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Student's scientific community

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Scientific discussion

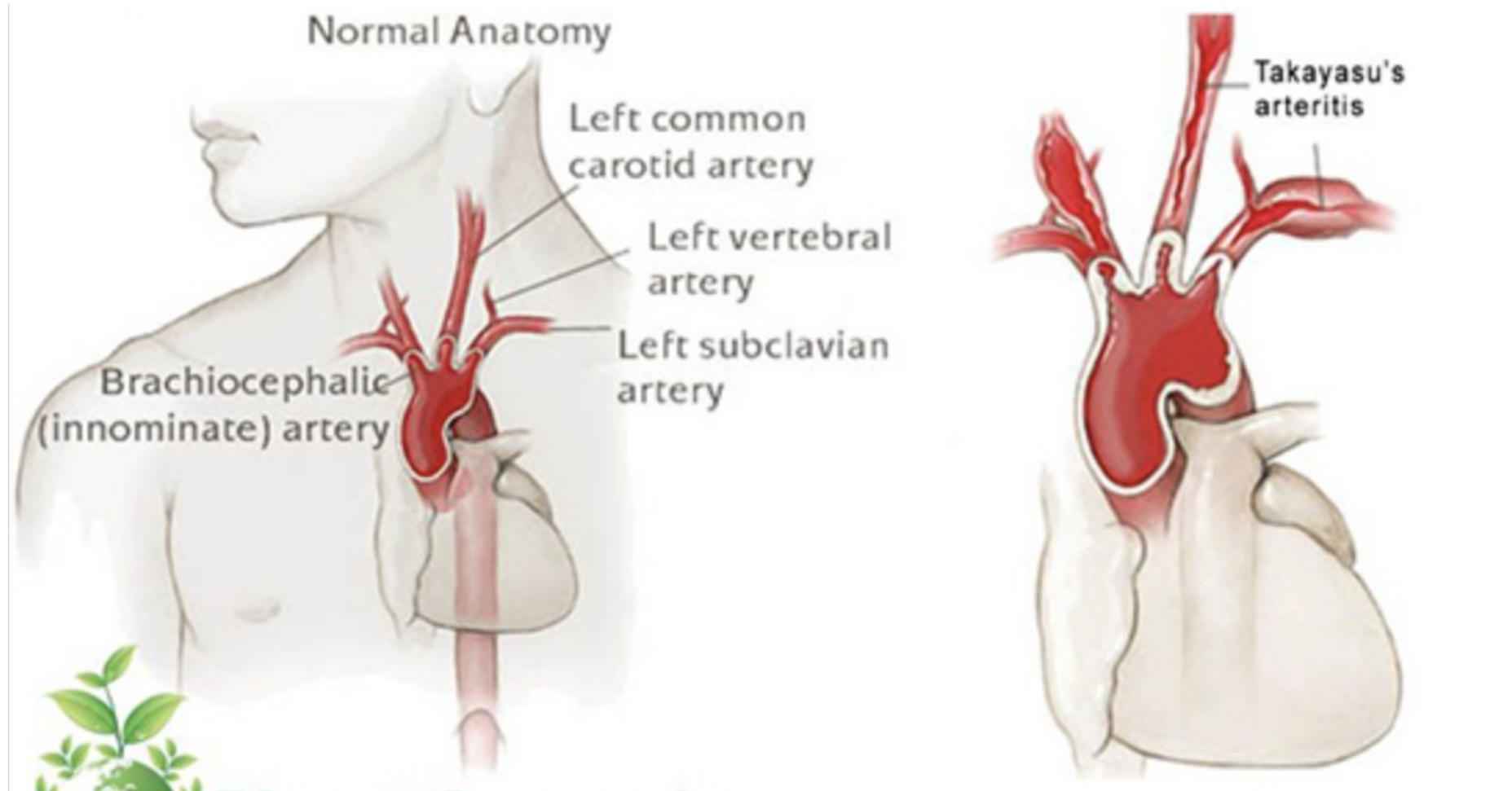
Takayasu's arteritis



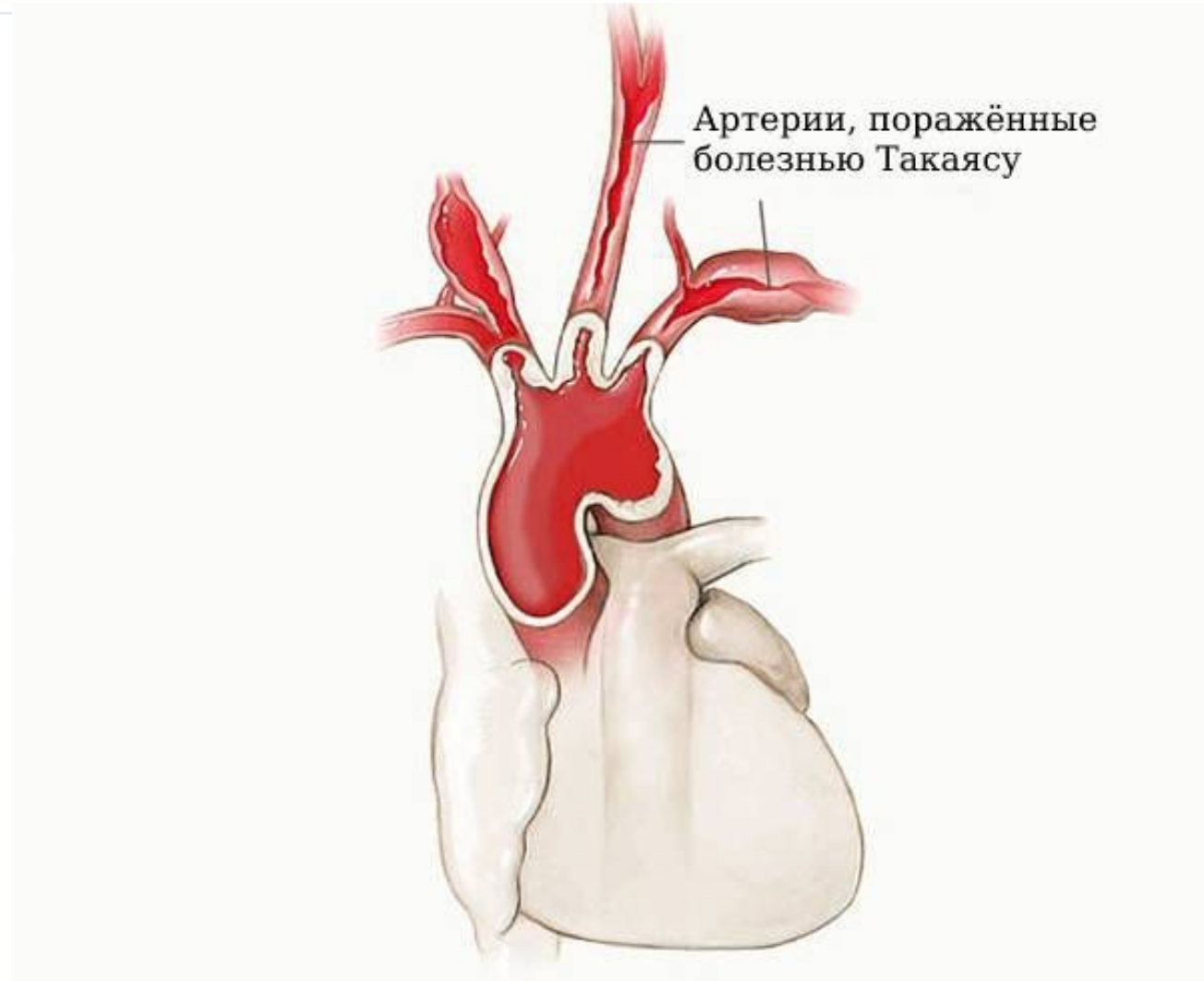
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Takayasu's arteritis- "Pulseless disease"



Takayasu's arteritis is a rare type of vasculitis, a group of disorders that cause blood vessel inflammation. In Takayasu's arteritis, the inflammation primarily damages the aorta — the large artery that carries blood from heart to the rest of body — and the aorta's main branches.



Causes

In Takayasu's arteritis, the aorta and other major arteries, including those leading to head and kidneys, become inflamed. Over time, the inflammation causes changes in these arteries, including thickening, narrowing and scarring. The result is reduced blood flow to vital tissues and organs, which can lead to serious complications and even death. Sometimes arteries become abnormally dilated, leading to aneurysms that may rupture.

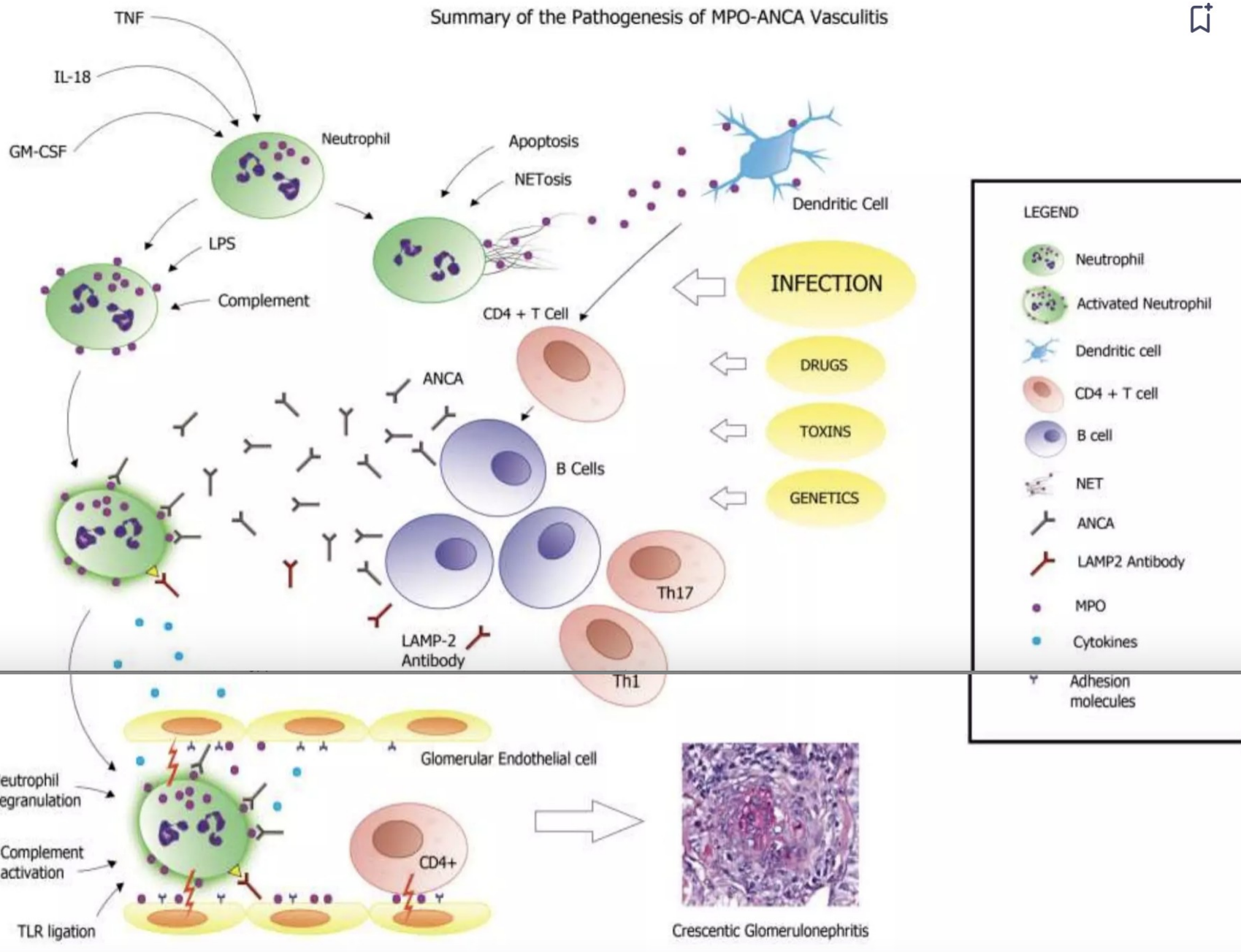
Just what causes the initial inflammation in Takayasu's arteritis isn't known. It's likely that Takayasu's arteritis is an autoimmune disease in which your immune system malfunctions and attacks arteries as if they were foreign substances. The disease may be triggered by a virus or other infection.

Who Gets Takayasu Arteritis?

- TAK primarily affects Asian women and teenage girls.
- Nine out of 10 patients are female, with age of onset between 15 and 40 years old.
- However, the disease can affect children and adults of both sexes, and all races and ethnic groups.
- Prevalence is estimated at 8.0 per million population.

Takayasu's arteritis is an inflammatory disease of the arteries that involves large vessels. The inflammatory lesions in Takayasu's arteritis originate in the vasa vasorum and are followed by cellular infiltration, mainly composed of T cells ($\gamma\delta$ T cells, cytotoxic T lymphocytes, T helper cells), but also of natural killer cells, dendritic cells, monocytes and neutrophils, invading the outer layer of the media and/or its neighbouring adventitia. At this stage, positive production of inflammatory cytokines and/or adhesion molecules around these areas is remarkable. According to data available--in Takayasu's arteritis--interleukin-6, interleukin-1 and RANTES are released in large amounts by infiltrating inflammatory cells within damaged tissue, as well as by circulating inflammatory cells, and very likely help maintain the aberrant immune activation, by promoting endothelial cells activation and by inducing lymphocyte infiltration.

Summary of the Pathogenesis of MPO-ANCA Vasculitis



Although the nature of the antigen that triggers the auto-immune process is still unknown, the infiltrating T lymphocytes may recognize one or a few self-antigens processed and presented in association with HLA. A considerable percentage of patients with Takayasu's arteritis have immune complexes in sera; moreover, on peripheral blood lymphocyte, Fc receptors and antibodies reactive against human endothelial cells (AECA) have been detected. This observation raised the possibility that AECA might have a role in endothelial cell activation and expression of adhesion molecules, which will facilitate neutrophils traffic.

Stage 1 symptoms

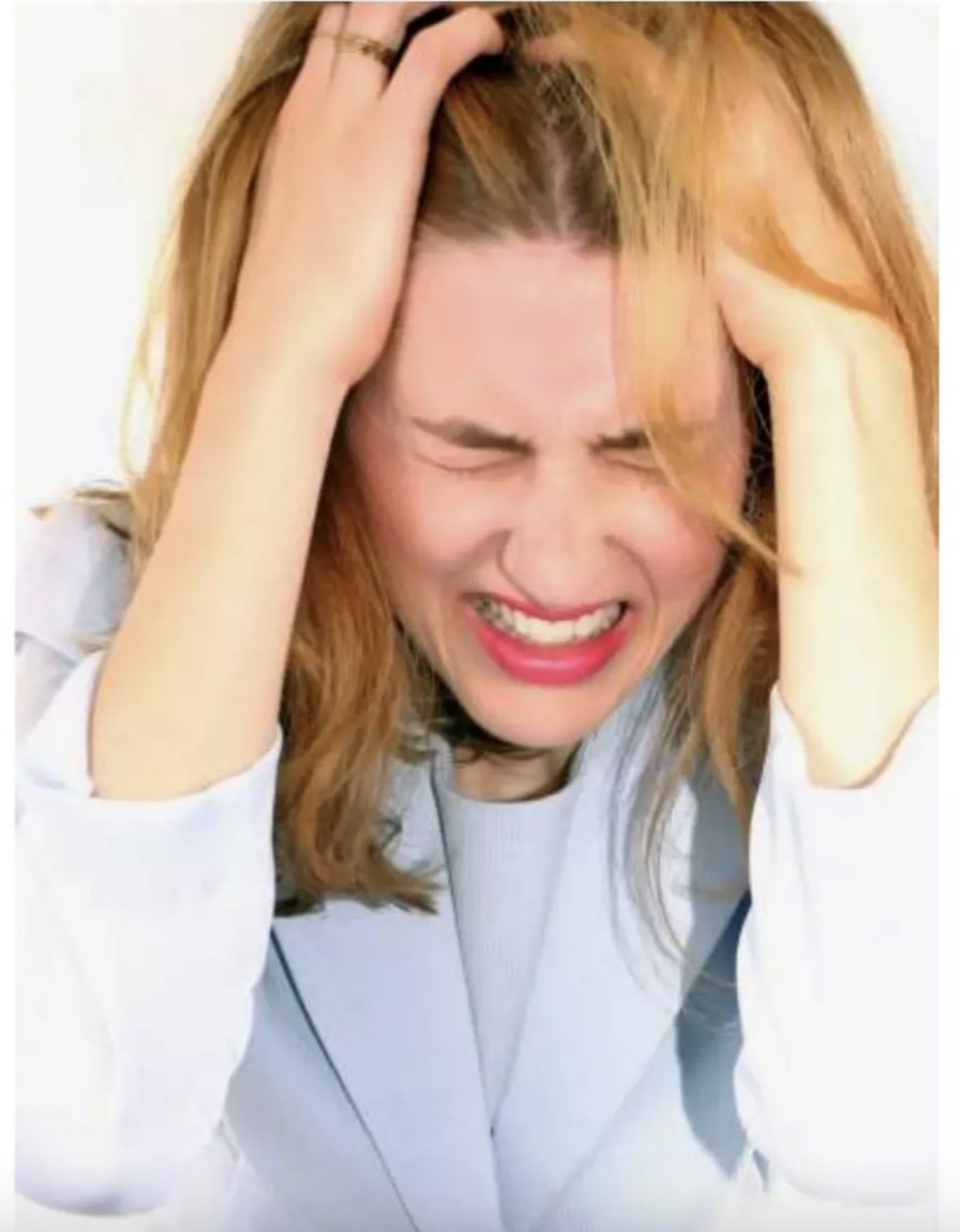
Takayasu's arteritis symptoms often occur in two stages. In the first stage, patient likely to feel unwell with:

- Fatigue
- Fast and unintentional weight loss
- Muscle aches
- Joint pain
- Slight fever

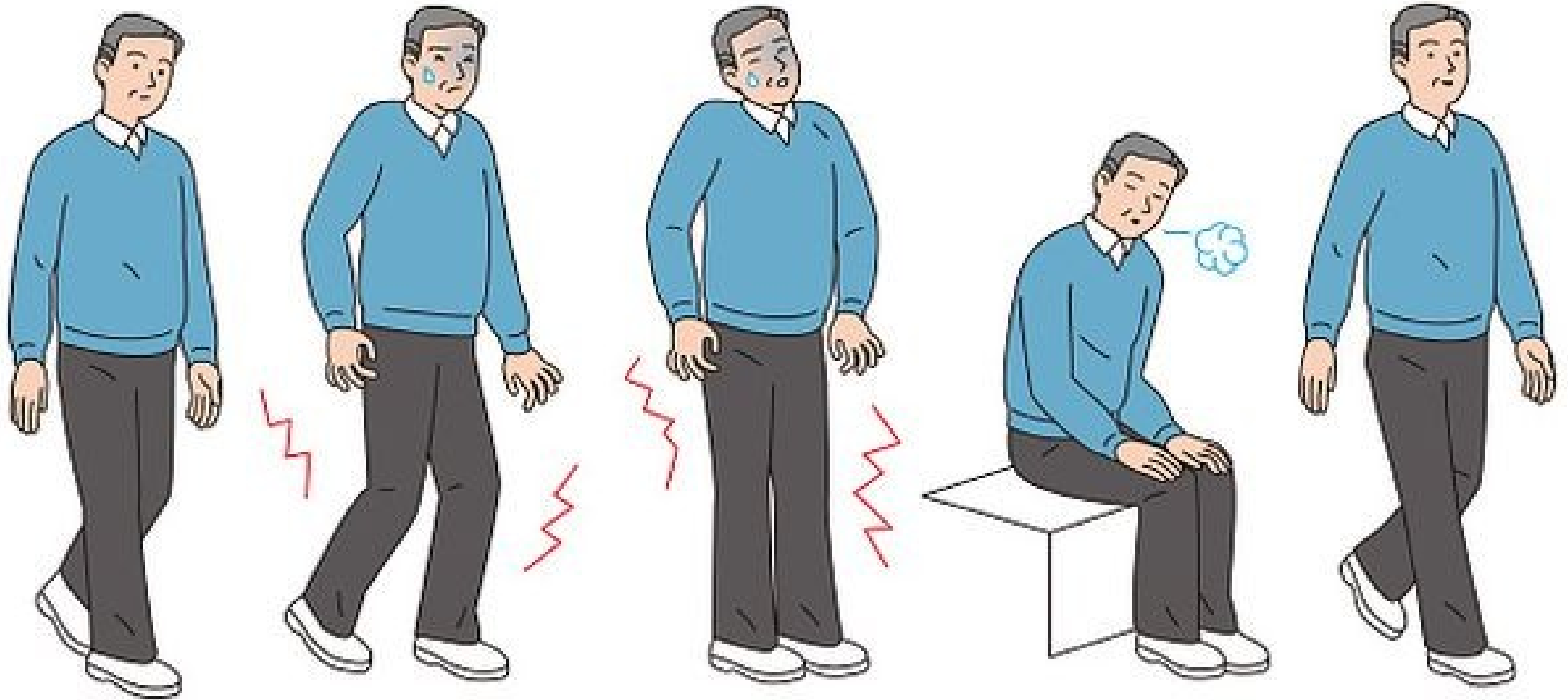
Not everyone has these early symptoms, however. It's possible for inflammation to damage arteries for years before patient realize something is wrong.

Second-stage symptoms begin to develop when inflammation has caused arteries to narrow. At this point, there's less blood, oxygen and nutrients reaching your organs and tissues. These signs and symptoms may include:

- Arm or leg weakness or pain with use (claudication)
- Lightheadedness or dizziness
- Fainting
- Headaches
- Memory problems
- Trouble thinking



Claudication (Claudication – severe muscle pain due to cramp, caused by narrowed blood vessels, on use of the extremity – a good example of this is hanging up washing where the arm affected become painful) of an extremity

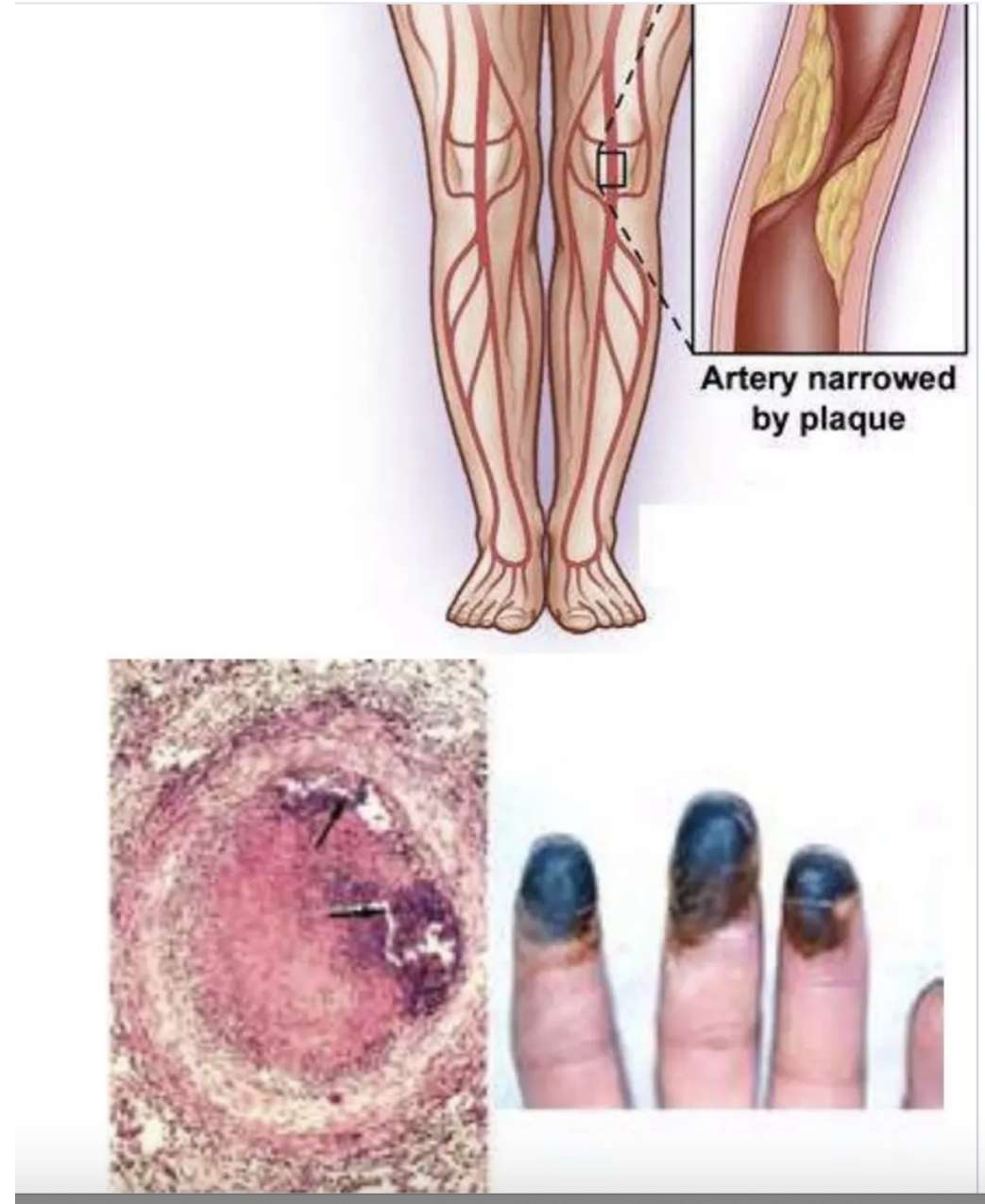


- Shortness of breath
- Visual problems
- High blood pressure
- Difference in blood pressure between two arms
- A difficult-to-find or absent pulse in the wrists — Takayasu's arteritis is sometimes called “**pulseless disease**” because narrowed arteries can make normal pulses difficult or impossible to detect
- Anemia
- Chest pain
- Abdominal pain



The severity of Takayasu's arteritis may vary. In some people, the condition remains mild and doesn't produce complications. But in others, extended or recurring cycles of inflammation and healing in the arteries can lead to one or more of the following:

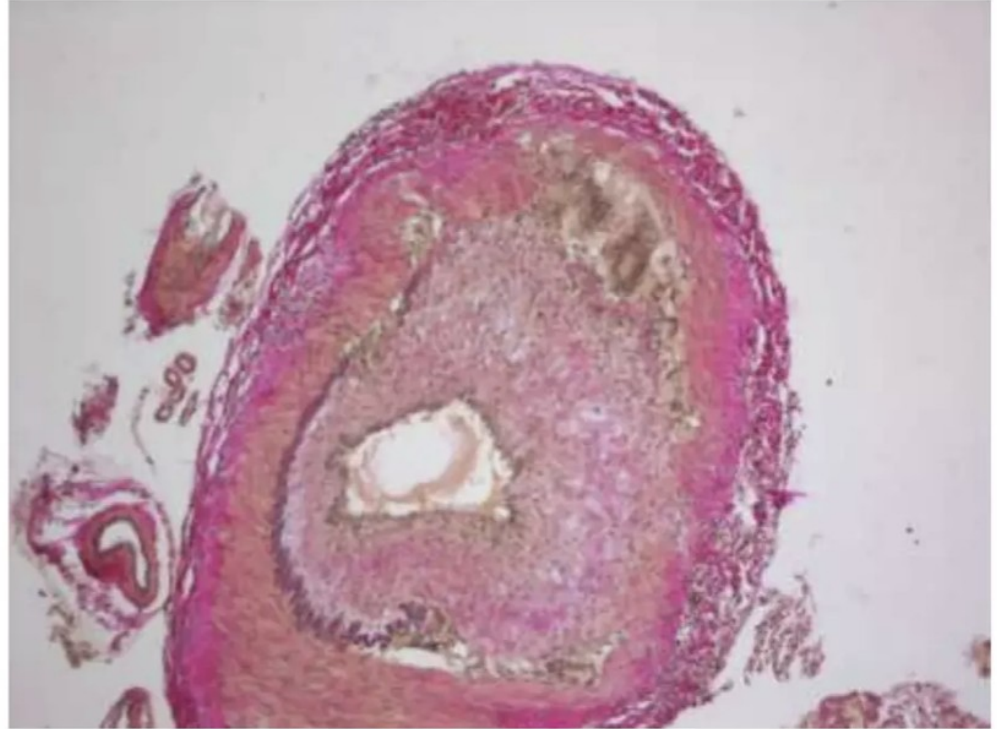
- **Hardening and narrowing of blood vessels**, which can cause reduced blood flow to organs and tissues.



Complication

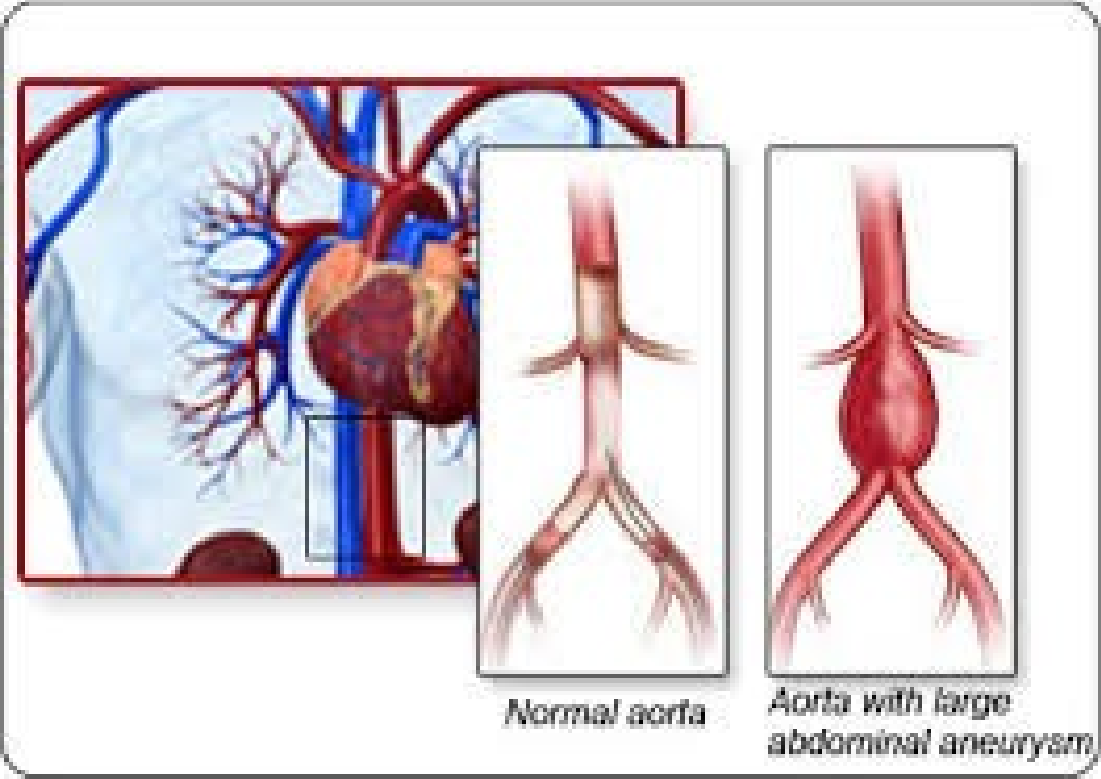
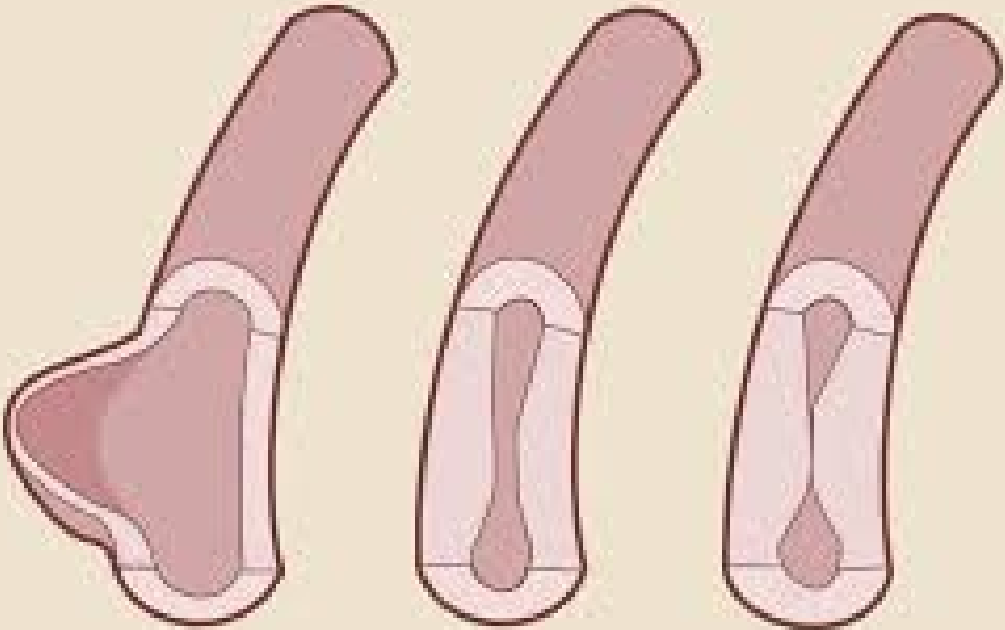
- **High blood pressure**, usually as a result of decreased blood flow to your kidneys
- **Inflammation of the heart**, which may affect the heart muscle (myocarditis), the heart valves (valvulitis) or the sac around the heart (pericarditis)
- **Heart failure** due to high blood pressure, myocarditis or aortic regurgitation — a condition in which a faulty aortic valve allows blood to leak back into your heart — or a combination of these

- **Ischemic stroke**, a type of stroke that occurs as a result of reduced or blocked blood flow in arteries leading to brain.



Cerebral Giant Cell Vasculitis of the brain causing Blocked blood flow

Aneurysm formation



A healthy pregnancy is possible for women with Takayasu's arteritis. However, the disease can affect fertility and pregnancy. If patients have Takayasu's arteritis and are planning on becoming pregnant, it's important to work with a doctor to develop a comprehensive plan to limit complications of pregnancy before conceiving. In addition, patients will be closely monitored throughout pregnancy.



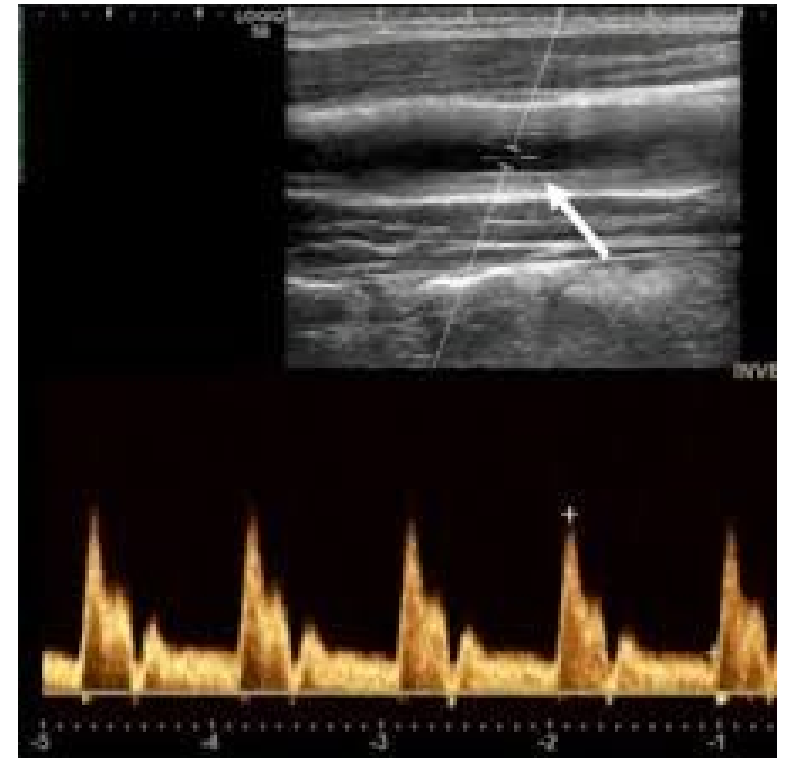
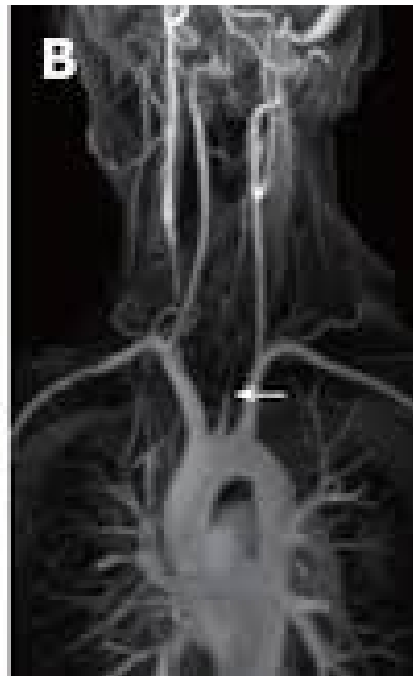
Diagnosis



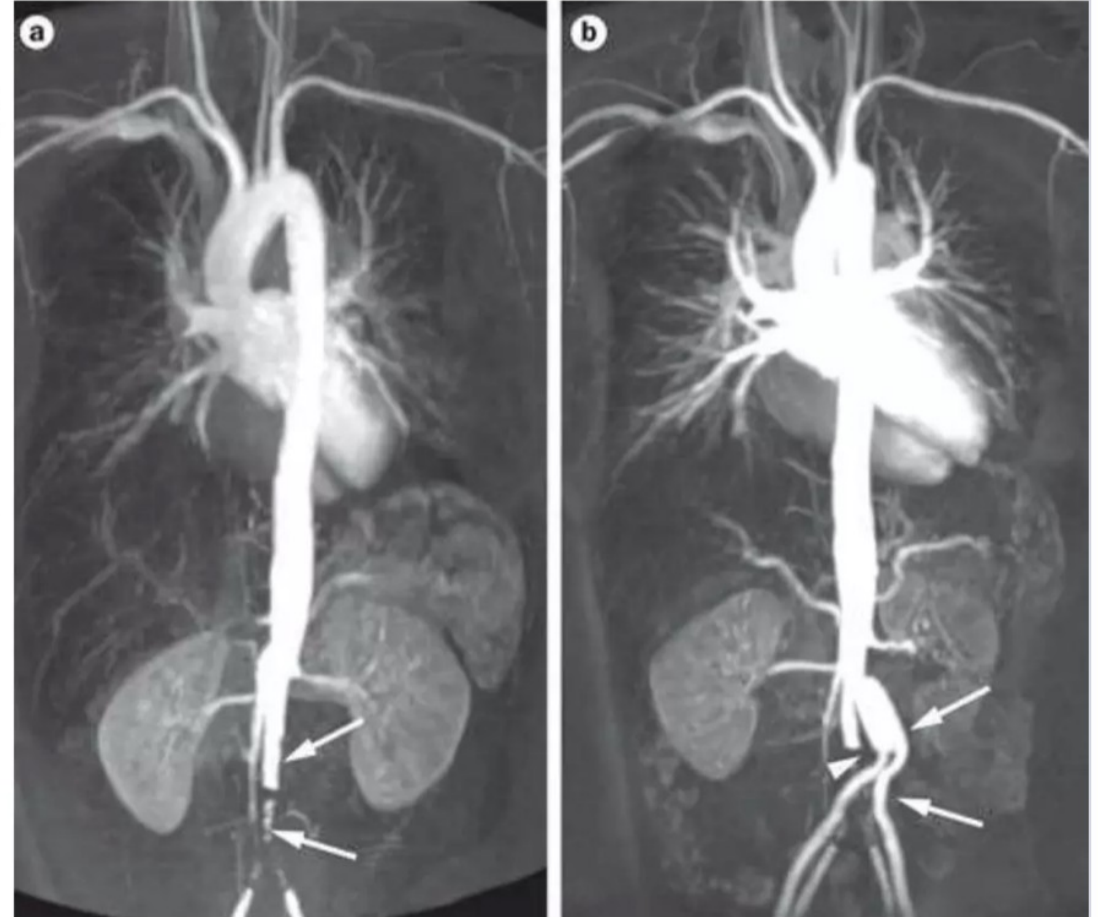
Takayasu's arteritis can be challenging to detect, and some people go years without an accurate diagnosis. Examinations of the following steps and tests to help rule out other conditions that closely resemble Takayasu's arteritis and to confirm the diagnosis:

- **Medical history and physical exam.** History of general health, including questions about heart and vascular disease.
- **Blood tests.** Examinations of blood tests to check for signs of inflammation in body, such as a high white blood cell count or high levels of C-reactive protein, an inflammatory substance produced by your liver. Another blood test commonly used to help identify inflammatory disorders is called the erythrocyte sedimentation rate and the existing anemia.

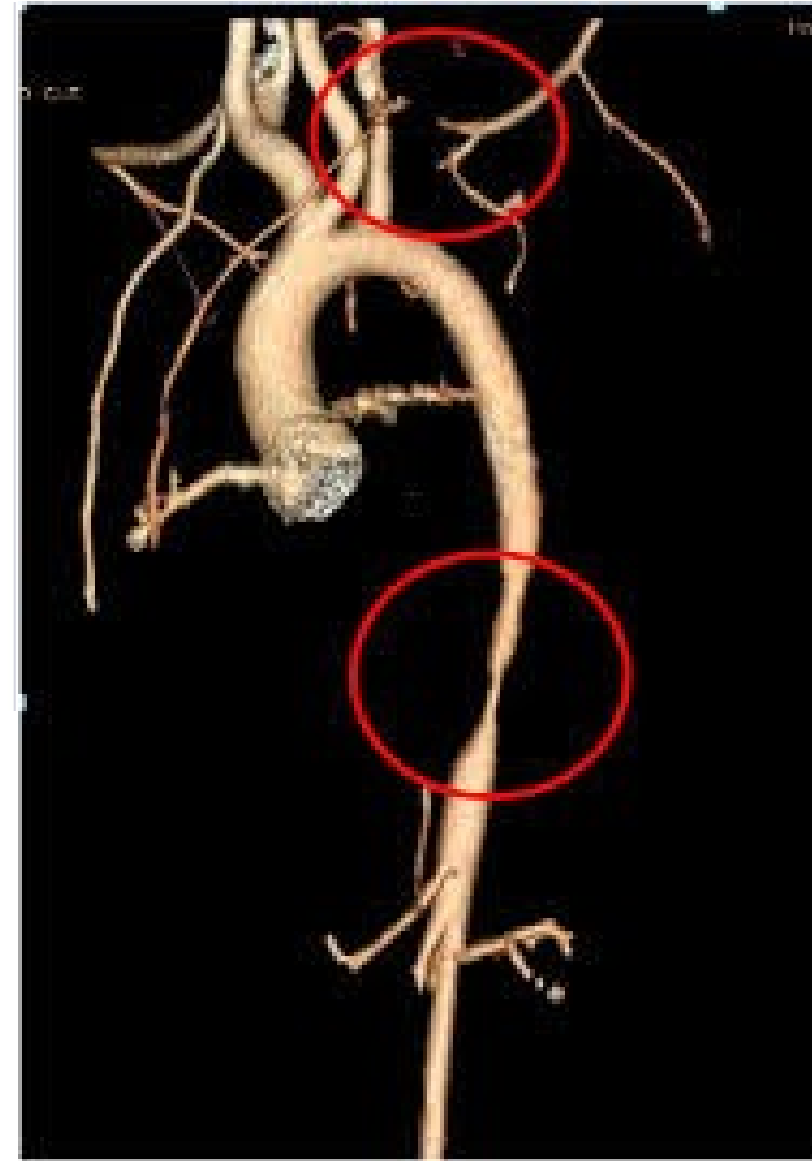
- **Ultrasonography.** Doppler ultrasound, a more sophisticated version of the common ultrasound, has the ability to produce very high-resolution images of the walls of certain arteries, such as those in the neck (carotid arteries) and those in the shoulder (subclavian arteries). It may be able to detect subtle changes in these arteries before other imaging techniques can. Doppler ultrasound can also help distinguish between Takayasu's arteritis and atherosclerosis, a much more common condition caused by the buildup of cholesterol particles and other cellular debris in your arteries.



➤ **Angiography.** Traditionally, examination using an X-ray test called an angiogram as one of the more definitive tests for diagnosing Takayasu's arteritis. During an angiogram, a thin, flexible tube called a catheter is inserted into a large blood vessel. A special dye (contrast medium) is then injected into the catheter, and X-rays are taken as the dye fills arteries or veins. The resulting images allow to see if blood is flowing normally or if it's being slowed or interrupted due to narrowing (stenosis) or blockage of a blood vessel. A person with Takayasu's arteritis generally has several areas of stenosis.



Magnetic resonance angiography (MRA). Increasingly, this less invasive form of angiography in place of traditional angiography as a test for Takayasu's arteritis. MRA produces detailed images of blood vessels without the use of catheters or X-rays, although an intravenous contrast medium generally is used. MRA works by using radio waves in a strong magnetic field to produce data that a computer turns into detailed images of tissue slices.

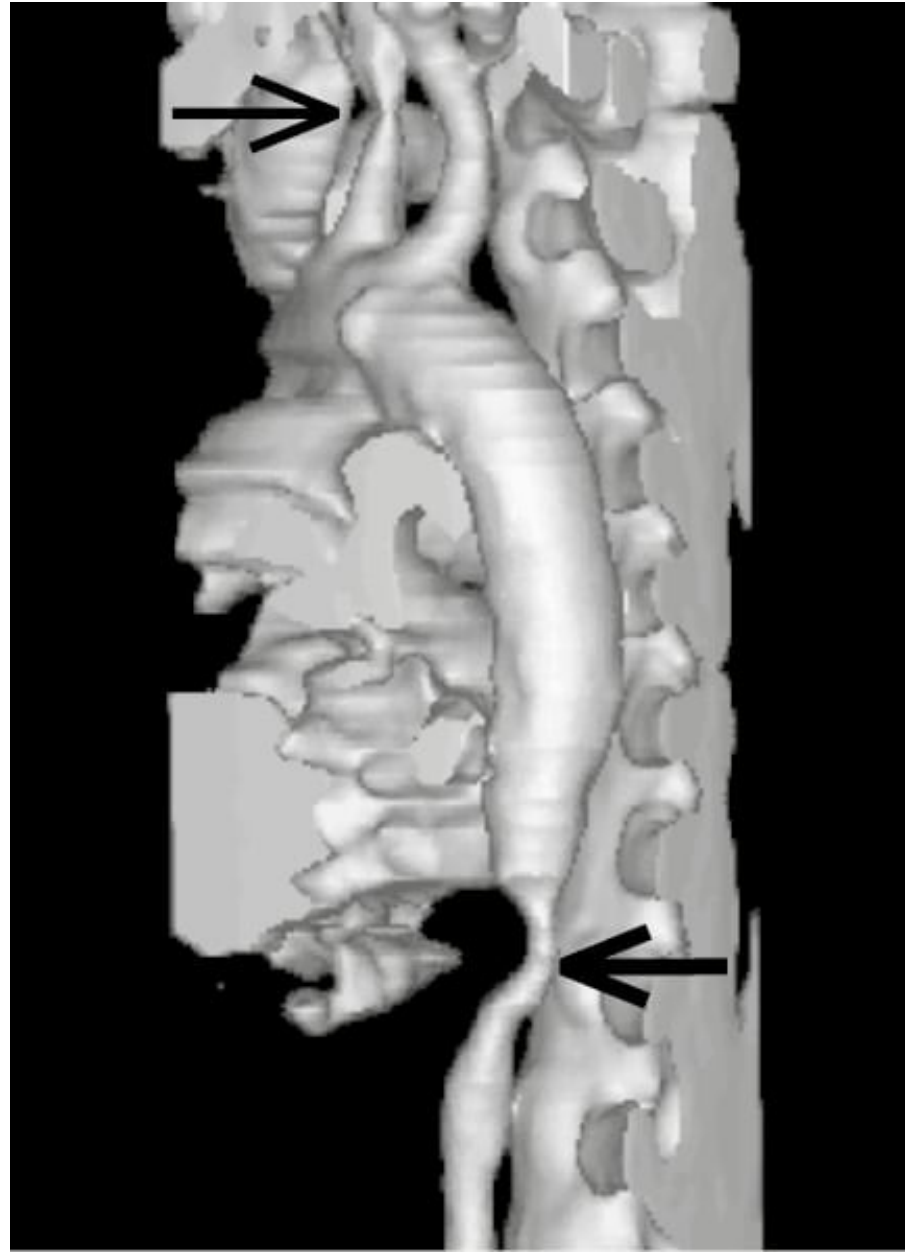


- **Computerized tomography (CT) angiography.** This is another noninvasive form of angiography combining computerized analysis of X-ray images with the use of intravenous contrast dye to allow to check the structure of aorta and its nearby branches and to monitor blood flow.



- **Biopsy.** Unlike other types of vasculitis, tissue biopsy is not usually used to diagnose Takayasu's arteritis.

CT



Because Takayasu's arteritis has a tendency to recur or flare up after being in remission for a while, these tests may be used not only for diagnosis but also for monitoring the progress of the disease and following up on effectiveness of treatment. Some of the medications used for Takayasu's arteritis may have potentially harmful effects over the long run, so it's important to know when medication is beneficial and when its risks outweigh its benefits.

Treatment



The goal of treatment is to control inflammation and prevent further damage to blood vessels with the fewest long-term side effects. Takayasu's arteritis can sometimes be difficult to treat because even if symptoms appear to be in remission the disease may still be active. In addition, by the time some people are diagnosed, it's possible that irreversible damage may already have occurred.

On the other hand, if there is no a lot of signs and symptoms or serious complications, it may not need treatment at all.

Medications

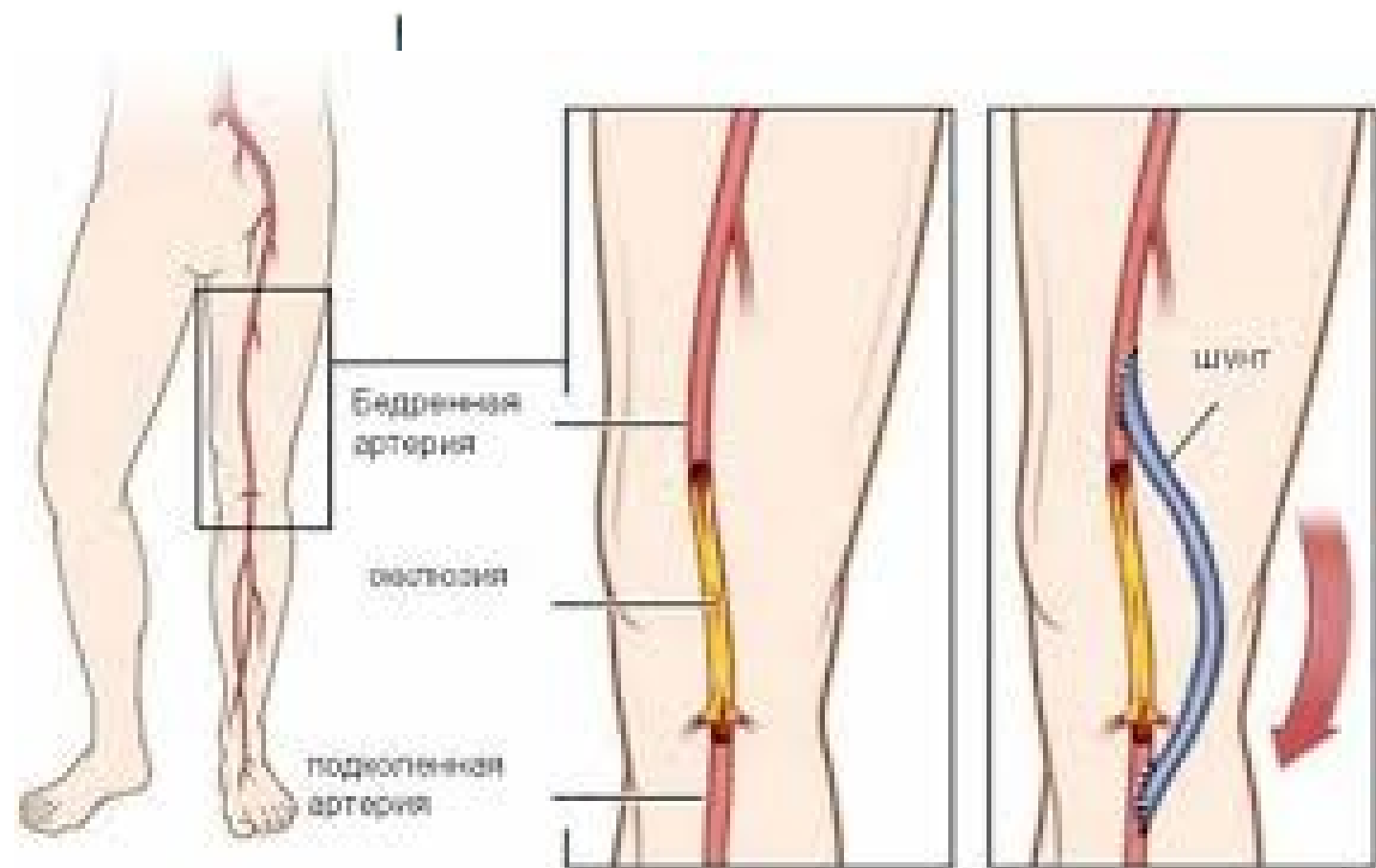
Many of these medications have serious long-term side effects, so try to balance their benefits against their potential risks by controlling dosing of medications and the length of time to take them.

- **Corticosteroids.** The first line of treatment is usually with a corticosteroid, such as prednisone or methylprednisolone (Medrol). Patients often start feeling better in just a few days, but usually need to continue taking medication for an extended period of time. After the first month, may gradually begin to lower the dose until reach the lowest dose needed to control inflammation. Some of symptoms may return during this tapering period. Long-term side effects of corticosteroids include weight gain, high blood sugar, increased risk of infections, osteoporosis, menstrual irregularities and slower wound healing.
- **Immune-suppressing medications.** If condition doesn't respond well to corticosteroids or have trouble tapering off the medication, may need treatment with drugs that suppress immune system function, such as methotrexate (Trexall, Rheumatrex) or azathioprine (Imuran, Azasan). These drugs, including mycophenolate (CellCept), work by suppressing the immune system, and they have effectively reduced blood vessel inflammation in people with Takayasu's arteritis. The most common side effect is an increased risk of infection.

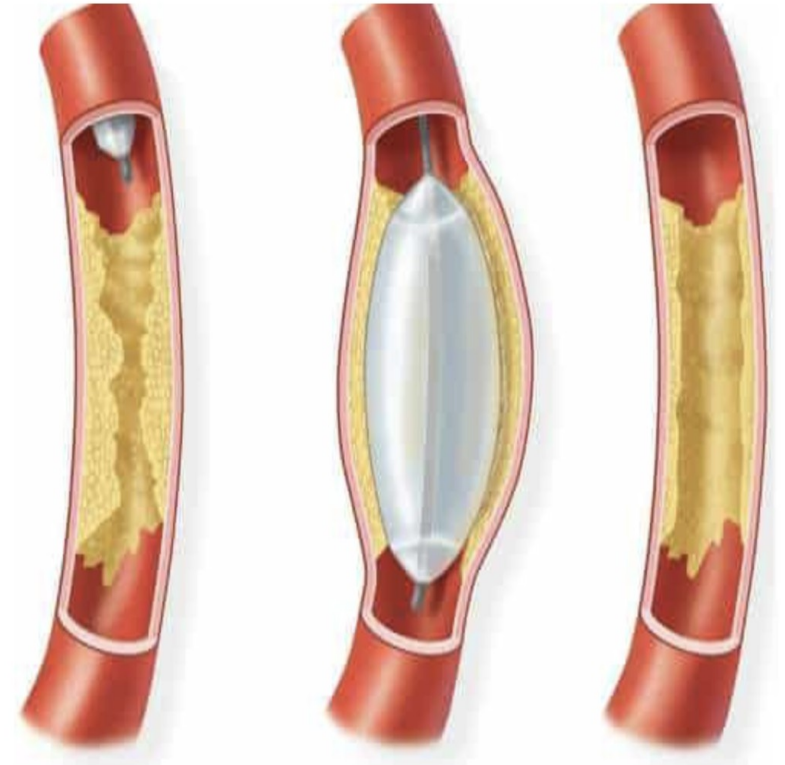
- **Drugs that regulate the immune system.** In people who don't respond to standard treatments, drugs that correct abnormalities in the immune system (biologics) may be used. Examples of these drugs include adalimumab (Humira), etanercept (Enbrel), infliximab (Remicade) and tocilizumab (Actemra). Small studies have found these medications effective at controlling signs and symptoms, as well as at reducing the need for corticosteroid treatments. However, the studies have been small, and more research is needed. The most common side effect is an increased risk of infection.

If arteries become severely narrowed or blocked, surgery may be necessary to open or bypass these arteries to allow an uninterrupted flow of blood. Often this helps to improve certain symptoms, such as high blood pressure and chest pain. In some cases, though, narrowing or blockage may recur, requiring a second procedure. Also, if large aneurysms develop, surgery may be needed to prevent them from rupturing. These procedures, which are best performed when inflammation of the arteries has been reduced, include:

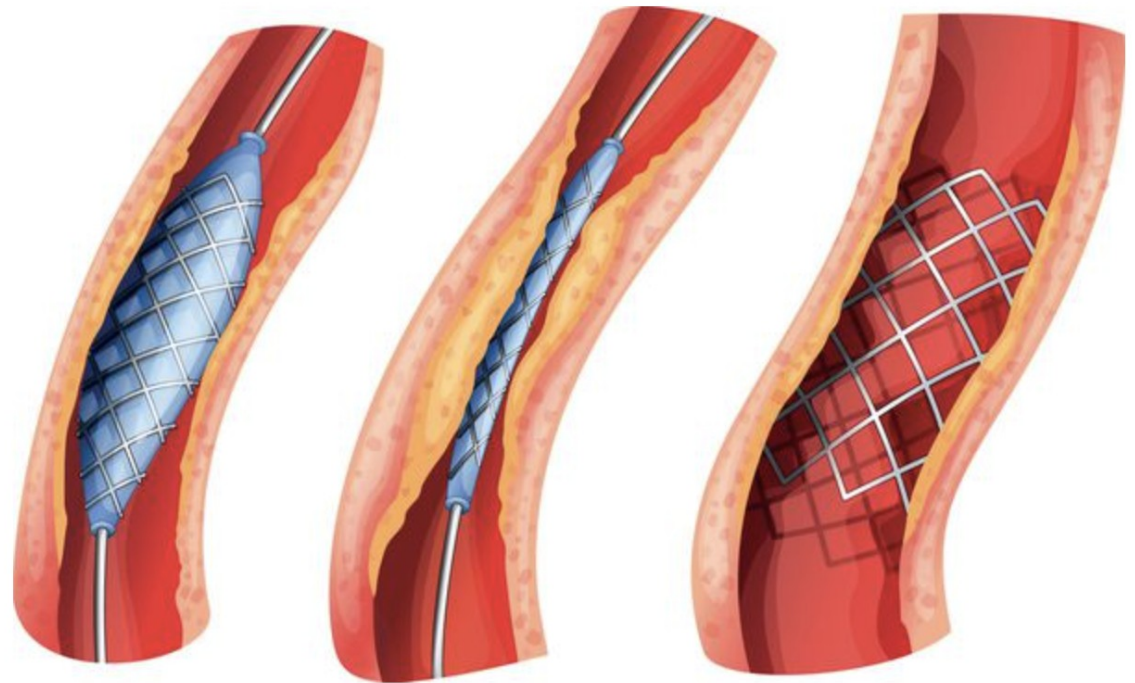
- **Bypass surgery.** In this procedure, an artery or a vein is removed from a different part of body and attached to the blocked artery, providing a bypass for blood to flow through.



- **Blood vessel widening (percutaneous angioplasty).** During this procedure, a tiny balloon is threaded through a blood vessel and into the affected artery. Once in place, the balloon is expanded to widen the blocked area, then it's deflated and removed.



- › **Stenting.** Tiny wire mesh coils called stents may be inserted into the area widened by angioplasty. The stents help to prop open the artery to prevent the blood vessel from narrowing again.



When Takayasu's arteritis is identified and treated early, the prognosis is usually good. One of greatest challenges may be coping with side effects of medication. The following suggestions may help:

- **Understand the condition.** Learn everything about Takayasu's arteritis and its treatment. Know the possible side effects of any medications, take and report any changes health to doctor.
- **Eat a healthy diet.** Eating well can help prevent potential problems that may result from condition and medications, such as high blood pressure, thinning bones and diabetes. Emphasize fresh fruits and vegetables, whole grains, and lean meats and fish while limiting salt, sugar and alcohol.
- Be sure to get adequate amounts of calcium and vitamin D to help prevent osteoporosis, a primary side effect of treatment with corticosteroids. Ask doctor what the proper amount of these nutrients for. If find it hard to get calcium from diet because don't eat dairy products, for example, talk with doctor about trying calcium supplements, which are often combined with vitamin D and may help combat thinning bones.

- **Exercise regularly.** Regular aerobic exercise, such as walking, can help prevent bone loss, high blood pressure and diabetes. It also benefits heart and lungs. In addition, many people find that exercise improves their mood and overall sense of well-being.
- **Avoid all tobacco products.** It's important to stop using all forms of tobacco to reduce the risk of injuring blood vessels and tissues even more.