Difference Between Pinocytosis and Receptor Mediated Endocytosis

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Key Difference – Pinocytosis vs Receptor Mediated Endocytosis

Molecules and ions are transported in and out the cell through the cell membranes. This action can happen actively, passively or facilitated in different ways. Active transport uses energy. Endocytosis is one way of transporting molecules inside the cells actively. Endocytosis is defined as the taking in of matter by a living cell by invagination of its membrane to form a vesicle. Phagocytosis, receptor mediated endocytosis and pinocytosis are forms of endocytosis. Pinocytosis is the ingestion of liquid into cells by budding of small vesicles from the cell membrane. Receptor mediated endocytosis is a process which absorbs specific molecules and viruses inside the cell, recognizing the molecules by receptors located in the cell membrane and then by forming of small vesicles from the cell membrane. The key difference between pinocytosis and receptor mediated endocytosis is that **in pinocytosis, endocytic vesicles nonspecifically absorb molecules from the extracellular fluid to the cells while in receptor mediated endocytosis, receptors specifically recognize and bind with extracellular macromolecules and transport them to the cell.**

What is Pinocytosis?

Pinocytosis is a form of endocytosis in which extracellular fluid is taken inside the cell by forming small vesicles. These endocytotic vesicles are invaginated from the cell membrane. Small molecules which are suspended in the extracellular fluid are transported through this mechanism. Pinocytosis does not select the molecules to transport. All small molecules in the water are ingested by pinocytosis. Hence, it not a specific process; it is also not an efficient process.

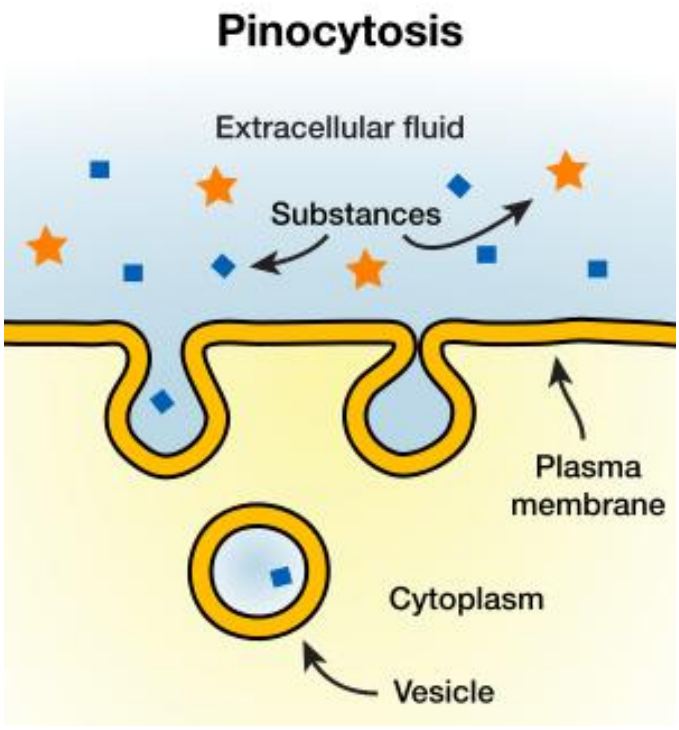

Figure 01: Pinocytosis

Pinocytosis is a simple mechanism which happens in most of the cells. Pinocytosis is the typical molecule transport mechanism in liver cells, kidney cells, capillary cells and epithelial cells.

What is Receptor Mediated Endocytosis?

Receptor mediated endocytosis is a form of endocytosis in which macromolecules are uptaken to the cell selectively from the extracellular fluid. This mechanism is mediated by the receptors on the cell surface. Receptors recognize specific macromolecules form receptor-macromolecule complexes. These receptor-macromolecule complexes accumulate in the pits which are created from the plasma membrane and coated with clathrin. Then these receptor-macromolecule complexes internalize into clathrin coated vesicles formed from clathrin coated pits. The clathrin-coated vesicles then fuse with early endosomes. Macromolecule-receptor complexes dissociate in the reduced pH levels of the endosomes; macromolecules are transferred to lysosomes while receptors are returned to the cell surface.

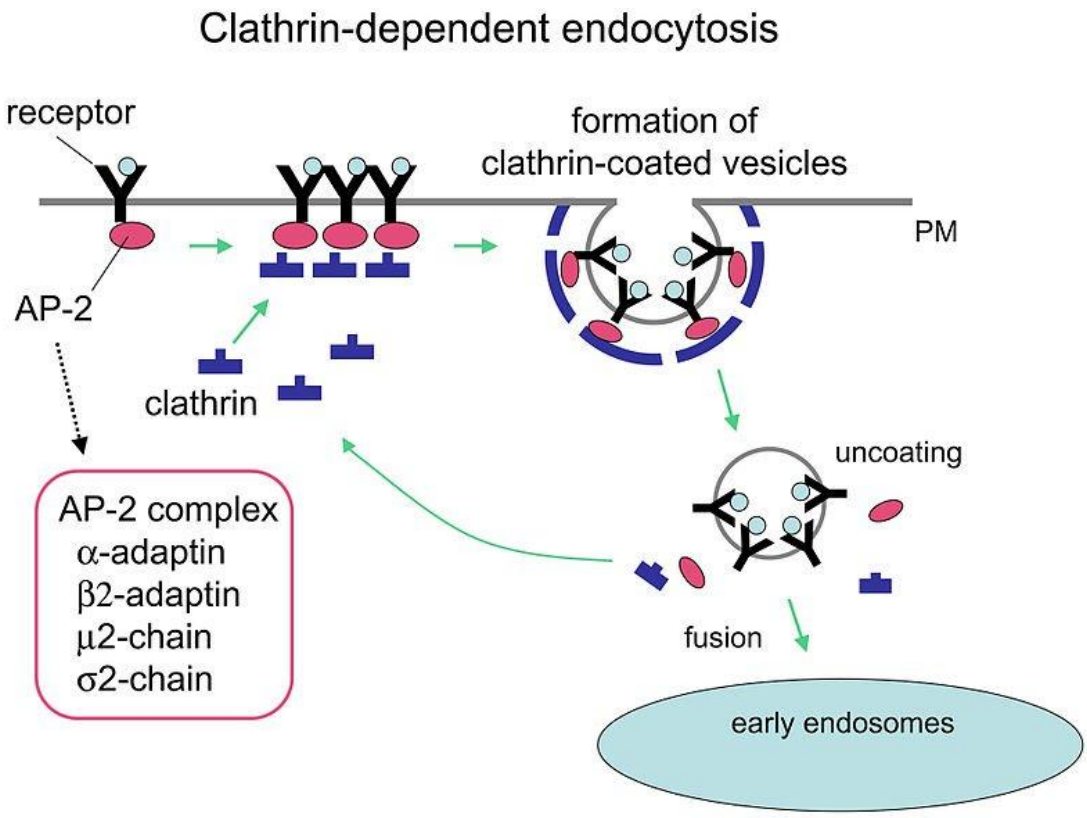

Figure 02: Receptor mediated endocytosis

Receptor mediated endocytosis is a very specific mechanism of up taking molecules into the cells, unlike pinocytosis. Materials to be transported inside are decided by the receptors present on the cell membrane surface. It is a more efficient process than pinocytosis.

What are the similarities between Pinocytosis and Receptor Mediated Endocytosis?

- Pinocytosis and receptor mediated endocytosis are forms of endocytosis.
- Both mechanisms uptake molecules inside the cell by forming small vesicles.

What is the difference between Pinocytosis and Receptor Mediated Endocytosis?

Pinocytosis vs Receptor Mediated Endocytosis	
Pinocytosis the ingestion of liquid into a cell by the budding of small	Receptor mediated endocytosis is a process of transporting molecules inside the cell by

vesicles from the cell membrane.	recognizing and binding to the cell surface receptors and forming vesicles.
Selectivity	
Pinocytosis does not select molecules to uptake. It absorbs anything in the extracellular fluid.	Receptor mediated endocytosis is very specific. It transports specific molecules which are recognized by the receptors.
Efficiency	
Pinocytosis is less efficient compared to receptor mediated endocytosis.	Receptor mediated endocytosis is more efficient than pinocytosis.
Mechanism	
Pinocytosis has a simple way of absorbing substances	Receptor mediated endocytosis is comparatively complex than pinocytosis. It involves receptors and clathrin.
Water Absorption	
Pinocytosis absorbs water together with small molecules.	Receptor mediated endocytosis uptake only large particles.
Types of Vesicles Formed	
Vacuoles are formed during the process of pinocytosis	Endosomes are formed during receptor mediated endocytosis.

Summary – Pinocytosis vs Receptor Mediated Endocytosis

Pinocytosis and receptor mediated endocytosis are two types of endocytosis mechanisms which function in most of the cells. Pinocytosis is a simple process in which extracellular fluid is taken in by the cell without a selection. Receptor mediated endocytosis is a complex process in which macromolecules in the extracellular fluid are identified by cell surface receptors and taken inside the cell

by clathrin coated vesicles. Pinocytosis is a nonspecific process while receptor mediated endocytosis is a specific process. This is the difference between pinocytosis and receptor mediated endocytosis.

References:

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2. Cooper, Geoffrey M. "Endocytosis." The Cell: A Molecular Approach. 2nd edition.U.S. National Library of Medicine, 01 Jan. 1970. Web. Available here. 18 July 2017.

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