PROJECT FACT SHEET

Molecular Charpones Protect Cells and Prevent Disease

Investigator: Thomas H. MacRae
Department of Biology
Dalhousie University

Organisms within the genus *Artemia* are unusually hardy, and perhaps the most famous of these are the brine shrimp, or "sea monkeys" that children purchase in novelty stores. Brine shrimp have the ability to produce embryos that enter a state of suspended animation termed diapause where they are metabolically inactive and extremely stress resistant. This means that the embryos can remain in stasis without oxygen, even at below-zero temperatures. Because of their unusual traits, *Artemia* embryos have long been a topic of scientific study.

Thomas MacRae, a Professor of Biology at Dalhousie University, studies p26, a small heat shock protein that is produced exclusively in *Artemia* embryos. Proteins like p26 are called molecular chaperones after their ability to influence protein folding and localization within cells.

After careful study of p26, Dr. MacRae's team, in collaboration with researchers at the University of California's Bodega Marine Laboratory, Leiden University's Department of Molecular Cell Biology, and the Departments of Biology at the University of Windsor and Mount Allison University, determined that p26 provides cells with resistance to physiological stress. Then, the team examined proteins that interact with p26 to find out how this protein, and small heat shock proteins in other species, protect cells. This work led to the discovery of another protective protein termed artemin, now under study.

The research takes scientists further along the path of understanding how molecular chaperones protect cells – a process with significant medical implications. For example, small heat shock proteins play a role in preventing cataracts, a major cause of blindness. The work also has implications for neurological diseases such as Parkinson's, Alzheimer's and Alexander's, because of the significant role that unfolded proteins play in these diseases.

"Learning how certain cells survive long-term suspension of metabolism and growth under difficult conditions has implications of a fundamental nature," notes Dr. MacRae. "This research makes both basic and applied contributions to the study of how molecular chaperones work and how cells respond to stress."

-30-

Contact information:
Thomas H. MacRae
Department of Biology
Dalhousie University
Phone: (902) 494-6525
Email: tmacrae@dal.ca