

Basics of Infectious Agents

*The role of this risk factor in the development of heart disease is not yet fully established. While some infectious agents are associated with heart disease and heart attack, it has not yet been shown that treating these infections will lower your risk of having a heart attack or dying early.

What are infectious agents and how are they related to heart disease?

Infectious agents are viruses or bacteria that takes up residence in your body, causing an infection. Certain common infections may play a role in heart disease. The theory is that these bacteria and viruses trigger inflammation in the arteries, making the arteries more likely to become clogged, thereby increasing your risk of heart attack or stroke. Researchers have identified several different bacteria and viruses that may be associated with heart disease.¹ The main suspects include:

- *Chlamydia pneumoniae* (*C. pneumoniae*), a cause of flu-like respiratory problems that can lead to pneumonia or bronchitis
- *Helicobacter pylori* (*H. pylori*), the bacteria that causes stomach ulcers
- *Cytomegalovirus* (CMV), a member of the herpes family of viruses that usually doesn't cause any symptoms

Studies are currently underway to determine which, if any, of these infections actually increase people's risk for heart disease, heart attack, and death, and whether your risk for heart disease can be reduced by treating these infections. Research so far has had conflicting results, and it's not known whether these infections actually contribute to heart disease or if they are just innocent bystanders. Any links between heart disease and other infections that cause inflammation, such as hepatitis A virus, herpes simplex virus, Epstein-Barr virus, and periodontitis (gum disease), have been less frequently studied.

Are these infections the same as heart infections?

No. Sometimes the heart muscle or the sac that surrounds the heart may get infected by bacteria causing *myocarditis* or *bacterial pericarditis*. This usually happens in people with autoimmune disorders or after a severe chest infection, but it may also be brought on by an

allergic reaction to medication. It is one of the reasons that heart patients have to take antibiotics before having dental work done (the bacteria can enter the bloodstream through the cuts in your mouth and travel to the heart to do damage). This is a separate situation and will not be covered in this section.

How common are the 3 infections suspected of causing heart disease?

Very common. Most people will be infected with one of these bacteria or viruses at some point in their lives. The Centers for Disease Control and Prevention estimates that between 50% and 85% of US adults are infected with CMV by age 40.² About two thirds of the world's population have been infected with *H. pylori*.³ *C.*

pneumoniae

is the most common; it infects about half of all people by age 20 and about 75% by age 60.

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How might these bacteria and viruses cause heart disease?

There are two main theories to explain how these bacteria and viruses may cause atherosclerosis

(hardening of the arteries). One is that the bacteria/viruses themselves directly attack and damage artery walls. The other theory is that the presence of these bacteria or virus causes other changes in the body, such as the release of chemicals that can accumulate in the blood vessels and clog the arteries, eventually leading to heart disease.

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A third theory is that the type of infection is less important than the number of different infections you get—a number known as the *total pathogen burden* (bacteria and viruses are pathogens).⁶ In a study of over 1,000 people with heart disease, the number of infections a person had was directly related to their risk of dying from heart disease. People in this study were tested for 8 different infections, including the 3 main suspects. Those who tested positive to more than 5 infections were nearly 5 times more likely to die or have a heart attack than those who tested positive for fewer than 4 infections.

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There are other studies showing a similar connection between the number of infections and heart disease,⁸⁻¹⁰ but there are also some that don't, including a study of 122 healthy

postmenopausal women.

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Will these bacteria and viruses affect my risk of heart disease?

Researchers do not yet know exactly how, or if, these infections affect a person's risk of heart disease. Presently, studies show an *association* between these infections and heart disease, but there is little proof yet that the infections actually *cause* heart disease.

Heart Disease Risk: *C. pneumoniae*

One study comparing about 100 men and 20 women who had a heart attack at a young age (younger than 45 in men and 50 in women) with 120 healthy individuals found that people infected with *C. pneumoniae* were about twice as likely to have had a heart attack. If a person was infected with both *C. pneumoniae* and CMV, their risk was 12 times greater than people with neither infection, and 5 times greater than people with only one infection.

¹² Looking at combined results from 13 studies involving more than 600 people, *C. pneumoniae*

bacteria was found in 52% of hardened artery tissue samples taken from people with heart disease, but only 5% of artery tissue samples taken from people without heart disease.

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Heart Disease Risk: *H. pylori*

There is less evidence that *H. pylori* affects your risk of heart disease. In general, studies that reported an association were small and not very rigorous. Larger studies have found either no connection or only a weak connection between this bacteria and heart disease.

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Heart Disease Risk:Cytomegalovirus

There have only been a few studies on cytomegalovirus in people with heart disease. The results have been mixed. Among more than 1,000 people in the Framingham Heart Study (62% were women), there was no increased risk of heart disease for people with CMV antibodies.¹⁴ However, another study of over 230 people, including 87 women, found that women with CMV were more likely to have heart disease as those who did not have this virus. In men, CMV was associated with inflammation markers such as

[CRP](#)

that have been linked to heart disease.

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In a study of 400 seemingly healthy people (more than half were women), those who tested positive for CMV were more likely to have signs of damaged blood vessels. Their blood vessels also did not widen very much in response to nitroglycerin, a medication used to relieve chest pain.

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In a study of nearly 1,000 people with heart disease (28% were women), those who tested positive for CMV (but not

H. pylori

or

C. pneumoniae

) were more likely to die of any cause during the following 3 years.

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How are infectious agents tested for?

Usually through a blood test. If you have been infected with these bacteria or viruses, your body will make antibodies against them. Antibodies are your immune system's customized weaponry for fighting infections – each antibody is made to fight a specific kind of infection. After your body has fought off the infection, the antibodies often stay in your blood so that the infection can be recognized and attacked if it reappears. Doctors can tell if you are infected or have been infected in the past with any viruses or bacteria by testing your blood for the specific antibodies.

The 3 types of bacteria and viruses suspected of having a role in heart disease are not routinely tested for to determine heart disease risk. You would only be tested for them if you presented symptoms of the ailments that they commonly cause.

- *H. pylori*: Diagnosing infection with *H. pylori* involves taking a blood sample, stool sample, a tissue biopsy of the stomach lining, or a breath test (depending on your healthcare provider's orders). You may be tested if you have a peptic ulcer (a sore in the lining of the stomach or small intestine).
- *C. pneumoniae*: A blood test may be given if you have symptoms of bronchitis, sinusitis, or pneumonia.
- Cytomegalovirus (CMV): A CMV test might be ordered if you are a young adult, a pregnant female, or an immune-compromised patient and have flu- or mononucleosis-type symptoms such as fatigue, swollen lymph nodes, and fever.

Can I prevent myself from being infected?

These bacteria and viruses are very common so there is little you can do to protect yourself. Most people will be infected at some point in their lives. There is not yet enough evidence to support taking antibiotics as a preventive measure against heart disease. Currently, there are two large trials underway to better understand if treating these infections can reduce a person's risk of heart disease.

How are these infections treated?

In many cases you won't receive any treatment because you will not even notice that you are infected with these bacteria and viruses. They often have no obvious symptoms. *C. pneumoniae* and *H. pylori* can be successfully treated with antibiotics, usually a 7 to 14 day course. But even after treatment, these bacteria are so common that it's possible you'll be infected again. Because CMV is a virus, it requires an antiviral drug called *ganciclovir*. While it can't cure the infection, ganciclovir can keep the virus in its inactive state.

There is no evidence to show that treating these infections can reduce a person's risk of heart

disease.

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