

Student Name: ___Jonathan

McEachin_____

COURSE: BIO 233

Module 2A and 2B Class Notes (Krc)

Module 2A: CELL STRUCTURE & THEIR FUNCTIONS

Module 2B: TISSUES

Instructions: Complete the notes from power point slides. Type in the answers/ fill in the blanks. Print in your name. Save the document in pdf format.

Module 2A : CELL STRUCTURE & THEIR FUNCTIONS

- 1. Cell Functions:** Basic _unit_____ of life. Cell metabolism_____ and _energy_____ release. _____reproduction_____ and inheritance.
- 2. Cell Structure: A. Organelles:** specialized _structures_____ in cells that perform _specific_____ functions Ex. ___Nucleus_____, mitochondria, ribosomes, etc. B. Cytoplasm_____ : jelly-like substance that holds organelles. C. **Cell Membrane:** What is it? _outermost_____ component of a cell_____ **Functions:** **_selective_____ _barrier_____;** encloses _cytoplasm_____.
____extracellular_____: material outside cell
____Intracellular_____: material inside cell
- 3. Structure of Cell Membrane:** Called Fluid ___Mosaic_____ ___Model_____. According to the fluid mosaic model of the cell membrane, ___protein_____ molecules float in a lipid bilayer. Made of ___phospholipids_____ and ___proteinss_____. Phospholipids form a _double_____ layer or bilayer. Phospholipids contain 2 regions: polar_____ and ___nonpolar_____. **Polar regions:** “heads”**hydrophilic**_____, (H₂O loving) **Nonpolar regions:**“tails”
____hydrophobic_____ (H₂O fearing)
- 4. Movement through Cell Membrane:** Cell membrane _selectively_____ determines what can pass in and out of the cell. Enzymes, _glycogen_____, and _potassium_____ are found in higher concentrations ___inside_____ the cell. _sodium_____, calcium, and _chloride_____ are found in higher concentrations _outside_____ the cell.
- 5. Ways molecules Pass through Cell Membrane**
 1. Directly through (___diffusion_____): O₂ and CO₂ (small molecules)
 2. Membrane channels: ___proteins_____ that extend from one side of cell membrane to other determine what can go through. Ex. Na⁺_____ passes through _Na⁺ channels_____.
 3. Carrier molecules: _bind_____ to molecules, _transport_____ them across, and drop them off. Ex. _glucose_____.
 4. Vesicles: can _transport_____ a variety of materials. fuse_____ with cell membrane.

5A. Diffusion: What is it? Movement of molecules from areas of high _____ to _____ low _____ concentration. solution _____: solid, liquid, or gas that contains one or more solutes.

solute _____: substance added to solvent that dissolves. solvent _____: substance such as H₂O that solute is being added to. Ex. Add salt to H₂O. H₂O =solvent, salt=solute, mixture=solution

5B. Mediated Transport Mechanisms: Facilitated diffusion: diffusion _____ with aid _____ of a carrier _____ molecule; requires no _____ ATP _____.

Active transport: moves substances from low _____ to _____ high _____ conc. Requires ATP _____ . Ex. Sodium-potassium pump; sodium _____, potassium, and calcium _____ ions pass through the cell membrane by active transport by carrier _____ molecules _____.

5C.

Osmosis: What is it? diffusion _____ of _____ water _____ across a cell membrane
Types of Osmotic Solutions: Hypotonic solution: lower _____ conc. of solute _____ outside cell; higher conc. of H₂O outside cell; H₂O _____ moves _____ into _____ cell;

lysis _____ (burst) Hypertonic solution: higher _____ conc. of solutes _____ outside cell; higher conc. H₂O inside cell; H₂O moves _____ out _____ crenation _____. This is called _____ (shrinks). Isotonic solution: equal _____ conc. of solutes. water doesn't move cell _____ remains intact _____.

6. Endocytosis: What is it? process that brings materials _____ into _____ cell using _____ vesicles _____. 2 types

A.

Phagocytosis: cell eating (solid _____ particles _____) B. Pinocytosis: It is a specific type of endocytosis that is responsible for bringing liquids and small particles into cells inside of small vesicles. cell drinking (liquid _____ particles _____)

7. Exocytosis: What is it? Process that carries materials _____ out _____ of cell using _____ vesicles _____

8. **Cell Structures:** 8 (1). Cytoplasm _____ Location: _____ inside cell _____ Characteristic: jelly _____ like _____ fluid _____. Function: give cell shape _____ and hold organelles _____ in place. 8(2). Nucleus _____: Location: _____ center _____ of cell. Function: _____ Houses DNA _____ .

8(3). Nuclear envelope: Location: _____ edge _____ of nucleus. 8(4). Nuclear pores: Location: _____ surface _____ of nucleus. Function: where materials _____ pass in and out _____ of nucleus 8(5).Chromosome: Location: _____ inside _____ nucleus. Characteristic: made of DNA and proteins _____.

Function: part of genetic _____ makeup _____. 8(6). Chromatin: Location: inside nucleus. Characteristic: loosely coiled _____ chromosomes.

8(7). Nucleolus _____: Location: in _____ nucleus _____. Function: _____ produce _____ ribosomes _____ . 8(8). Ribosome _____ :

Location: attached to RER _____ and _____ cytoplasm _____. Function: _____ produce _____ proteins _____

8(9). _____ RER _____ (Rough Endoplasmic Reticulum): Location: cytoplasm. Characteristic: membranes with _____ ribosomes _____ attached _____. Function: site of _____ protein _____ synthesis _____.

8(10). _____ SER _____ (Smooth Endoplasmic Reticulum): Location: cytoplasm. Characteristic: membranes with _____ no _____ ribosomes _____. Function: site of lipid _____

_synthesis_____ (Ex. Cholesterol). 8(11). _SER_____:
 Location: _cytoplasm_____. Characteristic: closely, packed _stacks____ of _____
 membranes____. Function: collect, sort, _package_____ and
 _distribute_____ proteins and lipids. 8(12). _secretory_____
 _vesicle_____: Location: cytoplasm. Function: distributes materials _out of_____
 _cell_____. 8(13). lysosome_____: Location: cytoplasm. Function: contain
 _enzymes_____ that _digest_____ foreign material. Ex. _white blood
 cells_____ that take up bacteria through
 _Phagocytosis_____ would be expected to have large numbers of lysosomes.
 8(14). _mitochondria_____: Location: cytoplasm. Characteristic: contains folds
 (cristae). Function: produces ATP_____. 8(15). _Cilia_____:
 Moveable _projections_____ from the surface of cells found in
 _abundance_____ in the _respiratory_____ tract. Location:
 cell surface. Characteristic: _many_____ per _____ cell_____. Function: move
 _materials_____ across _cells_____ surface_____.
 8(16). _flagella_____: Location: cell surface. Characteristic: 1 per cell. Function:
 _move cell_____. Ex. _____ sperm_____. 8 (17).
 _microvilli_____: Location: cell surface. Characteristic: _shorter
 than_____ cilia_____. Function: increase_____ surface area.
 8(18). Cytoskeleton: What is it? cell's _framework_____. made of
 _proteins_____ Functions: provide _support_____. enable cell to _change_____
 _shape_____.

9. Whole Cell Activity: A cell's characteristics are determined by the type _____ of _____
 _proteins_____ produced_____. Proteins' function is determined by
 _____ genetics_____ Information in DNA_____ provides_____ the cell with a
 _code_____ for its _cellular_____ processes_____.

10. CELLULAR ASPECTS OF AGING: 1. Cellular clock: after a certain _passage_____ of
 time or a certain _number_____ of cell divisions, results in the _____ of a given cell line.
 2. Death genes: “_death_____ _genes_____,” which turn on late in life, causing cells to and
 die. 3. DNA damage: through time, DNA is damaged, resulting in cell
 _degeneration_____ and death. 4. Free radicals_____ damage the
 _DNA_____ of a cell. 5. _Mitochondrial_____ DNA _damage_____ results in
 the _loss_____ of _proteins_____ and therefore energy production ability.

11. **DNA:** What is it? _double_____ _helix_____ in nucleus; composed of
 _nucleotides_____. contains _5_____ carbon sugar_____ (deoxyribose),
 _nitrogen_____ base, _phosphate_____

12. **Flow of Genetic Information:** DNA contains the information that directs _protein_____
 _synthesis_____. This process is called **gene expression**. Occurs in three stages:
 1. _DNA_____ _replication_____: The double strands of a DNA segment separate.
 2. _transcription_____: (making a copy of a gene) takes place in the
 _nucleus_____ of the cell. DNA_____ determines the structure of _mRNA_____
 through _TRANSCRIPTION_____. The information in mRNA is carried in
 _GROUPS_____ of _three_____ nucleotides called _codons_____, which specify a

particular amino acid.

3. Translation: (converting the copied information into a protein) occurs at ribosomes in the cytoplasm. The process of translation requires two types of RNA in addition to the mRNA: transfer RNA (tRNA) and ribosomal (rRNA).

13. Sequence of Protein synthesis:

1. DNA transcribes mRNA in the nucleus.
2. mRNA passes from nucleus into cytoplasm.
3. tRNA pairs with mRNA.
4. Peptide bonds are formed.

14. **Cell Division:** What is it? formation of 2 daughter cells from a single parent cell; uses mitosis and meiosis. Each cell (except sperm and egg) contains 46 chromosomes (diploid). sperm and egg contain 23 chromosomes.

15. **Mitosis:** What is it? cell division that occurs in all cells except sex cells. forms 2 daughter cells.

16. **Components of Mitosis: Chromatid:** 2 strands of chromosomes that are genetically identical. **Centromere:** where 2 chromatids are connected. **Centrioles:** small organelle involved in animal cell division.

17. **Stages in Mitosis: 1. Interphase:** time between cell divisions. DNA replication occurs. **2. Prophase:** chromatin condenses into chromosomes. centrioles move to opposite ends.

3. **Metaphase:** chromosomes align in at the equator.

4. **Anaphase:** chromatids separate. Chromosomes move towards poles (centrioles)

5. **Telophase:** nuclear envelopes and nucleoli reform. cytoplasm divides to form 2 cells.

Module 2B: TISSUES

1. **What is a tissue?** group of cells with similar structure and function plus substance (matrix)
2. Histology study of tissues
3. **Types of Tissues:** epithelial connective muscular & nervous
4. **Epithelial Tissues: Location:** cover body (internal and external) Ex. skin kidney, trachea, glands, etc.
5. **Characteristics:** cells close together (very little extracellular matrix)
form most glands. have free surface. basal surface: attaches epithelial cells to underlying tissues.
6. **Functions of Epithelial Tissues:** 1. protect: Ex. Skin 2. Act as a barrier: Ex. Skin keeps bacteria out. 3. diffusion and Filtration: Ex.

Lungs and kidneys. 4. secretion : Ex. Sweat glands. 5. absorption : Ex. Small intestine

7. Classification of Epithelial Tissue: Classified according to number of cell layers and cell shape. simple (One layer) stratified = more cell layers

8. CLASSIFICATION OF EPITHELIA

CLASSIFICATION OF EPITHELIA	
NUMBER OF LAYERS	CELL SHAPE
simple (ONE LAYER)	<u>Squamous</u>
	CUBOIDAL
stratified (MORE THAN ONE LAYER)	<u>columnar</u>
	SQUAMOUS
	<u>cuboidal</u>
	COLUMNAR

9. **Simple Squamous:** Structure: 1 layer of flat, tile like cells. Function: diffusion and and filtration. Location: blood vessels, alveoli of lungs, heart, kidneys

10. **Simple Cuboidal:** Structure: 1 layer of square shaped cells. Function: secretion Location: glands, ovaries, kidneys

11. **Simple Columnar:** Structure: 1 layer of tall, square shaped cells. Function: secrete and. Location: stomach, intestines, resp. tract

12. **Stratified Squamous:** Structure: many layers of flat, tile-like cells. Function: protect and acts as a barrier. Location: skin, mouth, throat esophagus

13. **Free Cell Surfaces:** Surface not in contact with other cells .

It can be 1. smooth & free to reduce friction, Ex. Blood vessels

2. With A. microvilli : increase cell's surface area. Ex. small intestine

B. **Cilia:** move materials across cell's surface Ex. trachea

C. **Goblet cells:** produce mucus Ex. stomach

14. **Cell Connections:** tight junctions: bind adjacent cells together

Ex. intestines; gap junctions: small channels that

allow molecules to pass between cells; allow cells to communicate;
 most common

15. Glands: What are they? structures that secrete substances onto a surface into a cavity, or into blood. **A. Exocrine glands:** glands salivary gland - Ex. Sweat or oil glands, salivary gland. **B. Endocrine glands:** no duct (directly into bloodstream), secrete hormones. Ex. Thyroid, thymus, pituitary glands, etc.

16. Connective Tissues Characteristics: Cells far apart. Contain large amounts of extracellular matrix. classified based on type of extracellular matrix and function. Extracellular matrix contains 3 components (in varying amounts): protein fibers, ground substance, fluid.

17. Functions of Connective Tissue: **1. Enclose and separate:** Ex. around organs and muscles. **2. Connect tissues:** Ex. tendons: connect bone to muscle. Ex. ligaments; connect bone to bone. **3. Support and Movement:** Ex. bone. **4. Storage:** Ex. bones store calcium and adipose tissue stores fat. **5. Cushion and insulate:** Ex. adipose tissue protects organs and helps conserve heat. **6. Transport:** Ex. blood. **7. Protect:** Ex. immune cells.

18. Types of Ordinary Connective Tissue: **1. loose:** Location: between organs, muscles, glands, skin. **Function:** support and protect. **2. tendons:** Location: tendons, ligaments, skin. **Function:** connect and can withstand pulling forces. **3. adipose:** Location: under skin and around organs. **Structure:** cells filled with lipids. **Function:** storage, insulate, cushion. **4. Cartilage:** Type of connective tissue; Composed of chondrocytes; Withstands compressions; Provides support, flexibility, strength.

19. Types of Cartilage: **A. Hyaline cartilage.** Location: covers end of bones. **Function:** reduces friction (cushion). **B. Fibrocartilage:** Location: between vertebra. **Function:** can withstand compression. **C. Elastic cartilage.** Location: external ear and tip of nose. **Function:** can recoil.

20. Bone: hard connective tissue. 2 types: compact and spongy. Composed of osteocytes.

21. Blood: liquid connective tissue. erythrocytes, leukocytes, platelets. transport food, oxygen, waste, hormones

22. Muscle Tissue:

Muscle Type	Nucleus/i	Location	Control	Striated

Skeletal (most muscles)	__many__ ---	Peripheral	__voluntary__ -----	__yes__
Cardiac (heart)	one	__centrally__ -----	involuntary	yes
__smooth__ _____ (organs)	one	centrally	__involuntary__ -----	__no__

23. **Nervous Tissue:** Consist of neurons or nerve cells. Found in brain, spinal cord, and peripheral nerves. The supportive cells of the nervous system are called neuroglia; controls and coordinates body movements.

24. **Tissue Repair. What is it?** substitution of dead cells for viable cells. regeneration: new cells of the same type are created and normal function is usually restored. (no scar). replacement: cells of a different type develop (scar)

25. **Inflammation:** Occurs when tissues are damaged. Signals the body's defenses (white blood cells) to destroy foreign materials and damaged cells so repair can occur. chemical mediators: released after injury. Both histamine and prostaglandins are mediators of inflammation.

26. **Symptoms of Inflammation:** 1. **Redness:** blood vessels dilate 2. **Heat:** due to increased blood flow. 3. Swelling: from water and proteins (edema). 4. Pain: nerve ending are stimulated by damage and swelling.