



# Coronary Artery Disease, CAD

## Essential Fats (EFs), Secrets to Living Long and Well

### Topics

- [Risk Factors](#) for Heart Disease
- [Atherosclerosis](#), arteriosclerosis and thrombosis
- [Heart attack](#) or MI
- How to achieve proper [clot formation](#)

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### Risk Factors

Risk factors (such as high cholesterol or overweight) are the characteristics that make a person more likely to have a particular disease. Many years of research have identified habits, physical characteristics, and test results that indicate who is most likely to have a heart attack. The most important factors are described below.

#### ***Smoking***

People who smoke are more likely than those who don't to suffer from CVD and cancer (particular lung cancer). Smoking interferes with the blood's ability to carry oxygen and slowly kills the organs of the body. Smoking may act as a heavy oxidant, which, roughly stated, "burns up" nutrients and ultimately body parts. Cigarette smoking greatly increases the risk of CAD among women as well as men.

#### ***High blood pressure (Hypertension)***

High blood pressure is a risk factor for heart disease because the high pressure inside the arteries may burst a blood vessel and produce internal bleeding. When the vessels are hard and narrow, more BP is needed to carry oxygen and nutrients to cells far away. Thus, lowering high BP with drugs may deprive organs such as the brain from enough oxygen and nutrients.

#### ***Elevated cholesterol/ HDL cholesterol***

A high ratio of total cholesterol over HDL cholesterol (**TC/HDLC**) has been shown to be associated a high probability of heart disease. Triglycerides (TG) are another type of fat found in the blood. Having elevated levels of both TC/HDLC and TG leads to fat and cholesterol being deposited in the arteries. After a while, the arteries harden and become obstructed. Some of the excessive cholesterol forms crystals, which are chunks of rock-hard cholesterol inside your arteries. Platelets hit them and form clots (clumped platelets), which further obstruct the arteries. The resulting reduced blood flow and poor circulation is insufficient to feed all the cells. Some cells die for lack of oxygen or nutrients.

#### ***High triglycerides***

Benefits of high HDL are lost in patients with high TGs. Low HDL and high TG is the most lethal combination. Current research indicates that TG > 120 mg/dL are undesirable for everyone. Diagnostic testing for CAD should always include TG, TC, and HDL, measured on a fasting blood sample. Fasting means 12-14 hours without food, last meal low in calories and fat. Do not waste time or money with tests done on non-fasting blood.

#### ***High glucose levels and Diabetes***

Individuals with diabetes and high levels of glucose in their blood are likely to have a heart attack. Inefficient transport and use probably cause the elevated glucose. This excess glucose in the blood may lead to the accumulation of saturated fat in the cells and interfere with the ability of the body to use EFs.

#### ***Overweight***

Some parts of the body, like the skin, expand or contract to adapt to the size of the body. Unfortunately, the ability of the heart to adapt to the size of the body is limited. Moreover, small parts of the heart die

every day, due to "aging." Thus as we get older, we have a smaller working heart (our heart may be larger, but it contains a lot of dead tissue). The only way to compensate is with a smaller body. Being overweight stresses the heart beyond its abilities and causes more cells to die, leading to premature heart disease.

### ***Stress***

Stress increases the requirements of the heart. It causes extra wear and tear and contributes to faster aging. However, stress is not as big a killer as many people think. If your body is healthy and you eat well, stress is unlikely to kill you (except for some diseases specifically affected by stress).

### ***Alcohol***

There is great controversy and huge financial interests in this topic. Obviously, people who sell or like to drink alcohol would like doing so to be "healthy," whereas those opposed to drinking prefer to find it dangerous to one's health. We may never agree on whether or not alcohol is dangerous because of its interaction with many other factors.

The active ingredient in red wine appears to be a chemical found in the skin of grapes, rather than alcohol itself. And you may need to take it almost every day; otherwise its effects wear off rapidly. However, daily drinking of alcohol also will slowly damage your liver.

Alcohol provides empty calories, that is, calories without any real nutritional value. The calories from alcohol add to the total of calories consumed from other sources. All calories which are not used by the body are converted and stored as SFAs. To avoid becoming obese, people who drink alcohol do not eat foods rich in other nutrients. Others gain weight from the alcohol, which is stored as SFAs and causes hardening of the arteries. Furthermore, alcohol seems to interfere with the optimal use of EFAs by the body. This is because the liver is involved in the delivery of EFAs to other parts of the body. Alcohol harms the liver and the enzymes that prepare EFAs for delivery to the rest of the body. Drinking wine is not the best solution to heart disease. Read our book for more information on doses, etc.

### ***Other substances and nutrients***

Low serum folate increases the risk of fatal CHD. Researchers found that subjects who had low blood levels of folate were at a high risk of CHD. Taking an occasional supplement of folate may be desirable (for example a multivitamin + mineral compound with 100% of RDA, taken 2-5 times per week). If you eat plenty of vegetables and lean animal foods, and eat more than 1500 calories per day without gaining weight, 2 vitamins per week should be enough. If you must eat a restrictive calorie diet because you are trying to lose weight or cannot exercise, take 5 vitamins per week.

Some people have a defect in their ability to make or use a substance called homocysteine. These rare cases can be found through blood testing. Low levels of homocysteine also indicate potentially low levels of folate or vitamin B12 or B6 or choline. You can be tested for folate and B12 as part of a comprehensive blood test for anemia. Most people only need this blood testing once every 5-10 years. Vegetarian, women (particularly if they have heavy blood loss through menstruation), and patients with blood loss or intestinal malabsorption (e.g., patients with Crohn's or ulcerative colitis) need more frequent testing. In patients with CAD, elevated homocysteine is associated with increased risk of death, probably due to thrombosis (see our [efalab](#) and our book for details).

### ***Genetics (family factors)***

There are great differences from one person to another. We are the result of the factors expressed in our genes. Each person has different physical characteristics: body shape, hair color, facial expressions, etc. Many differences among people cannot be seen by the naked eye. These are differences in the way the physiology or machinery of the body works. Some people have genes that allow them to get rid of toxic chemicals better than others. Others have genes that provide better hearing or vision. And some people have genes that protect against heart disease. Some people have genes that allow them to make more efficient use of essential fats and therefore need less of them. Others probably need more essential fats to survive.

Scientists are beginning to identify what genes are associated with heart disease. We do not know how they work. For now, the best way to know whether you have good genes is to study the health history of

your blood relatives. If most of the people in your family have died after the age of 80, then you have good genes. If any of your family members have died before the age of 50 due to heart disease, you may have some bad genes. Your physician can help you evaluate the cause of death of your family members and the type of genes you may have.

Everybody benefits from following a good diet. People with bad genes need to be more careful with their diets if they want to live a long life.

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## Atherosclerosis, arteriosclerosis and thrombosis

Most people have a combination of arteriosclerosis (thickening and hardening of the arteries) and atherosclerosis (obstruction or partial obstruction of the arteries with fat deposits called plaque). The result is that the *arteries are hard and narrow*. This combination makes it difficult for the blood to circulate efficiently and reach all the cells. Remember that blood carries nutrients and oxygen to the cells. Without sufficient blood, cells die and organs age prematurely.

Furthermore, the heart has to work harder to pump blood through the hard and narrow arteries. Some parts of the body do not get enough blood if the arteries are hard and partially obstructed. To compensate for this obstruction and lack of flexibility, the heart pumps harder. This causes an increase in your blood pressure. Because the pressure is higher, the chances increase that a small and tiny vessel in the brain or heart will break. The chance for breakage is greatest in hard vessels that are brittle and weak, because of the accumulation of junk (usually saturated fat and cholesterol) within them.

Fat affects different parts of an artery. The inside of the artery, called lumen, can get obstructed by clots. The next level of the vessel, known as the endothelium, can suffer spasms that contract the lumen and obstructs the artery. The balance of eicosanoids such as prostaglandins regulates spasms. You can reduce them by changing the  $\omega 3/\omega 6$  ratio in your blood. The next layer, known as the intima, has macrophages that attempt to eat junk fat. These macrophages sometimes get trapped in the vessel and contribute to the problem.

A “**thrombus**” is the technical name for a clot in a blood vessel, or in the heart itself. A thrombus is caused by the coagulation of the blood (in technical terms, the aggregation of platelets). The main purpose of clotting is to close ruptured vessels, but sometimes the body is confused by the junk (plaque) inside an artery. The body thinks that it is broken, and tries to “close” it. By mistake, instead of fixing the outside of a broken vessel, it fixes the inside and it closes a good vessel. Sometimes the thrombus stays in one place for a long time; other times it starts in one place, such as a leg, and moves to another place. When the thrombus obstructs a major artery, all parts of the body that receive oxygen and food from that artery start to die. Key organs like the brain and the heart may die within minutes.

If the platelets do their job, a small puncture of a vessel is promptly plugged. However, if the platelets become overactive and aggregate more than they need to, they form clots and begin to obstruct arteries. If they obstruct a small artery, they cause “minor damage,” such as slight destruction of your heart or brain, which you may not feel at first. But over a period of years, this small damage becomes cumulative and causes abnormal function. For example, many small damaged parts of the heart cause improper pumping or rhythm of the heart, which we call arrhythmia.

## Heart attack or myocardial infarction

What people call a “heart attack,” which is a relatively sudden injury to the heart, may occur in many different ways. Over many years, due to continuous periods of insufficient oxygen, parts of the heart die. When the damage is slight, you may not feel anything. When it is more significant but not yet deadly, you may feel pain, sometimes called “angina.” This lack of oxygen occurs when the heart is working near its limit and can barely cope with the body demands. Then almost any additional activity or exertion will push it over its limit and parts of the heart, brain or kidney will fail to get enough blood. When the damage to the heart is large enough for you to feel the pain and be at risk of dying immediately, we call it a heart attack.

Several things may trigger the formation of clots (which can also cause a stroke)...

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## How to achieve proper clot formation

Studies have shown that most people with cardiovascular disease form clots too easily. This is probably due to the excessive saturated fat and cholesterol in their vessels. Therefore, the first line of treatment is to use specific mixtures of fatty acids. See our book for further information.



Portions of this section have been excerpted from the book "[EFAs in Health and Disease](#)" (how to order, table of contents, references, notes, excerpts).

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