

Dr. Mark E. Girvin
Biochemistry Department
Albert Einstein College of Medicine
Bronx, New York

Title: “How a proton gradient drives ATP synthesis in oxidative phosphorylation”

Abstract:

Membrane transporter proteins are typically large, multi-chain proteins that only fold and function properly in close mimics of a membrane bilayer. With this size and complexity, solution NMR seems an unlikely method for examining their structure and function. Yet by careful choice of reconstitution media, protein constructs, and NMR methods, one can address key structural and functional questions for some of these membrane proteins. Solution NMR structural studies of two transporters – the F_1F_0 ATP synthase and a small multi-drug resistance pump from *S. aureus*. – will be described. The main focus will be on the ATP synthase, where NMR structure determinations and changes in distances determined from paramagnetic relaxation effects were used to identify the transport-linked conformational changes in monomers and small oligomers of the proton translocating subunit of the complex. The small MDR studies have proven more challenging, since the protein only folds in fully functional form in very large detergent micelles or phospholipid bicelles. Even in these protein-lipid complexes of ~ 150 kD, however, NMR assignments and structural information can be achieved.