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Transducing Signals between Cellular Compartments: Using a Protease Cascade to Construct a Rapid, Sensitive and Robust Signaling System

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Effective mechanisms to deal with stress are vital to all living organisms. To maintain cellular viability, stress signaling pathways and their responses must be rapid, sensitive and robust. In *E. coli*, separate responses cope with stress in the cytoplasmic and envelope compartments of the cell. Each response is carried out by an alternative's transcription factor whose activity is controlled by a signal transduction cascade with proteases as the central mediators.

During normal cell growth, the envelope stress response is induced primarily by unassembled outer membrane porins (OMPs) in the envelope compartment. s E directs the response that reduces this stress. RseA, a membrane spanning anti-sigma factor and RseB, a periplasmic protein that binds to RseA negatively regulate the activity of s E. RseA is degraded by a proteolytic cascade that is activated by stress.

I will discuss the design principles of the proteolytic cascade that carries out regulated proteolysis of RseA., and the interconnections that we have uncovered between the construction of the envelope stress pathway and its function.