
Physics Colloquium

University of Missouri-Kansas City

Department of Physics

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Biology
University of Missouri-Kansas City

Probing the Mechanisms for Intracellular Zinc Ion Regulation

Abstract: NMR is a well-suited technique to investigate structural and dynamic changes of proteins in solution. As the home of the UMKC School of Biological Sciences NMR Facility, we are using NMR and other biophysical and molecular biology approaches to explore several aspects of zinc finger transcription factor biology. Cys2His2 zinc finger proteins adopt a highly conserved bba fold, which is stabilized by tetrahedral coordination of a central zinc ion to two cysteine and two histidine residues. Although the function of most zinc fingers is sequence-specific DNA binding, other roles such as zinc sensors have been identified. A major focus of the lab is to characterize the molecular mechanisms that control zinc homeostasis in yeast and mammalian cells. The divalent zinc ion is the second most abundant trace element in humans after iron. It is an essential nutrient, but also toxic if accumulated to excess. Organisms ranging from bacteria to mammals maintain intracellular zinc levels within a functional range through homeostatic mechanisms that can be regulated at the level of gene expression. Zinc homeostasis is governed in part by two zinc finger-containing transcription factors, Zap1 (yeast) and MTF-1 (mammalian and insect). Studies from our lab and others have uncovered distinct mechanisms whereby MTF-1 and Zap1 sense and respond to intracellular levels of accessible or “labile” zinc at the level of coordination chemistry to a subset of Cys2His2 zinc fingers in each protein, which ultimately influence the expression of homeostatic proteins.

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****Coffee at 3:10: Colloquium at 3:30 in Room 310****