CENTER FOR DIGESTIVE HEALTH & NUTRITION
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Helicobacter pylori (H. pylori)

Have you heard about Helicobacter pylori or H. pylori? This is a crazy bacteria that lives inside the stomach. It's incredibly common—in fact, about half the world's population has it. The rate varies greatly depending on where you live, your age, socioeconomic status, and other things. In underdeveloped countries, where sanitation and clean water may not be readily available, infection rates tend to be higher. In these areas, most infections happen during childhood. In developed countries, on the other hand, infection rates are lower, and infections can occur later in life.

H. pylori: Survival Expert

What I find fascinating is that this bacteria lives and thrives in the stomach's very harsh, acidic environment. The stomach's acidic environment is so hostile that it can quickly kill most bacteria. Remember, to help digest your food, your stomach produces powerful hydrochloric acid (HCl)—the same acid that was so dangerous to handle in high school chemistry class. To protect your stomach from digesting itself, there is a thin, acid-resistant mucous layer that protects the stomach lining. Most bacteria can't survive there, but H. pylori is a survival expert.

Over eons of evolution, H. pylori has developed some extraordinary adaptations. First, its corkscrew shape helps it burrow through the mucus layer into the stomach wall, where it wants to set up shop. It also has these little adhesion molecules, which are like little hooks that help it stick to the stomach lining so it doesn't get swept away by the stomach's natural processes. So, it's good at staying put.

One of its primary survival mechanisms is the production of an enzyme called urease. Urease converts urea, a naturally occurring compound in the stomach, into ammonia. Ammonia, being alkaline, neutralizes the surrounding stomach acid, creating a little "protective bubble" around itself where the pH is not so acidic. It's like it brings its own little antacid with it - like a little walking antacid factory. These features make H. pylori one of the few bacteria capable of establishing a long-term presence in the stomach. H. pylori stomach infection usually lasts for life unless it is treated. It is an amazing example of evolution and the survival of the fittest.

Good for H. pylori - Bad for Humans

It may be a very successful bacteria, but that's not good for us. As mentioned above, H. pylori stomach infections are incredibly common. Fortunately, most infected individuals experience no symptoms or harmful effects. But, it can have serious health consequences for some individuals. H. pylori is a major cause of **peptic ulcers** — painful sores in the stomach or the upper part of the small intestine. This bacterium is also a significant contributor to chronic **gastritis**, an inflammation of the stomach lining that can lead to ongoing discomfort.

More concerningly, H. pylori infection is a recognized risk factor for **stomach cancer**. The World Health Organization classified it as a Group 1 carcinogen, meaning that it's known to cause cancer in humans. Although only a tiny percentage of those with H. pylori will develop stomach cancer, the infection can lead to changes in the stomach lining over time that increase the likelihood of cancerous growths. This is why addressing and managing H. pylori infections when identified is essential, even if symptoms are mild or absent.

A Bit of Unorthodox History…

Dr. Barry Marshall, an Australian physician, revolutionized our understanding of stomach ulcers by discovering that they are caused by Helicobacter pylori (H. pylori), not by stress or spicy foods as previously thought. In 1984, Marshall boldly drank a culture of H. pylori, developing symptoms of gastritis and confirming the bacterium's role in causing ulcers. After a course of antibiotics, he was cured. *The idea that a bacteria could cause peptic ulcers was groundbreaking, earning Dr. Marshall the 2005 Nobel Prize in Physiology or Medicine.* His research led to new treatments involving antibiotics, significantly improving patient outcomes and reducing rates of stomach cancer.

How is H. pylori Spread?

The exact transmission route for H. pylori is still unclear, but scientists suspect it spreads from person to person. Transmission occurs mainly through contaminated food, water, and saliva. Close contact with an infected person can increase the risk of acquiring H. pylori, especially in crowded living conditions. Practicing good hygiene is crucial for minimizing the risk of infection. Washing hands regularly with soap and water, particularly after using the restroom and before handling food, can significantly lower the chances of H. pylori transmission. Additionally, drinking clean water and avoiding undercooked or contaminated foods can reduce the risk, especially in regions with less reliable sanitation practices.

Signs and Symptoms of H. pylori Infection

Some people with H. pylori do show symptoms that could mean they have a problem. The intensity of the symptoms can vary, and they often overlap with symptoms of other digestive issues. This can make diagnosis difficult. Some common signs of an H. pylori infection are:

- Burning or biting stomach pain: This kind of pain usually happens when the stomach is empty, like before or after a meal or at night. It might feel better after eating or taking an antacid.

- There may be nausea and a general feeling of being uncomfortable or sick.

- Loss of appetite: Stomach pain that won't disappear can make you less interested in food.

- Frequent burping and bloating: People with H. pylori often complain of gas and bloating.

- Unwanted weight loss: Long-term stomach problems can make you eat less, which can cause you to lose weight.

These signs are common but could also be signs of other health problems. If you have them and they don't go away, especially if they interfere with daily life, you should see your doctor.

Diagnosing H. pylori

Since H. pylori often doesn't cause symptoms, testing is crucial for diagnosis. Several methods are available to detect H. pylori:

1. **Blood test**: A blood test can reveal antibodies to H. pylori, indicating a past or current infection. *However, this test may not distinguish between an active infection and one that has already been treated*.

2. **Stool test**: This fecal antigen test checks for H. pylori antigens in the stool and is reliable for identifying an active infection.

3. **Urea breath test**: During this test, a patient drinks a solution containing urea. If H. pylori is present, it will break down the urea, releasing carbon dioxide that can be

measured in the patient's breath. This test is accurate and non-invasive but requires special equipment and is generally unavailable.

4. **Endoscopy**: For more complex cases, a doctor may recommend an endoscopy. This involves inserting a small camera into the stomach through the mouth, allowing the doctor to visually examine the stomach lining and take tissue samples for testing. Although invasive, this test is the most definitive way to confirm an infection.

How About Treatment?

First, remember that H. pylori is a survival expert and, thus, is difficult to kill. Treatment for H. pylori typically involves a combination of multiple medications for an extended period of time. **Antibiotics** such as amoxicillin, clarithromycin, and metronidazole are commonly prescribed to kill the bacteria. Because H. pylori can resist certain antibiotics, doctors may use a combination approach to increase the likelihood of eradication. **Acid reducers**, like proton pump inhibitors (PPIs), lower stomach acid levels, helping relieve symptoms and heal any ulcers. This two-pronged treatment approach is usually effective, although some individuals may require additional courses of antibiotics if the infection persists or if they experience side effects or antibiotic resistance.

Here are some common treatment options.

1. **Optimized Bismuth-Based Quadruple Therapy (BQT):**
    - Components:
        - Proton Pump Inhibitor (PPI): Twice daily.
        - Bismuth subsalicylate or subcitrate: Four times daily.
        - Tetracycline: 500 mg four times daily.
        - Metronidazole: 500 mg three or four times daily.
    - Duration: 14 days.
    - Note: This regimen is recommended for treatment-naïve patients and those who have failed initial therapy.

2. **Rifabutin-Based Triple Therapy:**
    - Components:
        - PPI: Twice daily.
        - Amoxicillin: 1,000 mg twice daily.
        - Rifabutin: 150 mg twice daily.
    - Duration: 14 days.
    - Note: This is an alternative regimen, especially in cases of resistance or intolerance to other antibiotics. Not if allergic to penicillin.

3. **Vonoprazan-Amoxicillin Dual Therapy:**
    - Components:
        - Vonoprazan (Brand name Voquenza is a new, more potent potassium-competitive acid blocker than standard PPIs): 20 mg twice daily.

        - Amoxicillin: 1,000 mg twice daily.
    - Duration: 14 days.
    - Note: Not if allergic to penicillin

Treatment Considerations:

- Antibiotic Resistance: Due to rising resistance, especially to clarithromycin and levofloxacin, regimens containing these antibiotics should be avoided unless susceptibility is confirmed.
- Treatment Adherence: Completing the entire course of therapy is essential to ensure eradication and prevent resistance. A big problem with treating H. pylori is that antibiotics are becoming less effective. If you don't take antibiotics as directed, bacteria that survive can become resistant, making it harder to treat future infections. So, it's very important to do what your doctor tells you and finish the whole treatment plan, even if your symptoms improve quickly. This ensures the infection is gone for good and lowers the chance of resistance.
- Follow-Up Testing: Confirm eradication at least four weeks after completing therapy using a fecal antigen test
- Avoid NSAIDs: Non-steroidal anti-inflammatory drugs can exacerbate gastric irritation and should be used cautiously.

The Future of H. pylori Treatment

Scientists are working hard to find new ways to treat H. pylori, such as phage therapy and possible medicines. Phage therapy uses viruses to target H. pylori without hurting good bacteria, a more targeted method than traditional antibiotics. Vaccine research is also ongoing, and early tests are showing promising results, especially in children.

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