Endocytosis Encyclopedia Article

Endocytosis

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Contents

Endocytosis Encyclopedia Article.....1

Contents.....2

Endocytosis.....3

Endocytosis

Endocytosis (from Greek *endon*, meaning within and *kytos*, meaning vessel) is the process by which materials are engulfed into a cell. There is an infolding of the cell membrane, which then pinches around substances, forming a vacuole or vesicle, and the materials are transported into the cytoplasm of the cell. Since endocytosis requires energy some scientists consider it a form of active transport. There are three types of endocytosis: pinocytosis, phagocytosis, and receptor-mediated endocytosis.

Pinocytosis is the process in which cells engulf liquids. The liquids may or may not contain dissolved materials. Pinocytosis can occur in many types of cells in multicellular organisms. For example, as a human egg cell matures in the ovary, it is surrounded by other cells. These cells pass nutrients to the egg cell, which engulfs them using pinocytosis. Pinocytosis has also been observed in white blood cells (macrophages and leukocytes), kidney cells, epithelial cells of the intestine, and plant root cells.

Phagocytosis is the process by which solid particles are engulfed into the cell. Some unicellular organisms such as amoeba feed by phagocytosis. Their pseudopods move around solid food particles, which are engulfed into a vacoule or vesicle in the cytoplasm of the organism. The vacuole or vesicle can then fuse with a lysosome, containing digestive enzymes, so that the food may be broken down and used by the organism. Phagocytosis can occur in multicellular organisms as well. For example, some types of white blood cells in humans engulf invading bacteria and other foreign particles and destroy them. Thus, these phagocytic cells are an important part of our immune system.

With receptor-mediated endocytosis the substances which are to be transported into the cell first must bind to specific sites or receptor proteins on the outside of the cell. The substances are then engulfed into the cell. For example, in animals, cholesterol enters cells through receptor-mediated endocytosis. In order for cholesterol molecules to enter the cell, they must first bind with receptors on the cell membrane. Once they bind, a vesicle forms, carrying the cholesterol into the cell.

Once materials are engulfed into the cell and digested or used, wastes can be removed by the process of exocytosis. In this process, which is almost the opposite of endocytosis, the vacuole or vesicle joins the cell membrane and releases substances to the outside of the cell.