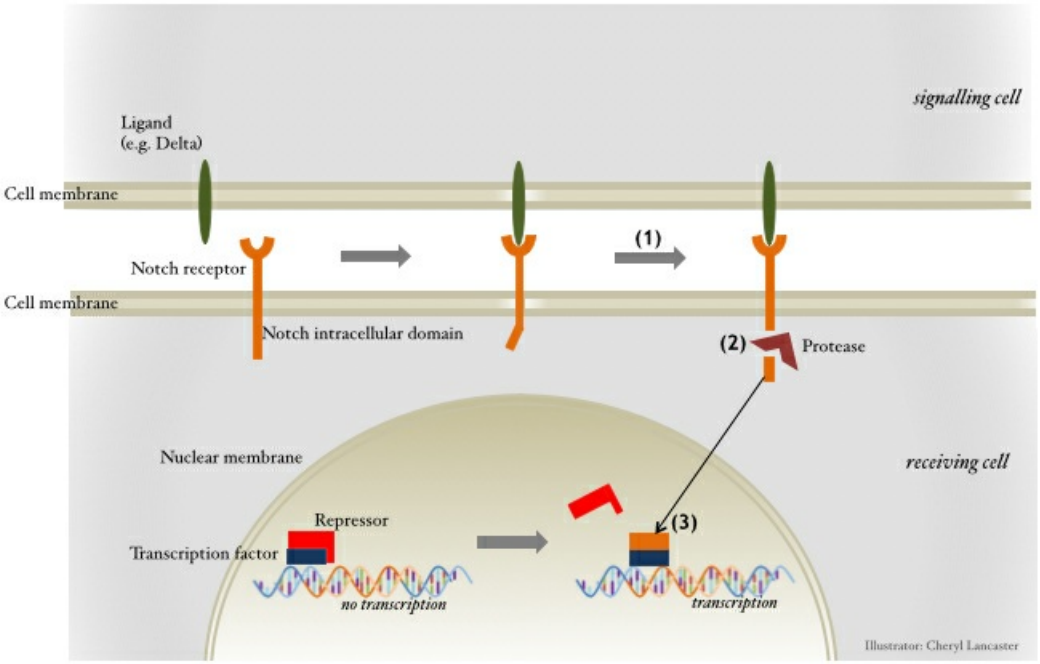
Mechanism of Notch Signaling [1]

By: Lancaster, Cheryl Keywords: Notch signaling [2]



Mechanism of Notch Signaling: The image depicts a type of cell signaling, in which two animal cells interact and transmit a molecular signal from one to the other. The process results in the production of proteins, which influence the cells as they differentiate, move, and contribute to embryological development. In the membrane of the signaling cell, there is a ligand (represented by a green oval). The ligand functions to activate a change in a receptor molecule. In the receiving cell, there are receptors; in this case, Notch proteins (represented by orange forks). The Notch proteins are embedded in the receiving cell membrane, and they have at least two parts: an intracellular domain (inside the cell) and the receptor (outside the cell). Once the ligand and receptor bind to each other, a protease (represented by the dark red triangle) can sever the intracellular domain from the rest of the Notch receptor. Inside the nucleus of the receiving cell (represented by the gray area) are the cellês DNA (represented by the multi-colored helices) and its transcription factors (blue rectangles). Transcription factors are proteins that bind to DNA to regulate transcription, the first step in gene expression, which eventually yields proteins or other products. Initially, repressor proteins (represented by a red irregular hexagon) prevent transcription factors from allowing transcription. When the severed Notch receptor intracellular domain reaches the nucleus, it displaces the repressor. The transcription factor can then signal for transcription to occur. 1) There is a Notch receptor protein in the membrane of a receiving cell, and a ligand for this receptor (for example, Delta) in the membrane of the signaling cell. When the ligand binds to the receptor, the intracellular domain of the receptor changes shape. 2) Inside the receiving cell, there are proteases. Once the intracellular domain of the receptor changes shape, the protease can bind to it and shear the intracellular domain away from the rest of the receptor molecule. 3) The severed intracellular domain is shuttled to the receiving cell nucleus. Here, the intracellular domain displaces a repressor protein. This allows a transcription factor to initiate DNA transcription. During transcription, DNA is used as a template to create RNA. Following transcription, the process of translation occurs, which uses RNA as a template to create proteins. These proteins influence the behavior, fate, and differentiation of cells, which contribute to normal embryonic development

Subject

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Publisher
Arizona State University. School of Life Sciences. Center for Biology and Society. Embryo Project Encyclopedia.

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Format
Graphics [10]

Last Modified
Wednesday, July 4, 2018 - 04:40

DC Date Accessioned
Thursday, August 21, 2014 - 15:16

DC Date Available
Thursday, August 21, 2014 - 15:16

DC Date Created
2014-08-21

DC Date Created Standard
Thursday, August 21, 2014 - 07:00

dspace_image
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