

CELL MEMBRANES
LESSON 4
"MEMBRANE PROTEINS"

■ TODAY'S LEARNING GOAL:

- LIST THE SEVEN FUNCTIONS (JOBS) OF MEMBRANE PROTEINS.

■ WARM-UP:

"LOOK BACK AT THE DATA TABLE FROM THE OSMOSIS LAB, AND ANSWER QUESTIONS 1 & 2 ON THE TABLE WITH YOUR LAB GROUP."

MEMBRANE PROTEIN NOTES

FUNCTIONS OF MEMBRANE PROTEINS

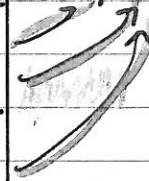
FUNCTION	EXAMPLE
ENZYMES	ATP SYNTHASE
CHANNELS ("PATHWAYS")	AQUAPORINS - H ₂ O FRUCTOSE CARRIER PROTEIN
I.D. MARKERS ("LIKE CELL FLAGS")	HELPER T CELLS IN IMMUNE SYSTEM I.D. ^{BAD} GUYS
RECEPTORS	INSULIN RECEPTOR
CELL-TO-CELL ATTACHMENT	TIGHT GAP JUNCTIONS
ANCHORS CYTOSKELETON	

PIC

CLIP

PIC/CLIP



PIC/CLIP

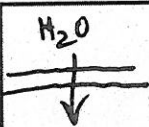


PIC

PIC

LESSON 4 BRICKS!

<p>Definition "GLIE · CO · PRO · TEEN" · LI · PID"</p> <p>PROTEINS (OR LIPIDS) THAT HAVE CARBOHYDRATES ATTACHED TO THEM.</p>	<p>Facts/Characteristics</p>
<p>Examples</p>  <p>IMMUNE CELL GLYCOPROTEIN IDENTIFIES INVADING CELLS</p>	<p>Non-examples</p> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> GLYCOPROTEIN / "SUGAR" / GLYCOLIPID </div>  <p>GLYCOPROTEIN ≠ GLYCOLIPID ATTACHED TO PHOSPHOLIPID</p>

<p>Definition "FAW · SIL · I · TATE · ID"</p> <p>PASSIVE TRANSPORT OF MOLECULES VIA MEMBRANE PROTEINS</p>	<p>Facts/Characteristics</p>
<p>Examples</p>	<p>Non-examples</p> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> FACILITATED DIFFUSION "MAKE EASIER" </div>  <p>OSMOSIS IS NOT FACILITATED DIFFUSION</p>

"MEMBRANE PROTEINS" (READING)

MAIN IDEA:

THE MAIN IDEA OF "MEMBRANE PROTEINS" IS THAT INTEGRAL PROTEINS IN CELL MEMBRANES SERVE MANY FUNCTIONS THAT THE CELL NEEDS TO CARRY OUT, AS WELL AS FACILITATING THE DIFFUSION OF BOTH LARGE & POLAR MOLECULES

SUPPORTING IDEAS:

MEMBRANE PROTEINS FUNCTION AS/IN:

1. ENZYMES

2. CELL-CELL RECOGNITION

3. CELL ADHESION

4. ATTACHMENT OF THE CYTOSKELETON

5. RECEPTORS

6. VESICLE TRAFFICKING

7. TRANSPORT OF MATERIALS

• GATED CHANNELS CONTROL PASSAGE OF PARTICLES BY OPENING/CLOSING

• CARRIER PROTEINS CHANGE SHAPE TO LET CERTAIN THINGS THROUGH

VOCAB: ~~MEMBRANE~~ FIBRONECTIN?

QUESTIONS:

• WHAT ARE FIBRONECTIN MOLECULES AND WHAT DO THEY DO?

• WHAT MAKES GATED CHANNELS OPEN/CLOSE?

CONCLUSION:

MEMBRANE PROTEINS FUNCTION IN MANY IMPORTANT CELL PROCESSES AS PART OF THE CELL MEMBRANE, THE MOST IMPORTANT OF WHICH BEING HELPING REGULATE THE PASSAGE OF MATERIALS INTO & OUT OF THE CELL.

AS A FUNCTION OF PASSIVE OR FACILITATED DIFFUSION, MEMBRANE PROTEINS FUNCTION AS CHANNELS, GATES, OR CARRIER MOLECULES.

CELL MEMBRANES LESSON 5: "ACTIVE TRANSPORT"

■ TODAY'S LEARNING GOALS:

- DESCRIBE HOW ACTIVE TRANSPORT IS DIFFERENT FROM PASSIVE TRANSPORT.
- USE THE TERMS ENDOCYTOSIS AND EXOCYTOSIS IN A SENTENCE ABOUT CELL TRANSPORT.

■ WARM-UP:

"A LOT OF BOTTLED WATERS CLAIM TO BE FILTERED BY "REVERSE OSMOSIS." DISCUSS WITH YOUR TABLE PARTNER THE FOLLOWING QUESTIONS. RECORD IN YOUR NOTEBOOK."

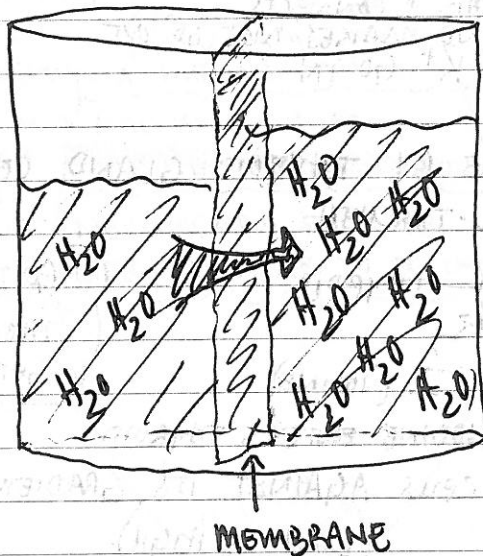
① IS THIS POSSIBLE? IF SO, WHAT WOULD YOU NEED TO PROVIDE TO MAKE IT HAPPEN?

② MAKE A SKETCH WITH A BEAKER, MEMBRANE, AND WATER MOLECULES (USE " H_2O ") THAT SHOW WHAT REVERSE OSMOSIS WOULD LOOK LIKE.

ANSWERS:

① YES, IT COULD. YOU WOULD HAVE TO SPEND ENERGY TO MAKE IT HAPPEN.

②



LESSON 5 BRICKS!

Definition "EN·DOE·SITE·OH·SIS" A PROCESS IN WHICH A CELL TAKES IN MATERIALS FROM THE OUTSIDE BY ENGULFING THEM.	USED FOR MATERIALS THAT ARE TOO BIG TO PASS NORMALLY	Facts/Characteristics TWO TYPES! 1. PHAGOCYTOSIS 2. PINOCYTOSIS
ENDOCYTOSIS		
Examples WHITE BLOOD CELLS ENGULF BACTERIA BY PHAGOCYTOSIS		Non-examples CELLS RELEASING STUFF INTO THE BLOOD STREAM

Definition "EX·OH·SITE·OH·SIS" WHEN VESICLES IN THE CYTOPLASM FUSE W/ CELL MEMBRANE AND SECRETE THEIR CONTENTS (STUFF LEAVES CELL)	USED FOR MATERIALS THAT ARE TOO BIG TO PASS NORMALLY	Facts/Characteristics ADDS MEMBRANE TO THE CELL SURFACE.
EXOCYTOSIS		
Examples THE PANCREAS RELEASES DIGESTIVE ENZYMES THAT BREAK FOOD DOWN.		Non-examples MACROPHAGE ENGULFING BACTERIA

LESSON 5 NOTES

ACTIVE TRANSPORT

"USES ENERGY"

WHY:

TO MOVE THINGS FROM AREAS OF LOW CONCENTRATION TO AREAS OF HIGH CONCENTRATION.

HOW:

CELL SPENDS ENERGY IN THE FORM OF ATP

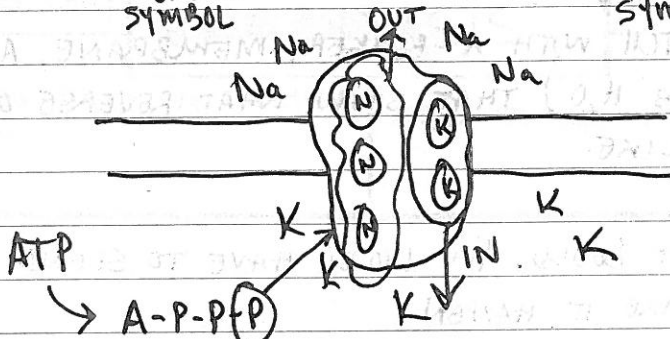
EXAMPLES:

1. SODIUM/POTASSIUM PUMP

(Na^+) HAS A POS. CHRG. (K^+) HAS A POS. CHRG.

CHEM. SYMBOL

CHEM. SYMBOL



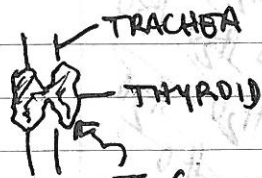
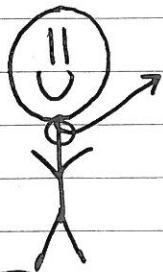
THIS P CONNECTS AND MAKES Na^+ GO OUT & K^+ GO IN

VIDEO CLIP

2. IODINE UPTAKE BY THYROID GLAND CELLS

PPT PIC

VIDEO CLIP



IODINE ENTERS THYROID CELLS AGAINST ITS GRADIENT (LOW → HIGH)

GOITER HAPPENS IF THE THYROID DOESN'T GET ENOUGH IODINE

READING

3. KIDNEY CELLS REABSORB SODIUM FROM URINE

4. GILLS OF MARINE FISH HAVE CELLS THAT REMOVE SALT FROM BODY BY PUMPING IT INTO SALT WATER.

5. PLANTS MOVE MINERALS INTO THEIR ROOTS BY ACT. TRANS.

SOMETIMES THINGS ARE SO BIG, THEY CAN'T PASS THROUGH THE CELL MEMBRANE.

SO, IN COMES ... **BULK** TRANSPORT → MEANS "LOTS OF"

ENDOCYTOSIS
"STUFF MOVES INTO CELL"

EXOCYTOSIS
"STUFF LEAVES THE CELL"

PHAGOCYTOSIS
"CELL EATING"

PINOCYTOSIS
"CELL DRINKING"

- WASTE
- CELLULAR PRODUCTS

EX: HARVARD CELL VIDEO

VIDEO CLIP

MACROMOLECULES OR CELL

DISSOLVED SOLUTES

EX: WHITE BLOOD CELL EATING AN INVADER

VIDEO CLIP

PASSIVE VS. ACTIVE
TRANSPORT

