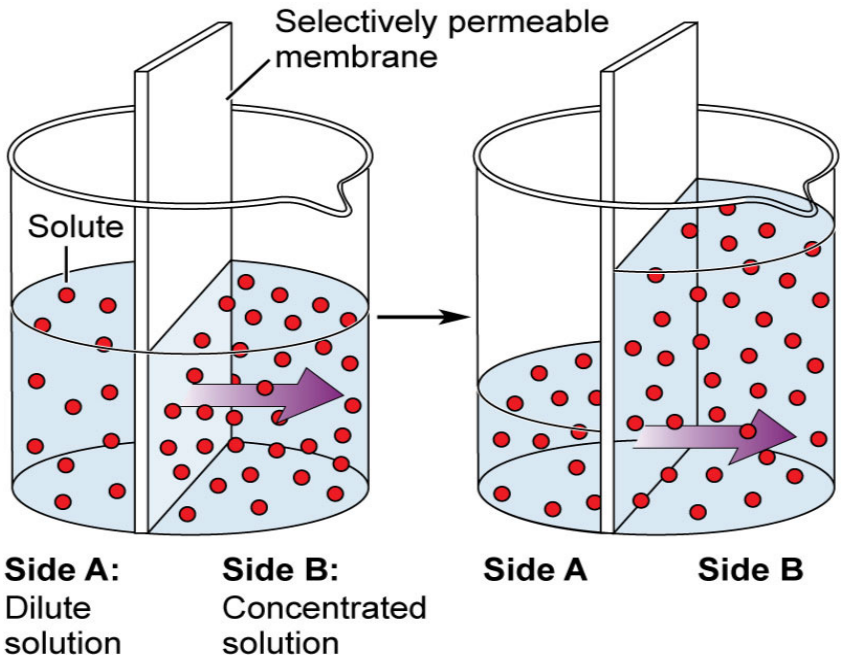
Cell Physiology

Filtration Movement of particulates across the cellular membrane as a result of ___pressure___.



Cell Physiology

Osmosis Movement of a pure solvent such as __water__ from an area of low concentration (most dilute) to an area of high concentration (least dilute). Movement continues until the two concentrations are equal.



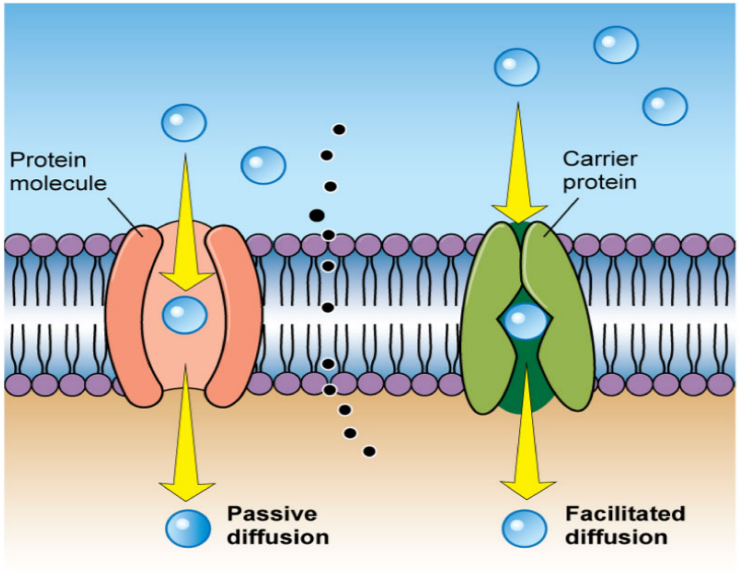
Cell Physiology

Active cell process Movement of substances across the cell membrane that requires the expenditure of ATP.



Cell Physiology

Active transport pumps Carrier proteins that are part of a cell membrane attract charged particles (ions) and move them from one side of the cell membrane to the other. Example: sodium-potassium pump used during nerve conduction.



Cell Physiology

Active transport vesicles Small spherical __sacs__ that transport various substances within a cell, as well as import and export materials into and out of the cell.

Cell Physiology

Phagocytosis Process by which specialized cells ingest harmful __microorganisms__ and cellular debris, break them down, and expel the harmless remains back into the body.

Pinocytosis Process by which specialized cells engulf __liquids__ and draw them into the cell.

Compare and Contrast

Passive Cell Process

- Movement across cell membrane
- Free
- Diffusion
- Filtration
- Osmosis

Active Cell Process

- Movement across cell membrane
- Costs ATP
- Phagocytosis
- Pinocytosis

Cellular Metabolism

Metabolism

- Anabolism
- Catabolism

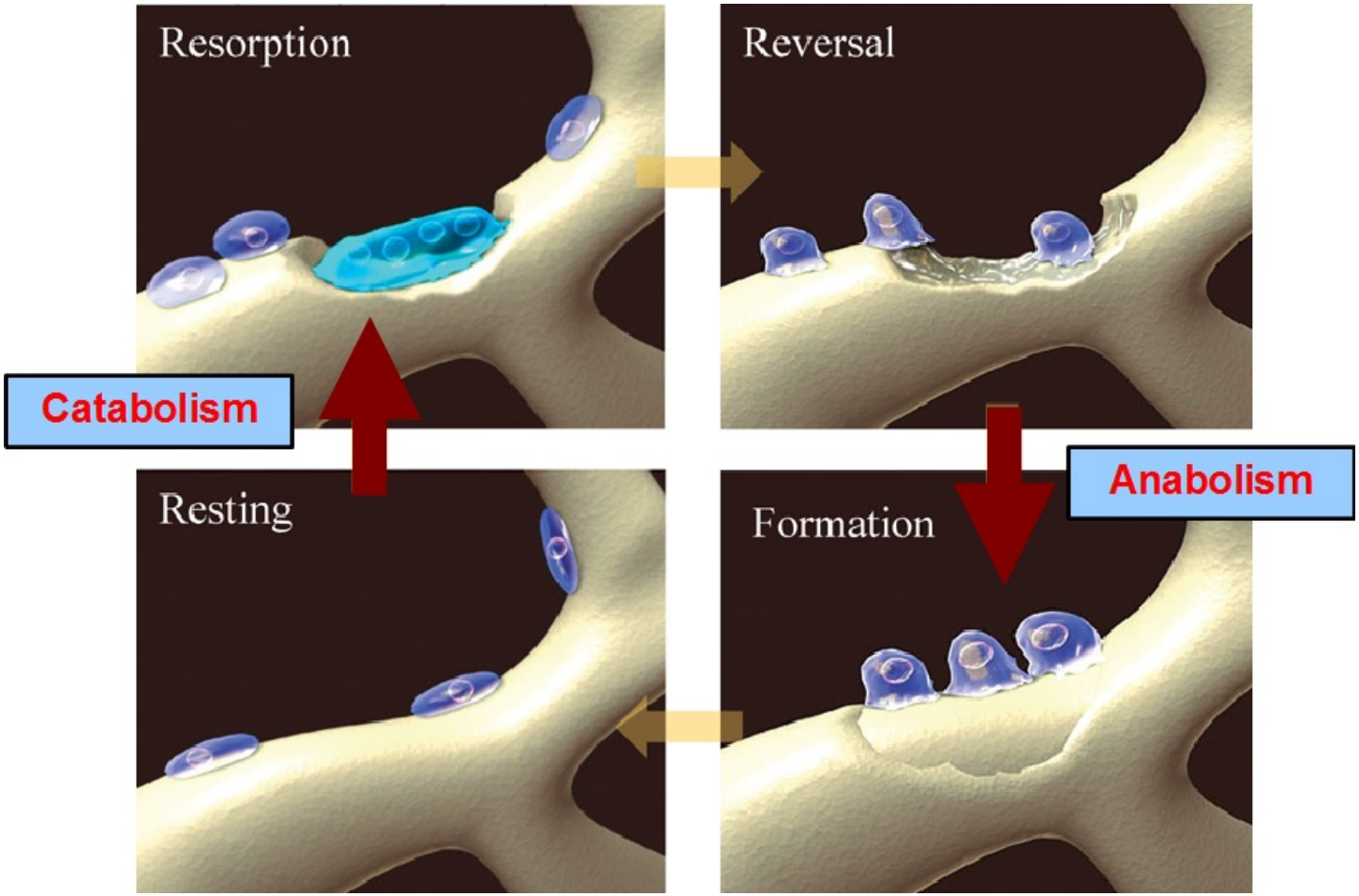
Cellular Metabolism

Metabolism The total of all __physical__ and __chemical__ processes that occur in an organism. Examples:

Anabolism The __constructive__ phase of metabolism in which smaller, simpler molecules are built up into larger molecules.

Catabolism The __destructive__ phase of metabolism in which larger, more complex molecules are converted to smaller, simpler molecules.

Anabolism is constructive
Catabolism is destructive



Catapults are destructive and so is Catabolism



5a A&P:
Introduction to the Human Body - Cells