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Associate Professor Steve Reichow

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Steve Reichow earned his PhD from the University of Washington in 2006, followed by post-doctoral training at the Howard Hughes Medical Institute. There, he embraced cryo-EM to investigate membrane channels and dynamic protein assemblies. In 2014, he began as an Assistant Professor at Portland State University, rising to Associate Professor in 2020. In 2022, Reichow joined Oregon Health & Science University, holding dual roles in the Department of Chemical Physiology & Biochemistry and the Vollum Institute. His lab combines biochemical techniques with atomic-level cryo-EM imaging to explore protein function and disease. Reichow has been closely involved with development of the Pacific Northwest Cryo-EM Center (PNCC), and now serves as the OHSU lead investigator for the PNCC.

Mechanistic insights into gap junction cell-to-cell communication enabled by cryo-EM

Gap junctions play a central role in facilitating cell-to-cell communication throughout our bodies. These intercellular channels are essential for establishing harmonious coupling of neurons, the synchronous beating of cardiac cells, and ensuring efficient coordination of cellular signals and metabolic activity throughout most tissues (e.g. heart, skin, liver and eye lens). When something goes awry with these communication pathways, the repercussions can be dire, leading to conditions such as cardiac arrhythmia, stroke, blindness, deafness, skin disease and cancers. Despite their importance, our understanding of the intricacies of how these channels function had remained stymied for decades. The hurdle? Challenges associated with the crystallization of membrane proteins. By harnessing the power of high-resolution single particle cryo-electron microscopy (cryo-EM), we've been able to sidestep these traditional barriers and illuminate the previously obscured mechanisms behind these vital communication channels. We're now able to dissect, with atomic-level detail, how gap junctions meticulously regulate the flow of electrical and chemical information between cells, and unravel the mysteries of how misregulation can trigger disease. By leveraging developing methods in membrane protein biochemistry and cryo-EM technologies, we are unveiling fresh perspectives of how gap junctions interact with, and are influenced by, their local lipid environment. Ultimately, we envision cryo-EM as an enabling technology that will shepherd us toward the development of new pharmacological agents that may serve as effective tools to combat a variety of gap junction-related disease.