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## Investigation Of Channel Clustering and Cooperativity for the Ion Channel Protein Kcsa

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Ion channel proteins are essential for various physiological processes, such as muscle contraction and signal transduction, by transporting ions and small molecules across biological membranes. The cooperative behaviour of ion channels, where the activity of one channel can directly influence neighbouring channels, plays a crucial role in their overall function and regulation. A thorough investigation of the mechanisms underlying cooperativity is key to understanding how ion channel proteins work in concert to control cellular processes. Since physical proximity is required for cooperativity, we aim to investigate channel clustering via fluorescence microscopy. This project focuses on KcsA, a potassium ion channel protein with the aim of assessing its clustering behaviour and linking it to channel activity and regulation. By comparing full-length KcsA with truncated versions, where the C-terminal cytoplasmic domain and/or the M0 helix have been removed, it will give insight into the structural components of the protein involved in clustering. Furthermore, a unique approach will be the simultaneous use of fluorescence microscopy for the investigation of channel clustering and electrophysiology to assess the properties of channel activity. This combined methodology provides a more comprehensive understanding of channel function by capturing the complexity of the system.