Mechanisms and functions of endocytosis in T cells

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Video Byte

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Abstract

In endocytosis, the cell plasma membrane folds inward and pinches off to form intracellular vesicles. Originally, endocytosis was thought to primarily facilitate feeding and pathogen neutralization, but it is now known to regulate numerous processes in eukaryotic cells, such as signaling, membrane composition, mitosis, movement, and morphogenesis. Endocytosis also plays many roles in T cells through both clathrin-dependent and clathrin-independent mechanisms. For example, clathrin-mediated endocytosis regulates the receptors on the plasma membrane and internalizes α/β -type T cell antigen receptors (TCRs). Through clathrin-independent pathways, endocytosis internalizes TCR ζ and the IL-2R β complex and recycles TCR $\alpha\beta$. Clathrin-independent endocytosis also helps T cells bind to antigen-presenting cells of the immune system and ingest pathogens and other foreign materials to aid in host defense and immune surveillance. One form of endocytosis, termed macropinocytosis, provides amino acids for mTORC1 activation, thereby promoting T cell growth and activation. Although certain mechanisms and functions remain unclear, the existing evidence reveals that endocytosis supports diverse T cell-specific functions, highlighting the critical role of this process in T cell biology.