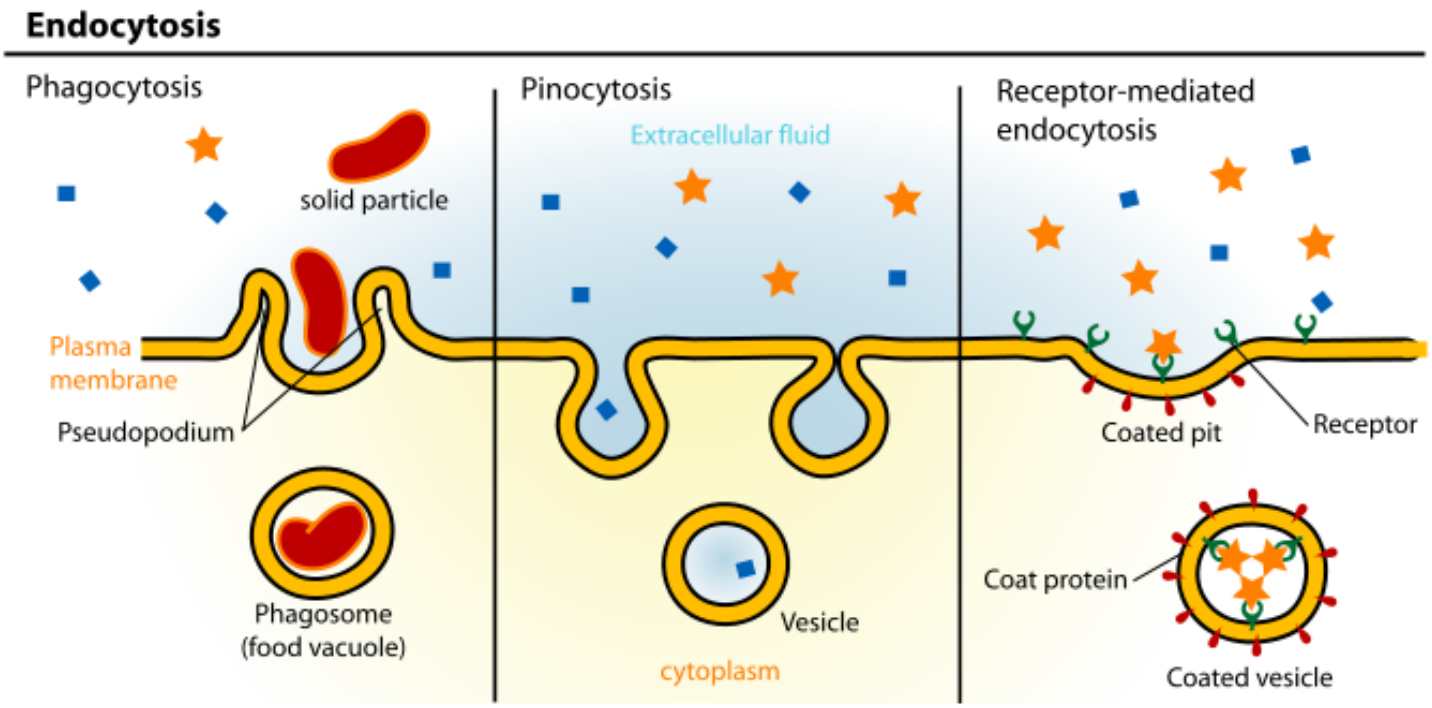
CONCEPT: ENDOCYTIC PATHWAYS

Three types of endocytosis

- There are three methods of **endocytosis** which bring fluid or other molecules _____ the cell
  - □ **Pinocytosis** (cell drinking) brings fluid into cells
  - □ **Phagocytosis** (cell eating) brings large molecules into cells
    - Phagosome fuse with lysosomes in order to degrade molecules
  - □ **Receptor-mediated endocytosis** is a highly specific way to bring molecules into cells
    - Clathrin coated pits bind specific receptors which select cargo for entry (LDL and cholesterol)
    - **Caveolae** (small invaginations of the plasma membrane) can also specifically bring molecules into the cell

EXAMPLE: Three types of endocytosis



Endosomal Sorting

● **Endosomes** are a large organelle sorting _____ for a variety of materials entering and exiting the cell

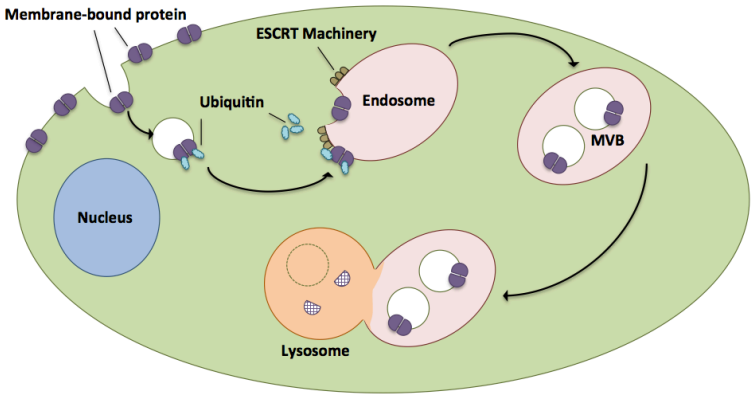
□ There are two types of endosomes: *early* and *late*

- **Late endosomes** are a more mature form of **early endosomes**

□ **Multivesicular bodies** form when invaginations from the endosomal membrane form internal vesicles

- Carries these internalized vesicles to the lysosome for degradation

EXAMPLE: Multivesicular body formation and transport to the lysosome



□ Endosomes are slightly _____ compartments which acts to release receptors from their cargo

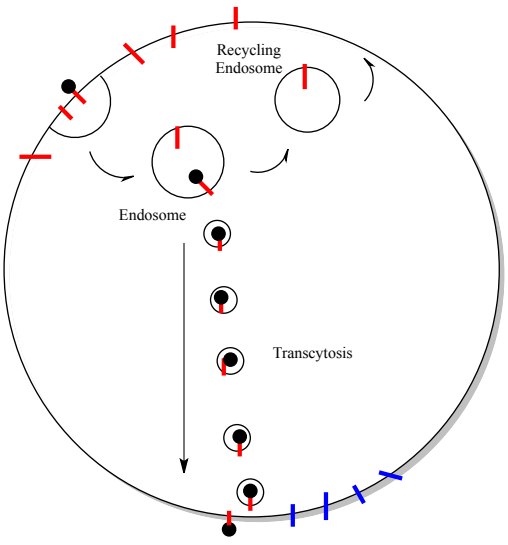
- **Recycling endosomes** carry receptors back to the plasma membrane

- Cargo can travel to the lysosome or other organelles

- **Transcytosis** occurs If cargo remains attached to the receptor and it travels to a different cellular spot

- Cargo that remains bound to receptors ends up wherever the receptor ends up

EXAMPLE: Recycling endosomes and transcytosis



Cholesterol (LDL) Uptake

● Receptor-mediated endocytosis is responsible for taking up _____ from the blood stream

□ **Low-density lipoproteins (LDLs)** are the main form of cholesterol found in the blood

- LDL receptors are present on the plasma membrane

□ When the cell needs cholesterol it makes LDL receptors and places them in the plasma membrane

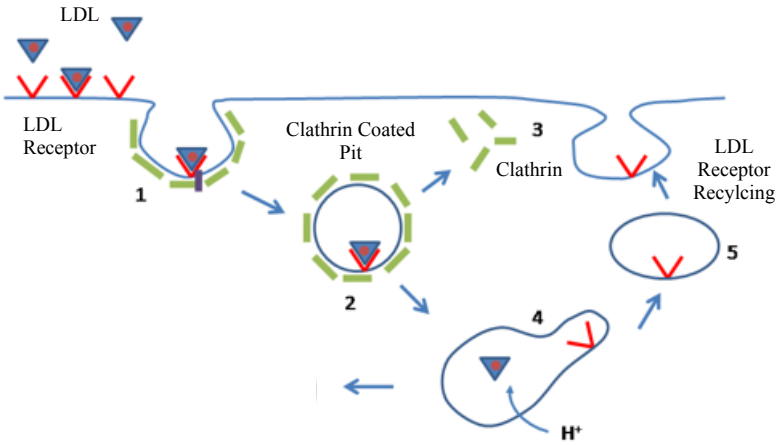
- These receptors then diffuse in the membrane until they come in contact with clathrin-coated pits

- LDL receptors then bind LDL which allows for interaction with adaptor proteins

- This triggers further formation of the clathrin coated pit and internalization of LDL cholesterol

□ High blood cholesterol develops in individuals with mutations in the LDL receptor

EXAMPLE: Diagram of LDL Uptake



Separation of LDL from LDLR

PRACTICE:

1. Which of the following is not an endocytic pathway?
    a. Receptor-mediate endocytosis
    b. Pinocytosis
    c. Fluid uptake
    d. Phagocytosis

2. Which vesicle is responsible for carrying receptors back to the plasma membrane?
    a. Early endosomes
    b. Late endosomes
    c. Recycling endosomes
    d. Multivesicular bodies

3. High blood cholesterol develops when what happens to the LDL receptor?
    a. Too much LDL receptor is produced
    b. Too little LDL receptor is produced
    c. LDL binds the LDL receptor
    d. The cell takes in too much LDL in clathrin coated pits