Arctic evolution leads to salmonella vaccine

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Bacteria harvested from the frigid waters of the Arctic could be the key to a new type of temperature-sensitive vaccine. University of Victoria microbiology researcher Dr. Francis Nano has received Genome BC Proof-of-Concept funding to use that bacteria to develop a vaccine that will immunize chickens against Salmonella enterica.

Vaccinating animals against a variety of diseases has begun to play an important role in ensuring global food security, especially as the overuse of antimicrobial drugs has led to a rise in drug resistance. Salmonella enterica infection, or salmonellosis, is one of the most common food-borne illnesses in the world. Approximately 10,000 cases of salmonellosis are reported by Canadians each year, and many more cases go unreported. Internationally, millions of deaths are linked to this infection.

Nano's lab at UVic will replace an essential gene in a Salmonella bacterium with a gene from an Arctic bacterium. This process will create a modified bacterium that will no longer be able to survive in a warm environment such as the tissue of a warm-blooded animal. When used as a vaccine this temperature-sensitive bacterium will immunize and protect the recipient from future infection.

"Using Arctic genes, we can create bacterial pathogens that behave like vaccines, much like the many temperature-sensitive viruses that are used as vaccines," says Nano. "We can apply this same approach to develop new vaccines against many diseases of humans and animals."

Nano and his collaborators are using this technology to produce a cost-effective vaccine that will reduce the carriage of Salmonella among poultry, and prevent its spread to humans. In the future, Nano and his collaborators plan to develop vaccines against other bacterial pathogens that cause diseases in animals and humans. With the support of UVic Industry Partnerships, a patent application has been filed to protect this platform technology.

Provided by University of Victoria