Liguo Wang, J Proteomics Bioinform 2016, 9:10(Suppl)
http://dx.doi.org/10.4172/0974-276X.C1.088

6th International Conference on

Structural Biology

August 22-23, 2016 New Orleans, USA

Liguo Wang
University of Washington, USA

Random spherically constrained (RSC) single particle cryo-EM for structures of membrane proteins in a membrane environment

Recently, a steadily growing community of researchers has been attracted by the capability of cryo-Electron Microscopy (cryo-EM) to obtain atomic-resolution structures without the need to crystallize their samples. To study membrane protein structures using cryo-EM, membrane proteins are usually extracted from cell membranes and dissolved in detergents. However, both functional and structural studies clearly highlight the importance of a lipid membrane environment to preserve protein integrity and activity. To restore the lipid membrane environment of membrane proteins, I have been developing a platform called "random spherically constrained" (RSC) single-particle cryo-EM for both structural and functional studies of membrane proteins. The RSC platform establishes the lipid environment for membrane proteins and makes it possible for the first time, to apply desired transmembrane potential to trap voltage-gated ion channels in desired functional states for structural analysis. To confirm the absolute amplitude of the transmembrane potential, the hyperpolarization- activated cyclic nucleotide-gated (HCN2) channel was investigated as a model protein, as it only opens at very negative transmembrane potentials. The results confirmed that a negative potential of -120 mV was successfully established as predicted. The RSC method has been successfully employed to obtain the structures of both the large conductance voltage and calcium-activated potassium (BK) and HCN2 channels in lipid membranes. This confirmed that the RSC method could be used to manipulate the functional states of other voltage-gated ion channels, which is critical for understanding the mechanism under which the ion channel responds to the transmembrane potential.

Biography

Liguo Wang has completed his PhD from Cornell University and Post-doctoral studies from Yale University School of Medicine. He is an Assistant Professor in the Department of Biological Structure at the University of Washington. He has more than 10 years of expertise in cryo-Electron Microscopy and developed a method to study structures of membrane proteins in lipid environments, which make it possible to manipulate the functional states of membrane proteins. He has published more than 20 papers in reputed journals, served as a Reviewer for several high-ranking journals and as a Reviewer of scientific proposals for a few scientific organizations.

LW32@uw.edu