TIFR Centre for Interdisciplinary Sciences
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Students' Annual Seminar

Structure, dynamics and biomolecular interactions as studied by NMR

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I. Structural Characterization of a Cataract-active Mutant of Human γS Crystallin

Cataract, or the opacification of the eye lens, is the leading cause of blindness world over. While age-related cataract is the result of the accumulation of environmental and metabolic effects, congenital cataract, seen in newborn children, is essentially genetic in etiology. The human eye lens has three major γ crystallins, namely, γC, γD, and γS. Mutations in these crystallins are expected to affect their packing in the lens and compromise transparency, giving rise to lens opacification or cataract. Such mutations, when inherited, can lead to congenital cataracts. A fifth mutation in human γS-crystallin, G57W, has been recently reported in a three-generation Chinese family wherein a young boy and his mother were found to have pulverulent cataract in the center of the lens.

With this in the backdrop, we set out to structurally characterize the G57W mutant of γS-crystallin by solution NMR and correlate its 3D structure and dynamics with the wild-type protein. The question that will be addressed is how the introduction of a bulkier aromatic side chain of Trp residue in place of Gly leads to notable changes in the intra- and intermolecular interactions in the mutant. In addition, attempts will be to study the unfolding kinetics of these two proteins upon heating and upon the addition of chemical denaturants.

II. Biomolecular Interaction of a bifunctional nuclease UVI31+ with RNA

UVI31+ is a novel bifunctional nuclease associated with pyrenoid (chloroplast) and cell wall compartments of ***Chlamydomonas reinhardtii,*** single celled algal plant cells. When overexpressed, it provides UV resistance and induces round cell morphology in ***E. coli.*** UVI31+ is a member of the BolA family of proteins, which have a conserved helix-turn-helix motif, with proposed DNA binding ability. As a prelude to studying biomolecular interactions, we have successfully overexpressed and purified the wild type and its relevant S114A mutant. We want to study the interactions between UVI31+ and RNA by solution NMR and ITC.

Thursday, Jun 8th 2017

4:30 PM (Tea/Coffee at 3:45 PM)

Seminar Hall, TCIS