* This study guide is based off of the content written in your syllabus. Please do not use this as your only source of studying * Sept 14th

→ Cell Membrane

- seperates intercellular from extracellular compartment
* remember that there is a hydrophobic and hydrophilic layer *

consist of:
- hydrophillic head
- hydrophobic tails
- lipid bilayer embedded w/ proteins

Types of Proteins Embedded

- integral
  - ↳ most abundant; throughout entire membrane
    could be used as receptors
- peripheral
  - ↳ on cytoplasmic side

* remember Glycocalyx *

Function of Cell Membrane

1. cell barrier → only allows certain substances inside
2. External proteins act as receptors and in cell to cell recognition
3. Transport (selective)

↳ **Types of transport**

1. passive: [high] to [low]; no ATP required
   - ↳ Facilitated diffusion: carrier mediated
     more rapid than simple diffusion
     Example: glucose transport in muscle and adipose cells
2. Active: [low] to [high]; ATP required

1° - direct use of ATP
- ↳ Examples: Na^+/K^+ pump
  Ca^{2+} pump
  proton pump (inhibited by Omeprazole)

* if solutes move in same direction across the cell membrane called cotransport (symport) *

* if solutes move in opposite direction across the cell membrane called countertransport *

2° - indirect use of energy from Na^+ gradient

3. Vesicular or Bulk Transport: large molecules/particles
   1. exocytosis: Vsnares binds with Tsnares causing lipid layers to fuse which causes the vesicle to release their contents
   2. endocytosis: brings molecules into the cell
      * clathrin protein is responsible for deforming membrane *
      1. phagocytosis (cell-eating)
      2. pinocytosis (cell-drinking)
      3. Receptor-mediated
         - ↳ specific molecules (insulin, enzymes, LDLs)

Clinical

Familial hypercholesterolemia: inherited disease
cells lack LDL receptors

Tay-Sachs Disease: large, harmful quantities of fatty substances build up in tissue and nerve cells in brain
infants lack enzyme that breaks down of certain glycolipids

Gaucher's Disease: lack of glucocerebrosidase enzyme
1. Type 1 affect both children and adults
2. Type 2 begins in infancy ——→ neurological degredation ——→ early death
3. Type 3 live till adulthood

——→ Cell life cycle

interphase: nondividing
G_1, S, G_2

G_1: growth
S: growth/DNA synthesis
G_2: growth/preperation for division

mitotic phase: cell division

produce 2 daughter cells

include:

prophase

metaphase

Anaphase

Telophase | cytokinesis

	Meiosis I	Meiosis II
synapsis	pairing of 46 homologous duplicated chromosomes	absent
crossing over	large segments of DNA ar exchanged	absent
Alignment	46 chromosomes at metaphase plate	23
Disjunction	46 chromosome seperate	23 centromeres split
cell division	two secondary gametes 23, 2N	4 gametes 23, 1N

Clinical Consideration

Down syndrome: trisomy 21 extra chromosome 21

Klinefelter syndrome: XXY both male and female characteristics

Turner syndrome: X O

→ Aging

- damage due to free radicals

vitamin A and C prevent excessive production of free radicals

→ Oncogenes

- mutations in proto-oncogene causes proliferation and development to occur more rapidly

→ Tissues

- muscle: contractile tissue, produce force and motion
- Skeletal: striated muscle, create movements
- smooth: not under conscious control
- cardiac: "involuntary"
- Nervous: react to stimuli to create impulses

FUNCTION OF EPITHELIAL

1. protection
2. sensation sensory stimuli
3. secretion in glands
4. Absorption
5. Excretion
6. Diffusion
7. cleaning
8. reduce friction

Type	Function	Location
simple squamous epithelia	Facilitate gas exchange	lining body cavities and capillaries
simple cuboidal epithelium	secretion/absorption	glands kidney tubules
simple columnar epithelium	secrete mucus or slime	germinal epithelium lining of stomach and intestine
pseudostratified columnar epithelium	secretion/mucus	most upper respiratory tract
stratified cuboidal epithelium	protection	sweat glands and male urethra
stratified columnar epithelium	protection/secretion	male urethra
stratified squamous epithelium		vagina

→ GLANDS

exocrine: ducts

endocrine: ductless

modes

1- merocrine most glands

2- Apocrine mammary glands

3- holocrine death of cell

Tight Junctions : hold cells together
preserve transcellular transport

Desmosomes : plaques connected across intercellular space

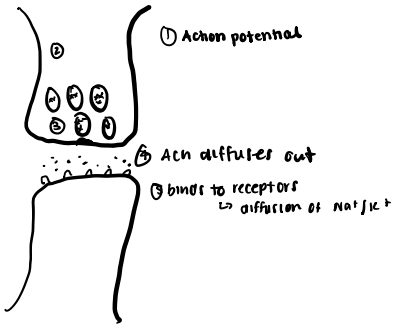
Gap junctions : passageway between to adjacent cells
6 connexins = 1 connexon

Clinical consideration

Marfan syndrome : defect in gene of chromosome 15 which encoded glycoprotein Fibrillin I

Ehlers-Danlos syndrome : defect in collagen synthesis I and III

→ Action Potential



→ Cell Respiration and Metabolism

- Catabolism : breakdown of large molecules
- Anabolism : synthesis of large molecules

glycolysis

↳ glucose converted into pyruvic acid

NAD reducing

* when no oxygen is present glucose is converted to lactic acid

glycogenesis

↳ glycogen from glucose

↳ converted into glucose 6 phosphate

in liver can be used to produce free glucose for organs

in skeletal muscle : only make glucose for their own use

gluconeogenesis

↳ noncarbohydrate → pyruvic acid → glucose