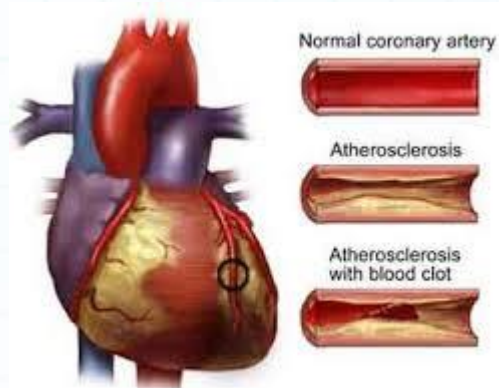


Atherosclerosis



Atherosclerosis happens when the blood vessels that carry oxygen and nutrients from your heart to the rest of your body (arteries) become thick and stiff — sometimes restricting blood flow to your organs and tissues. Healthy arteries are flexible and elastic, but over time, the walls in your arteries can harden, a condition commonly called hardening of the arteries.

Atherosclerosis is a specific type of arteriosclerosis, but the terms are sometimes used interchangeably. Atherosclerosis refers to the buildup of fats, cholesterol and other substances in and on your artery walls (plaques), which can restrict blood flow.

These plaques can burst, triggering a blood clot. Although atherosclerosis is often considered a heart problem, it can affect arteries anywhere in your body. Atherosclerosis usually is preventable and is treatable.

Causes of Atherosclerosis

Atherosclerosis is a slow, progressive disease that may begin as early as childhood. Although the exact cause is unknown, atherosclerosis may start with damage or injury to the inner layer of an artery. The damage may be caused by:

- High blood pressure
- High cholesterol, often from getting too much cholesterol or saturated fats in your diet
- High triglycerides, a type of fat (lipid) in your blood
- Smoking and other sources of tobacco
- Diabetes
- Inflammation from diseases, such as arthritis, lupus or infections, or inflammation of unknown cause

Once the inner wall of an artery is damaged, blood cells and other substances often clump at the injury site and build up in the inner lining of the artery. Over time, fatty deposits (plaques) made of cholesterol and other cellular products also build up at the injury site and harden, narrowing your arteries. The organs and tissues connected to the blocked arteries then don't receive enough blood to function properly.

Eventually pieces of the fatty deposits may break off and enter your bloodstream. In addition, the smooth lining of a plaque may rupture, spilling cholesterol and other substances into your bloodstream. This may cause a blood clot, which can block the blood flow to a specific part of your body, such as occurs when blocked blood flow to your heart causes a heart attack. A blood clot can also travel to other parts of your body, blocking flow to another organ.

Symptoms of Atherosclerosis

Atherosclerosis develops gradually. Mild atherosclerosis usually doesn't have any symptoms.

You usually won't have atherosclerosis symptoms until an artery is so narrowed or clogged that it can't supply adequate blood to your organs and tissues. Sometimes a blood clot completely blocks blood flow, or even breaks apart and can trigger a heart attack or stroke.

Symptoms of moderate to severe atherosclerosis depend on which arteries are affected. For example:

- If you have atherosclerosis in your heart **arteries**, you may have symptoms, such as chest pain or pressure (angina).
- If you have atherosclerosis in the arteries leading to your **brain**, you may have signs and symptoms such as sudden numbness or weakness in your arms or legs, difficulty speaking or slurred speech, or drooping muscles in your face. These signal a transient ischemic attack (TIA), which, if left untreated, may progress to a stroke.
- If you have atherosclerosis in the arteries in your **arms and legs**, you may have symptoms of peripheral artery disease, such as leg pain when walking (intermittent claudication).
- If you have atherosclerosis in the arteries leading to your **kidneys**, you develop high blood pressure or kidney failure.
- If you have atherosclerosis in the arteries leading to your **genitals**, you may have difficulties having sex. Sometimes, atherosclerosis can cause erectile dysfunction in men. In women, high blood pressure can reduce blood flow to the vagina, making sex less pleasurable.

Diagnosis of Atherosclerosis

During a physical exam, your doctor may find signs of narrowed, enlarged or hardened arteries, including:

- A weak or absent pulse below the narrowed area of your artery
- Decreased blood pressure in an affected limb
- Whooshing sounds (bruits) over your arteries, heard using a stethoscope
- Signs of a pulsating bulge (aneurysm) in your abdomen or behind your knee
- Evidence of poor wound healing in the area where your blood flow is restricted

Depending on the results of the physical exam, your doctor may suggest one or more diagnostic tests, including:

- **Blood tests.** Lab tests can detect increased levels of cholesterol and blood sugar that may increase the risk of atherosclerosis. You'll need to go without eating or drinking anything but water for nine to 12 hours before your blood test. Your doctor should tell you ahead of time if this test will be performed during your visit.
- **Doppler ultrasound.** Your doctor may use a special ultrasound device (Doppler ultrasound) to measure your blood pressure at various points along your arm or leg. These measurements can help your doctor gauge the degree of any blockages, as well as the speed of blood flow in your arteries.
- **Ankle-brachial index.** This test can tell if you have atherosclerosis in the arteries in your legs and feet. Your doctor may compare the blood pressure in your ankle with the blood pressure in your arm. This is known as the ankle-brachial index. An abnormal difference may indicate peripheral vascular disease, which is usually caused by atherosclerosis.
- **Electrocardiogram (ECG).** An electrocardiogram records electrical signals as they travel through your heart. An ECG can often reveal evidence of a previous heart attack. If your signs and symptoms occur most often during exercise, your doctor may ask you to walk on a treadmill or ride a stationary bike during an ECG.
- **Stress test.** A stress test, also called an exercise stress test, is used to gather information about how well your heart works during physical activity. Because exercise makes your heart pump harder and faster than it does during most daily activities, an exercise stress test can reveal problems within your heart that might not be noticeable otherwise. An exercise stress test usually involves walking on a treadmill or riding a stationary bike while your heart rhythm and blood pressure and breathing are monitored. In some types of stress tests, pictures will be taken of your heart, such as during a stress echocardiogram (ultrasound) or nuclear stress test. If you're unable to exercise, you may receive a medication that mimics the effect of exercise on your heart.
- **Cardiac catheterization and angiogram.** This test can show if your coronary arteries are narrowed or blocked. A liquid dye is injected into the arteries of your heart through a long, thin tube (catheter) that's fed through an artery, usually in your leg, to the arteries in your heart. As the dye fills your arteries, the arteries become visible on X-ray, revealing areas of blockage.
- **Other imaging tests.** Your doctor may use ultrasound, a computerized tomography (CT) scan or magnetic resonance angiography (MRA) to study your arteries. These tests can often show hardening and narrowing of large arteries, as well as aneurysms and calcium deposits in the artery walls.

Treatment of Atherosclerosis

Once a blockage has developed, it's generally there to stay. With medication and lifestyle changes, though, plaques may slow or stop growing. They may even shrink slightly with aggressive treatment.

- **Lifestyle changes:** Reducing the lifestyle risk factors that lead to atherosclerosis will slow or stop the process. That means a healthy diet, exercise, and no smoking. These lifestyle changes won't remove blockages, but they're proven to lower the risk of heart attacks and strokes.
- **Medication:** Taking drugs for high cholesterol and high blood pressure will slow and perhaps even halt the progression of atherosclerosis, as well as lower your risk of heart attacks and stroke.

Various drugs can slow — or even reverse — the effects of atherosclerosis. Here are some common choices:

- **Cholesterol medications.** Aggressively lowering your low-density lipoprotein (LDL) cholesterol, the "bad" cholesterol, can slow, stop or even reverse the buildup of fatty deposits in your arteries. Boosting your high-density lipoprotein (HDL) cholesterol, the "good" cholesterol, may help, too. Your doctor can choose from a range of cholesterol medications, including drugs known as statins and fibrates. In addition to lowering cholesterol, statins have additional effects that help stabilize the lining of your heart arteries and prevent atherosclerosis.
- **Anti-platelet medications.** Your doctor may prescribe anti-platelet medications, such as aspirin, to reduce the likelihood that platelets will clump in narrowed arteries, form a blood clot and cause further blockage.
- **Beta blocker medications.** These medications are commonly used for coronary artery disease. They lower your heart rate and blood pressure, reducing the demand on your heart and often relieve symptoms of chest pain. Beta blockers reduce the risk of heart attacks and some heart rhythm problems.
- **Angiotensin-converting enzyme (ACE) inhibitors.** These medications may help slow the progression of atherosclerosis by lowering blood pressure and producing other beneficial effects on the heart arteries. ACE inhibitors can also reduce the risk of recurrent heart attacks.
- **Calcium channel blockers.** These medications lower blood pressure and are sometimes used to treat angina.
- **Water pills (diuretics).** High blood pressure is a major risk factor for atherosclerosis. Diuretics lower blood pressure.
- **Other medications.** Your doctor may suggest certain medications to control specific risk factors for atherosclerosis, such as diabetes. Sometimes specific medications to treat symptoms of atherosclerosis, such as leg pain during exercise, are prescribed.

Sometimes more aggressive treatment is needed. If you have severe symptoms or a blockage that threatens muscle or skin tissue survival, you may be a candidate for one of the following surgical procedures:

- **Angioplasty and stent placement.** In this procedure, your doctor inserts a long, thin tube (catheter) into the blocked or narrowed part of your artery. A second catheter with a deflated balloon on its tip is then passed through the catheter to the narrowed area. The balloon is then inflated, compressing the deposits against your artery walls. A mesh tube (stent) is usually left in the artery to help keep the artery open.
- **Endarterectomy.** In some cases, fatty deposits must be surgically removed from the walls of a narrowed artery. When the procedure is done on arteries in the neck (the carotid arteries), it's called a carotid endarterectomy.
- **Thrombolytic therapy.** If you have an artery that's blocked by a blood clot, your doctor may use a clot-dissolving drug to break it apart.
- **Bypass surgery.** Your doctor may create a graft bypass using a vessel from another part of your body or a tube made of synthetic fabric. This allows blood to flow around the blocked or narrowed artery.

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