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## News Release

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# USU Researchers link high salt diet to ulcers

**BETHESDA, Md.** – Scientists from the Uniformed Services University of the Health Sciences (USU) have discovered that diets high in salt may increase the virulence of the pathogen *Helicobacter pylori* (*H. pylori*), which is the most common cause of ulcers in the stomach and duodenum.

"Apparently the stomach pathogen *H. pylori* closely monitors the diets of those people whom it infects. Epidemiological evidence has long implied that there is a connection between *H. pylori* and the composition of the human diet. This is especially true for diets rich in salt," says D. Scott Merrell, Ph.D., Assistant Professor of Microbiology and Immunology at the Uniformed Services University of the Health Sciences in Bethesda, Maryland. Hanan Gancz, a postdoctoral fellow in the Merrell laboratory presented the research May 22, 2007 at the 107th General Meeting of the American Society for Microbiology in Toronto. High concentrations of salt in the stomach appear to induce gene activity in *H. pylori*, making it more virulent and increasing the likelihood of an infected person developing a severe gastric disease.

*H. pylori* is a spiral-shaped bacterium that can live in the acidic environment of the stomach and duodenum which is the section of intestine below the stomach. It is the most common cause of ulcers of the stomach and duodenum, accounting for up to 90% of duodenal ulcers and up to 80% of gastric ulcers. Infection with *H. pylori* also causes gastritis, and infected persons also have a 2- to 6-fold increased risk of developing mucosa-associated lymphoid tissue (MALT) lymphoma, and gastric cancer compared with uninfected counterparts.

*H. pylori* infection is common in the United States and is most often found in persons from lower income groups and older adults. About 20% of persons less than 40 years of age and about 50% of persons over 60 years of age are infected. Most infected people do not have symptoms and only a small percentage go on to develop disease.

Previous research has focused on the effects diet has on the stomach environment where *H. pylori* resides, but until now scientists have overlooked the response of the microorganism specifically to these dietary queues. Working from the epidemiological evidence that *H. pylori* infection combined with a high-salt diet results in an increased incidence of severe gastric maladies, Merrell and colleagues decided to look at the direct effect a high concentration of salt had on both the growth and gene expression of the bacterium.

"We noted that *H. pylori* growth rate shows a sharp decline at high salt concentrations. Moreover, bacterial cells exposed to increased salt exhibited striking morphological changes: cells

became elongated and formed long chains," says Merrell. "We conclude that *H. pylori* exposed to high levels of salt in vitro exhibit a defect in cell division."

They also discovered transcription of two genes responsible for the virulence of the bacterium was increased during high-salt conditions.

"The altered expression patterns of some virulence genes may partially explain the increased disease risk that is associated with a high salt diet in *H. pylori* infected individuals," says Merrell.

The Uniformed Services University of the Health Sciences is located on the grounds of the National Naval Medical Center in Bethesda, Md. The University provides military and public health-relevant education, research, service and consultation to the nation and the world. USU is a typical academic health center with a unique focus on health promotion and disease prevention and the specialized mission of educating health care practitioners to deal with peace and wartime casualties, natural disasters, emerging infectious diseases and other public health emergencies. This work was supported by a grant from the U.S. National Institutes of Health.

For more information, call the Office of External Affairs at (301) 295-1219.