

Researchers capture images of open channel that moves proteins across cell membranes

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Similar to passengers on an urban transit system, every protein made in the cell has a specific destination and function. Channels in cell membranes help direct these proteins to their appropriate target.

Researchers at Boston University School of Medicine (BUSM) and their colleagues have now captured images of these channels as they open to allow proteins to pass through a membrane, while the proteins are being made. These findings are published as a Letter in *Nature* (Park, E. et al. 2013).

Christopher W. Akey, PhD, professor of physiology and biophysics at BUSM is a co-senior author of the Letter. In addition, the collaborating institutions include Harvard Medical School (HMS), Baylor College of Medicine (BCM) and Georgia Institute of Technology (GT).

Proteins, which are encoded by genes, are large molecules that perform specific functions. Many proteins such as hormones and growth factors are secreted by the cell and move into the bloodstream. These proteins are made in factories called ribosomes, which interact with a family of channels called Sec61/SecY that provide a path across the membrane. Initially, these nascent, or newly-made, proteins are inserted into channels as the proteins are being made. The channels also aid in inserting nascent proteins into the [cell membrane](#) where they function as receptors for drugs and form ion channels that function in vision and in transmitting nerve cell impulses.

In this study, researchers used samples made in *E. coli* bacteria to

determine the structure of the highly conserved SecY [channel](#). Using an electron microscope and computer analysis, researchers were able to capture images of the SecY channel opening when a nascent protein enters the central pore. In particular, the channel undergoes large movements that enlarge the central pore as a first step in allowing the nascent [protein](#) to cross the cell membrane and eventually travel to its destination.

"Similar to train cars that transport passengers through a tunnel, SecY/Sec61 channels help nascent proteins move across the cell membrane to reach their target in the body, and this study provides important insight about the function of these channels," said Akey.

Provided by Boston University Medical Center

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