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Some bacteria may protect against disease caused by stomach infection

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Half of the world's human population is infected with the stomach bacteria called *Helicobacter pylori*, yet it causes disease in only about 10 percent of those infected. Other bacteria living in the stomach may be a key factor in whether or not *H. pylori* causes disease, according to a new study led by scientists at the University of California, Santa Cruz.

"People tend to think of the stomach as a relatively sterile environment, but it's actually populated with microbes," said Karen Ottemann, professor and chair of microbiology and environmental toxicology at UC Santa Cruz.

Researchers in Ottemann's lab were studying *H. pylori* infections in mice when they noticed that mice from two different suppliers had different responses to the infection, even though they were the same mouse strain and therefore genetically identical. Examining the bacteria in the stomachs of the mice (the stomach "microflora"), they found differences between the mice from different suppliers. They then used antibiotics to alter the stomach microflora in mice from a single supplier and again found changes in the response to *H. pylori*.

"We found that something about the preexisting microflora, before *H. pylori* comes into the mouse, changes the mouse's response to the infection," Ottemann said.

The findings, published in the journal *Infection and Immunity*, have potential implications for treating human infections. The bacteria in the

stomachs of mice and humans are broadly the same—not necessarily at the species level, but the same types of bacteria are present in both, Ottemann said.

H. pylori infections can cause ulcers and stomach cancer, but most infected people don't develop any disease. Furthermore, there is evidence that *H. pylori* infection can protect against diseases such as esophageal cancer and asthma. For these reasons, people are only treated for the infection if they develop symptoms. With a better understanding of the effects of the stomach microflora, it might be possible to predict whether someone is likely to develop disease and should be treated for an *H. pylori* infection.

"It would be nice if we could predict who would get disease," Ottemann said. "The other possibility is that we might be able to identify some bacteria that could be used as a probiotic to dampen *H. pylori* disease."

At this point, it is not clear which bacteria are responsible for changing the response to *H. pylori* infection in mice. Focusing on mice from one supplier, Ottemann's team used genetic profiling techniques to identify more than 10,000 different types of bacteria present in mouse stomachs, of which about 2,000 were found in all the mice sampled.

The researchers treated some of the mice with antibiotics, which did not eliminate stomach bacteria but substantially changed the composition of the gut microflora. The altered microflora dampened the inflammatory response to *H. pylori* infection. When they looked for differences in the stomach microfloras of mice with and without inflammatory disease, the researchers found more than 4,000 differences—either species present in one group and not in the other, or differences in the abundances of certain species.

More work is needed to identify which differences in bacterial

composition are responsible for the differences in response to *H. pylori*, Ottemann said. "The results do point to some potential candidates for a protective effect, such as Clostridium species, some of which are known to influence inflammation in the intestine," she said.

Provided by University of California - Santa Cruz