CONCEPT: GLUCOSE ACTIVE SYMPORTER MODEL

●Classic & relevant example of *secondary active transport* are *intestinal epithelial* Na^+*-Glucose* _____.

A *Primary Active Transport*: _____/_____ *pump* maintains transmembrane Na^+ gradient.

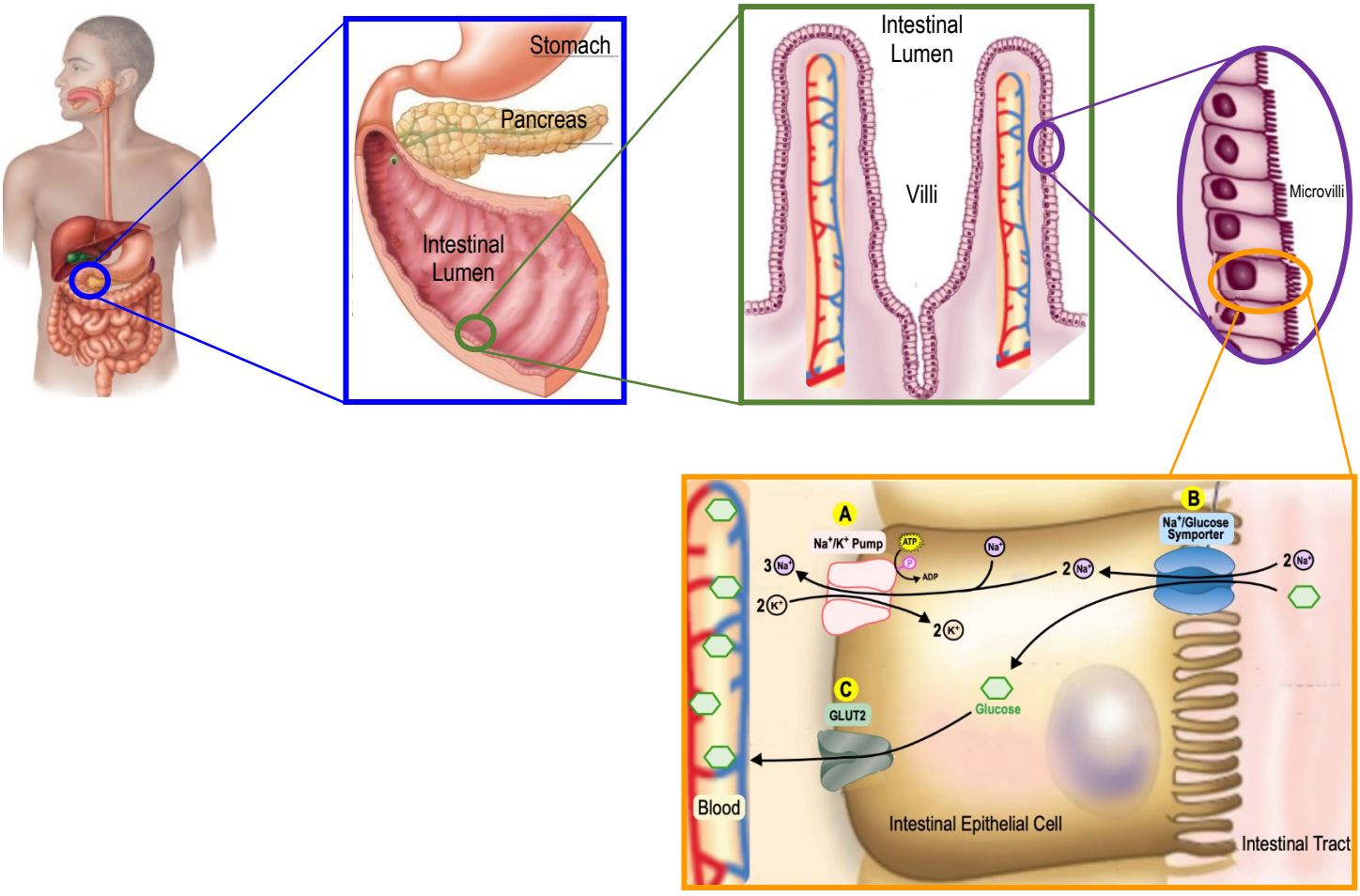
B *Secondary Active Transport*: Na^+*-Glucose symporters* _____ Na^+ & glucose in *same* direction.

□ ____ Na^+ imported _____ their gradient *powers* ____ glucose imported _____ its gradient.

C As glucose is pumped into epithelial cell, it is simultaneously moved into the blood via a *GLUT2* _____.

□ Na^+*-Glucose symporter* & *GLUT2 uniporter* operate on _____ sides of epithelial cells.

EXAMPLE: Intestinal Epithelial Glucose Active Symporter.



PRACTICE: Which of the following is TRUE about the Na^+-glucose symporter?

a) The transporter moves glucose down its concentration gradient.

b) The transporter is directly powered by ATP hydrolysis.

c) The energy stored in the Na^+ gradient is harvested for the movement of glucose.

d) The energy stored in the glucose gradient is harvested for the movement of K^+.

e) The protein is an ABC transporter.

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PRACTICE: The Na^+-Glucose symporter effectively transports glucose inside of cells against its concentration gradient using energy stored in the Na^+ concentration gradient. This energy for glucose transport is derived from the _____.

a) Glucose-Na^+ antiporter.
b) Na^+-K^+-ATPase.
c) Chloride-bicarbonate antiporter.
d) Glucose erythrocyte uniporter (GLUT1).
e) Epithelial glucose uniporter (GLUT2).
f) SERCA pump.

PRACTICE: The Na^+-Glucose symporter transports the two molecules into the cell, while the Na^+-K^+ ATPase uses ATP to transport Na^+ ions out of the cell. What would be the result of a mutation leading to a nonfunctional Na^+-Glucose symporter?

a) Increased levels of intracellular K^+.
b) Increased levels of intracellular glucose.
c) Decreased activity of the Na^+-K^+ ATPase.
d) Overactivation of the Na^+-K^+ ATPase.
e) Increased levels of ATP.

PRACTICE: Imagine that you perform a series of experiments to test the rate of glucose transport (V_0) into epithelial cells using the Na^+-Glucose symporters. These experimental epithelial cells contain no intracellular Na^+ but have the same glucose concentration as their surroundings. In experiment #1, you transfer your cells to test tubes that contain different extracellular [Na^+] & then measure the rate of glucose transport (V_0). In experiment #2, you introduce leakage Na^+ channels into the cell membranes & then repeat the same experiment. Label the data on the plot below as showing results to either Experiment #1 or Experiment #2.