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Talk 1:

**Protein clustering enhances signaling fidelity**

Experiments in recent years have vividly demonstrated that the membrane is a highly heterogeneous environment. A key example is the partitioning or clustering of proteins via lipid domain formation or cytoskeleton-induced corralling. In this talk, I will show using theory and computer simulations that protein clustering can enhance biochemical information transmission by removing correlations in the signal and by linearizing the response. Yet, protein partitioning can also impede signaling when the partitions become too small. This trade-off leads to an optimal protein cluster size that agrees quantitatively with experiment. Our results suggest that molecular partitioning or clustering is not merely a consequence of the complexity of subcellular structures, but also plays an important functional role in cell signaling.