Weekly Seminar by Dr Chandrika Deshpande

Calcium is essential for the iron-export activity of the ferroportin transporter family

Tuesday 8th March at the Department of Molecular Sciences, Macquarie University

Abstract

Iron is essential for almost all living organisms owing to its involvement in a number of metabolic and catalytic processes. Iron metabolism is critical in mammalian system and both iron deficiency and overload can account for some of the most common human diseases, such as iron-restricted anemia and hemochromatosis. To date, Ferroportin (FPN) is the only known mammalian iron exporter and is responsible for the entry of iron from intracellular storage into plasma for circulation.

Despite the pivotal function of FPN in iron homeostasis, the fundamental driving mechanism for FPN-mediated iron export remains unknown. We have shown by combining transport and biophysical studies, that FPN is a Ca^{2+} dependent iron transporter. In addition, we have determined the crystal structure of a Ca^{2+}-bound BbFPN protein (a prokaryotic homolog of FPN), revealing a marked Ca^{2+}-induced conformational change. Our results have demonstrated that Ca^{2+} is a required cofactor in FPN-mediated metal efflux. Our findings provide important conceptual advancements in the understanding of FPN-mediated iron efflux and have fundamental implications for developing strategies to manipulate FPN therapeutically.

Short bio

Dr Chandrika Deshpande completed her PhD under the supervision of Dr. Bridget Mabbutt from Macquarie University in 2011. During her PhD, she received the prestigious Endeavour International Postgraduate Research Scholarship, a highly competitive scholarship from Australian government for international students as well as the Macquarie University Research Excellence Scholarship. Post PhD she has been working as a Research Officer at the Centenary Institute (CI), Sydney. She is a biochemist and molecular biologist with a strong background in protein research. At the Centenary Institute her current research involves structural and functional characterization of important bacterial and eukaryotic membrane proteins. In 2012, she received the Postdoctoral Fellowship award (2012-2015) from the National Breast Cancer Foundation (NBCF) as well as the Early Career Researcher grant from the University of Sydney which enabled her to pursue her research in membrane transporters. She has maintained a good publication record with a total of 15 publications and continues to publish despite the complexity of the structural biology field. These include primary and co-authorships in high impact journals such as Nature Genetics, Nucleic Acids Research, Genome Research and Nature Communications. In this talk she will present the most recent results of her research on the iron transporter Ferroportin.