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Targeting Efflux Pump Machinery at Multiple Scales

Gnana S. Gnanakaran
Principal Investigator
Theoretical Biology and Biophysics Group
Los Alamos National Labs

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For more information contact:
Ajay Gopinathan; agopinathan@ucmerced.edu

ABSTRACT

At present we mainly rely on antibiotics for the treatment of bacterial infections encountered in public health and bio-threat scenarios. However rapid emergence of antibiotic-resistant bacteria poses a major hurdle in the treatment of such infections. Membrane protein complexes, called the multi-drug resistance efflux pumps are the most important machinery that bacteria utilize to pump out almost all types of antibiotics before they can act on their targets. Although all bacteria express these efflux pumps, very little is known about how they work. In this talk, I will describe our efforts to develop an experiment-based multi-scale model that integrates structural, genetic, and cellular processes to understand how efflux pumps work.

BIO:

Dr. Gnanakaran's research interest lies at the interface of biology and the physical sciences. Gnana did his Ph.D. in Physical Chemistry from UPenn and then a postdoc at Los Alamos National Lab in the Theoretical Biology and Biophysics Group where he stayed on as a staff scientist. The general thrust of his research program is aimed at developing and applying computational methodologies to understand structural characteristics, kinetics and thermodynamics of peptides, proteins and carbohydrates in the context of aqueous and lipid environments.