While the following article provides a reasonably good explanation of endocytosis, biomedical research is still seeking to understand many facts of this crucial cellular mechanism.


With that being said, our modeling of the mechanisms that facilitate transfer of cell-surface signaling to the cytoplasm provides considerably more significant details than the ones addressed in the following article. Our modeling is described here:


Until now, we have opted to set aside efforts to explain exocytosis and the mechanisms that enable the transport of signaling from within a cell to the surface where the process enables cells to communicate and align. The MCFIP website provides explicit and verifiable modeling for how small molecules are formed that perform cell-surface signaling. However, our hypothesis for how substances created within cells are transported into the extracellular matrix (exocytosis) has not been elucidated until now.

The theory for expulsion of contents of cells into the extracellular environment is mentioned in figure 1 and illustrated in step three. However, unlike our model for endocytosis, specific epigenetic signaling and a verifiable model for process and other methods are not provided.

While verification is needed, the following is provided to stimulate discussions for exocytosis with interested parties.

As cells require additional support to facilitate their ability to communicate as a means of means of creating crucial mass, a TBD mechanism must signal the cell to divide. Following division, the original cell is likely to be subjected to apoptosis (whole cell disassembly) that will place the entire contents in the extracellular matter where the constituents can be used by new cells to replenish their needs; e.g. amino acids, minerals, etc. This cyclic activity is necessary to ensure others cells can secure necessary substances that are required for them to perform their specific functions.

Details to support this hypothesis and our thoughts for the signaling to divide can be discussed with interested parties.


Endocytosis and Exocytosis

Written by tutor Aleli C.

The movement of macromolecules such as proteins or polysaccharides into or out of the cell is called bulk transport. There are two types of bulk transport, exocytosis and endocytosis, and both require the expenditure of energy (ATP).

In exocytosis, materials are exported out of the cell via secretory vesicles. In this process, the Golgi complex packages macromolecules into transport vesicles that travel to and fuse with the plasma membrane. This
fusion causes the vesicle to spill its contents out of the cell. Exocytosis is important in expulsion of waste materials out of the cell and in the secretion of cellular products such as digestive enzymes or hormones.

Endocytosis, on the other hand, is the process by which materials move into the cell. There are three types of endocytosis: phagocytosis, pinocytosis, and receptor-mediated endocytosis. In phagocytosis or “cellular eating,” the cell’s plasma membrane surrounds a macromolecule or even an entire cell from the extracellular environment and buds off to form a food vacuole or phagosome. The newly-formed phagosome then fuses with a lysosome whose hydrolytic enzymes digest the “food” inside.
In pinocytosis or “cellular drinking,” the cell engulfs drops of fluid by pinching in and forming vesicles that are smaller than the phagosomes formed in phagocytosis. Like phagocytosis, pinocytosis is a non-specific process in which the cell takes in whatever solutes that are dissolved in the liquid it envelops.

Unlike phagocytosis and pinocytosis, receptor-mediated endocytosis is an extremely selective process of importing materials into the cell. This specificity is mediated by receptor proteins located on depressed areas of the cell membrane called coated pits. The cytosolic surface of coated pits is covered by coat proteins. In receptor-mediated endocytosis, the cell will only take in an extracellular molecule if it binds to its specific receptor protein on the cell’s surface. Once bound, the coated pit on which the bound receptor protein is located then invaginates, or pinches in, to form a coated vesicle. Similar to the digestive process in non-specific phagocytosis, this coated vesicle then fuses with a lysosome to digest the engulfed material and release it into the cytosol. Mammalian cells use receptor-mediated endocytosis to take cholesterol into cells. Cholesterol in the blood is usually found in lipid-protein complexes called low-density lipoproteins (LDLs). LDLs bind to specific receptor proteins on the cell surface, thereby triggering their uptake by receptor-mediated endocytosis.
Figure 4: Receptor-Mediated Endocytosis

1. A specific molecule binds to a receptor protein on the cell's surface.
2. The cell membrane pinches in.
3. A coated vesicle forms.
4. The coated vesicle fuses with a lysosome, which contains hydrolytic enzymes.