

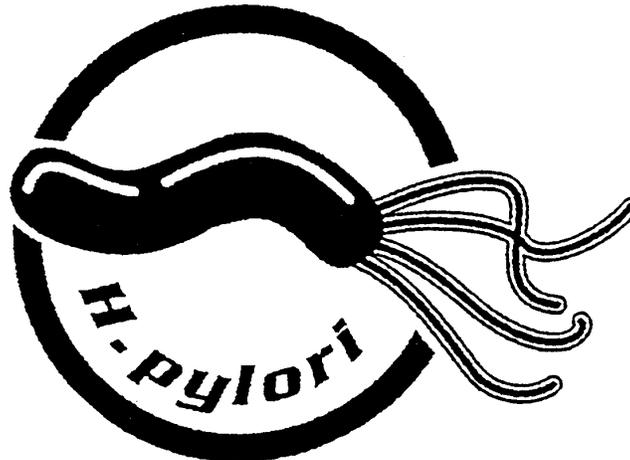
TIMELY INFORMATION

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BACTERIUM CAUSES ULCERS AND MAY BE TRANSMITTED THROUGH DRINKING WATER

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Don't be surprised if you never heard of the bacterium, *Helicobacter pylori*. Most people have not. No one knew this spiral-shaped bacterium existed until two Australian researchers (Barry Marshall and Robin Warren) found it in human stomach ulcers in 1982. The following year they successfully treated the ulcers with antibiotics. It was over 10 years before their work was taken seriously by the medical profession.

Medical professionals now blame at least 75% of all stomach ulcers on this bacterium, and epidemiologic studies have shown that infection from this bacterium increases the risk for two types of stomach cancer and maybe other chronic diseases.

Within the past 10 years, a number of chronic health problems have been linked to microbial infections. One example is the accumulating evidence which suggests that

periodontal gum infections may contribute to arteriosclerotic heart diseases. Researchers think they may have even found a link between kidney stones and a bacterium about one-tenth the size of *Escherichia coli*. Several on-going studies are attempting to link *H. pylori* infection to a number of chronic diseases such as coronary heart disease and stroke. Results have been somewhat mixed.

***H. pylori* Infection is Widespread**

About half the world adult population has some strain of this microbial life form growing in their stomachs, making it one of the most common infections in humans. From 20-30% of Americans over age 40 are infected. The infection is generally acquired during childhood because very young children are not infected. In most underdeveloped nations, the infection rate is over 90% for those above the age of five years.

It is amazing how little we know about this microorganism that is so widespread in the human population. Most infected persons will live their entire lives unaware that they have been colonized by *H. pylori*. Infection usually produces no symptoms, but can cause ulcers in about 20% of those infected and even stomach cancer in some individuals.

***H. pylori* and Their Human Host**

H. pylori has the unusual ability to thrive in the harsh acidic environment of the stomach. The bacteria live in the thick mucus layer lining the inside of the stomach, which protects epithelial cells from stomach acid. When the bacteria enter the stomach, some penetrate the mucus layer and attach to epithelial cells where food molecules are absorbed. These bacteria release chemicals that irritate and degrade epithelial cells, which creates food for the bacterial colony. The bacteria that adhere to the epithelial cells make up only 1 percent of the entire

colony, but they must be present or the bacterial community will not thrive.

H. pylori's ability to live in such a close, long-term relationship with people indicates that the bacterium may have been evolving with humans for thousands of years. The advantages of this relationship to the bacteria are obvious. However, if there are any advantages for the human host, they are not yet understood.

Some researchers believe two or more competing strains of *H. pylori* live together in the stomach at the same time, and that one strain is more virulent than the others. Changes in stomach conditions may create advantages for one strain over another, allowing it to dominate. Such changes could lead to domination by the more virulent strain, with the resulting effect being ulcers or even stomach cancer.

Stress may still play a role in causing stomach ulcers because only 1 out of 5 persons infected with *H. pylori* develops ulcers. On the other hand, few people actually develop ulcers in the absence of *H. pylori* bacteria. The stomach secretes more acid under stress and people under stress often smoke more, drink more alcoholic beverages, and skip more meals--all behavioral patterns more likely to cause ulcers.

Peptic Ulcer Impacts and Treatment in the U.S.

Several studies have assessed human impacts from ulcers in the United States. It has been estimated that we have about 2.5 million new infections per year, that 5 million persons are treated for peptic ulcers per year, that treatment costs exceed \$5 billion per year (not including indirect costs due to work and productivity loss), and that we have approximately 16,000 deaths per year attributed to peptic ulcer disease.

Data collected only five years ago showed that 90% of Americans who had ulcers did not know the primary cause was *H. pylori* bacteria. Other data from the same year showed that doctors were still treating about 75% of ulcer patients with anti-acid secreting medications as the primary therapy. Only 5% received antibiotic therapy. Hopefully, these numbers have improved a lot within the past few years.

Antibiotic therapy costs less than one-tenth of other treatments for ulcers and takes a maximum of 17 days. In 90% of the patients who receive antibiotic therapy, the ulcer is cured and does not recur. Other approaches merely treat the symptoms rather than curing the ulcer, and may last for 10 or 15 years, and symptoms often return.

Transmission for *H. pylori* Infection

The primary mode of transmission for *H. pylori* is not yet known, but viable bacteria are excreted in feces from infected persons. Therefore, many scientists believe *H. pylori* infection is spread from person to person by fecal-oral transmission. It has also been postulated that flies feed on human feces and then transmit the bacteria to other humans by walking on food before it is eaten.

More than 100 species of pathogenic organisms have been isolated from the digestive tract of flies. This makes flies a likely vector for *H. pylori* transmission and would explain why the infection rate is much higher in those countries that do not have indoor plumbing. Studies conducted within the past few years indicate that common houseflies could transmit this bacterium, but this mode of transmission has not been confirmed.

Because of such widespread infection by this organism, some scientists have theorized that *H. pylori* is spread through contaminated drinking water. However, few scientists have been successful in isolating

the organism from water. A team of scientists from the Massachusetts Institute of Technology found the first evidence of *H. pylori* in drinking water in 1995 in Narino, Colombia. This town was chosen because of the very high infection rate among its citizens. This provided the first scientific evidence that *H. pylori* might be spread through drinking water.

Special studies are now underway to link *H. pylori* in water to those found in the stomach because of genetic variation within the bacterium. It must be established that those organisms in water are the same ones capable of causing infection. It is also important to determine whether people can get rid of one type of *H. pylori* but then later become reinfected with a different type of bacterium.

***H. pylori* in U.S. Water Supplies**

Recent studies found *H. pylori* to be widespread in water sources in Pennsylvania. Researchers from Penn State Harrisburg developed a special monoclonal antibody that would bind with actively respiring *H. pylori*, and used the method to detect organisms in 75 percent of 36 tested surface water samples. They also found the bacteria in shallow ground water that was under the influence of surface water. In further studies, they found the organism in 62 samples tested.

These were the first reports of live *H. pylori* in surface water in the U.S., demonstrating that water may be a major reservoir for this organism outside the human body. Other water supplies throughout the U.S. probably have similar contamination levels. The Pennsylvania data also support the theory of a water-borne route of transmission for this organism.

The researchers from Pennsylvania also found no correlation between the occurrence of either total coliforms or *Escherichia coli* and the presence of *H. pylori* in water. This

indicates that routine screening of water supplies for the presence of traditional indicator organisms may fail to protect consumers from exposure to *H. pylori*.

How Safe is Our Drinking Water?

H. pylori is not considered to be a health risk in most municipal water systems, but very little is known about the epidemiology of this organism in community water systems. It is believed that all standard disinfection methods used in the U.S. are capable of killing this organism in drinking water. Chlorination, the most commonly used method for disinfecting community drinking water, requires that a chlorine residual of 1 mg/L be left in the water after chlorination. According to EPA, this mean chlorine residual is adequate to kill *H. pylori* in a properly managed municipal water treatment plant.

For households in rural areas that rely on private water supplies rather than community water systems for their drinking water, the risk of *H. pylori* infection is greater. However, there has been no national assessment to determine the level of *H. pylori* contamination in private wells, and few states have attempted to educate private well owners about *H. pylori*.

Conclusions

Everyone is equally susceptible to having ulcers, regardless of the stress they endure. While stress and diet can irritate an ulcer, they do not cause it. Most ulcers are caused by the bacterium *H. pylori*, and can be cured with a two-week course of antibiotics, even for people who have had ulcers for years.

Drinking water with live *H. pylori* is a likely route of infection and maybe even reinfection from this organism. Since *H. pylori* has been found in water samples that were free of coliform, the most common test for microbial purity of drinking water, current methods may be indicating that *H. pylori*

contaminated water is free of bacteria when in reality it is not.

Persons drinking water from private wells which are not disinfected, at least periodically, are at greater risk for *H. pylori* infection and peptic ulcer disease. One of the first ulcer symptoms is a distinct and constant burning sensation in the stomach.

If you think you have a stomach ulcer, it is very important to get an accurate diagnosis and prompt treatment with antibiotics if tests indicate the presence of *H. pylori* bacteria. It could save your life. A new test to diagnose active *H. pylori* infection recently received clearance from the U.S. Food and Drug Administration. It is a simple blood test that can be conducted on a sample of blood drawn in any doctor's office.

As our technology and knowledge base improves, we are finding that many chronic health problems appear to be tied to microbial agents. Protecting ourselves from *H. pylori* infection may have long-term health benefits that we do not yet comprehend.

More Information

For more information about *H. pylori* infection and ulcers you can call:
1-888-MY-ULCER toll free.

You can also find information on *H. pylori* and ulcers from the following web sites:

The Helicobacter Foundation. The URL is:
<http://www.helico.com>.

The Centers for Disease Control and Prevention. The URL is:
<http://www.cdc.gov/ncidod/dbmd/hpylori.htm>.

The Medical Science Bulletin. The URL is:
<http://pharminfo.com/disease/ulcers/ulcerfaq.html>.

Healthlink USA. The URL is:
http://www.healthlinkusa.com/helicobacter_pylori.html.

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