Effect of noise on signaling pathways.

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All cellular processes are characterized by noise because of the microscopic nature of the system. This noise, generally, is categorized into two components - intrinsic and extrinsic. Intrinsic noise is a result of the inherent randomness in the system in terms of the stochasticity in the number of molecules undergoing a reaction at a particular time. Extrinsic noise, on the other hand, is the randomness that is caused by factors external to the system of interest.

In this talk, I will discuss the effect of noise on two specific biological processes. One is the study of ribosome trafficking on an mRNA under the influence of extrinsic noise. We have found that the extrinsic noise in the rate of exit of ribosome from the mRNA does not have a significant effect on the mean residence time of the mRNA near the membrane, while the residence time distribution broadens significantly when the noise influences the entry rate. The other study looks at the influence of the heat shock factor in the heat shock stress response mechanism. We find that the system becomes more constrained and this then affects the bistability in the protein aggregate formation. Here, intrinsic noise is the major player.