NANYANG TECHNOLOGICAL UNIVERSITY

School of Biological Sciences

Seminar Announcement

Interaction of Membrane Cholesterol with G Protein-Coupled Receptors: Novel Insights in Health and Disease

Date: 17 April 2017 Monday

Time: 11:0am to 12:00pm

Venue: SBS Classroom 2 (SBS-01n-22)

Host: Associate Professor Surajit Bhattacharyya

Speaker: Prof. Amitabha Chattopadhyay
Centre for Cellular and Molecular Biology, Uppal Road, Hyderabad, India

Abstract

G protein-coupled receptors (GPCRs) are the largest class of molecules involved in signal transduction across membranes, and represent major drug targets in all clinical areas. The serotonin1A receptor is an important neurotransmitter receptor of the GPCR superfamily and is implicated in the generation and modulation of various cognitive, behavioral and developmental functions. We previously demonstrated that membrane cholesterol is necessary for ligand binding, and G-protein coupling of serotonin$_{1A}$ receptors. Interestingly, recently reported crystal structures of GPCRs have shown structural evidence of cholesterol binding site(s). In this context, we reported the presence of cholesterol recognition/interaction amino acid consensus (CRAC) motifs in the serotonin1A receptor. We also showed that the receptor is more stable and compact in the presence of membrane cholesterol. Our recent results utilizing coarse-grain molecular dynamics simulations to analyze the molecular nature of receptor-cholesterol interaction offer interesting insight in cholesterol binding site(s) in the receptor and oligomerization of the receptor. We showed utilizing homo-FRET that the serotonin1A receptor is constitutively oligomerized in live cells, with the possibility of higher order oligomers of the receptor. Progress in deciphering molecular details of the nature of GPCR-cholesterol interaction in the membrane would lead to better insight into our overall understanding of GPCR function in health and disease.

Short Bio

Prof. Amitabha Chattopadhyay received B.Sc. with Honors in Chemistry from St. Xavier's College (Calcutta) and M.Sc. from IIT Kanpur. He obtained his Ph.D. from the State University of New York (SUNY) at Stony Brook, and was a Postdoctoral Fellow at the University of California, Davis. He subsequently joined the Centre for Cellular and Molecular Biology (CCMB) in Hyderabad and now is a J.C. Bose Fellow there.

Prof. Chattopadhyay's work is focused on monitoring organization, dynamics and function of biological membranes in healthy and diseased conditions. His group has developed and applied novel, innovative and sensitive techniques (such as the *wavelength-selective fluorescence approach*) using fluorescence spectroscopy for monitoring solvent relaxation in membranes, membrane-mimetic media, and proteins. These pioneering studies have led to a better understanding of the dynamics of hydration of membranes and proteins. Another seminal contribution of Prof. Chattopadhyay's group focuses on the role of membrane cholesterol in regulating the organization, dynamics and function of G protein-coupled receptors such as the serotonin$_{1A}$ receptor.