# NSHRF PROJECT FACT SHEET

**Bacterial Food Borne Infections: A Safer Food Supply For The New Millennium**

Investigators: Rafael A. Garduno
Assistant Professor
Department of Microbiology and Immunology, and
Department of Medicine
Faculty of Medicine
Dalhousie University

Tom Gill
Professor
Department of Food Science & Technology
Dalhousie University

Walter Schlech
Infectious Diseases Specialist
Queen Elizabeth II Health Sciences Centre and
Department of Medicine, Dalhousie University

Three Nova Scotian scientists from three complementary disciplines are working together to improve the safety of the food supply. Microbiologist Rafael Garduno, food scientist Tom Gill and infectious diseases specialist Walter Schlech are investigating listeriosis and the bacterium that causes it, *Listeria monocytogenes*. Listeriosis is a serious, often fatal, systemic infection that results in septicemia and inflammation of the brain, caused by eating food contaminated with *L monocytogenes*.

*Listeria monocytogenes* is commonly found in soil and water and sometimes in food-processing plants. But human listeriosis is infrequent. In spite of modern sanitation, better quality control and stringent legislation, epidemic outbreaks of listeriosis occasionally occur. Dr. Garduno and his colleagues speculate that the epidemic strains of *L. monocytogenes* (those involved in causing outbreaks) are rare and differ from environmental strains commonly found in nature, and food products, and even from strains involved in sporadic cases of listeriosis. Detection of epidemic strains of *L. monocytogenes* would be highly desirable, but there are no established markers of virulence that would reliably distinguish environmental from epidemic strains. The three Dalhousie University researchers suspect this difference is only apparent *in vivo*, i.e., within the animal host.

Dr. Garduno and his team are attempting to identify virulence factors of the bacterium that could be relevant for its growth and survival within a host. They built a basic *in vivo* technology to systematically study differences between epidemic and environmental strains of *L. monocytogenes*. For this, they developed an intraperitoneal diffusion

chamber model to grow the bacterium and invented an *in vivo* co-culture technology, in which host cells and bacteria are placed inside the same chamber, to study host cell and pathogen interactions.

The research team is also using protamine, a peptide capable of killing bacteria, as a tool to probe the cell surface of *L. monocytogenes*. Protamine causes defined changes to the surface of the bacterium, so the isolation of mutant *L. monocytogenes* that are resistant to protamine may lead to identifying surface molecules involved in virulence or the survival of the bacterium in processed food products. In the long term, it may be possible to use these surface markers to distinguish epidemic from non-epidemic strains.

Dr. Garduno found that *L. monocytogenes* mutants that are resistant to protamine indeed have altered cell surfaces, display a different molecular composition in their cell walls, and cannot efficiently infect mice. Eventually the addition of protamine to food products may significantly influence the ecology of *Listeria* and potentially increase the safety of food products. The research of Dr. Garduno and his colleagues has the potential to affect food safety regulations and advance our knowledge of epidemic listeriosis.

-30-

Contact information:

Rafael A.Garduno
Department of Microbiology and Immunology, and Department of Medicine
Faculty of Medicine
Dalhousie University
Phone: (902) 494-6575
Rafael.Garduno@dal.ca