

Dyslipidemia

High cholesterol builds fat plaques in arteries that can suddenly block blood flow and cause heart attacks or strokes. Statins lower cholesterol and stop this before it happens.

THE ONE-LINE TRUTH

Too much LDL cholesterol in the blood lets fat stick to artery walls and block blood flow to the heart and brain.

The chain — how it unfolds

1. LDL cholesterol builds up in the blood because the liver cannot clear it fast enough. — why: Genes (like familial hypercholesterolemia), saturated fat in the diet, smoking, lack of exercise, diabetes, or hypothyroidism slow down or overwhelm the liver's ability to pull LDL particles out of the bloodstream.
2. LDL particles slip through the inner lining (endothelium) of artery walls and get trapped underneath. — why: High LDL levels and inflammation (from smoking, high blood sugar, or high blood pressure) damage the endothelium, making it leaky so LDL particles can squeeze through and get stuck in the artery wall.
3. White blood cells (macrophages) try to clean up the trapped LDL, but they turn into foam cells and die, forming a fatty streak. — why: Macrophages eat the LDL particles to protect the artery, but when there is too much LDL, the macrophages fill up with fat (becoming foam cells), burst, and leave behind a pool of cholesterol and dead cells — the start of plaque.
4. The fatty streak hardens into plaque as smooth muscle cells and scar tissue grow over it, narrowing the artery. — why: Your body tries to wall off the fatty mess by growing a fibrous cap (scar tissue) over it, but this makes the artery stiff and narrow, reducing blood flow — especially during exercise when your heart or brain needs more oxygen.
5. The plaque can crack open suddenly (rupture), and a blood clot forms on top in seconds, blocking the artery completely. — why: The fibrous cap can crack if blood pressure spikes, inflammation weakens it, or stress hormones surge — when it ruptures, blood touching the fatty core triggers clotting, and the clot blocks blood flow instantly, killing heart or brain tissue (heart attack or stroke).

6. Without enough oxygen, heart muscle or brain cells die within minutes, causing permanent damage or death. — why: Heart and brain cells need a constant supply of oxygen from blood — when flow stops, cells run out of energy (ATP), membranes break down, and the tissue dies (infarction), leading to chest pain, irregular heartbeat, paralysis, speech loss, or sudden death.
7. Statins lower LDL cholesterol by blocking the liver's cholesterol-making enzyme, shrinking plaques and preventing most heart attacks and strokes. — why: Statins (like atorvastatin, rosuvastatin) stop the enzyme HMG-CoA reductase, so the liver makes less cholesterol and pulls more LDL out of the blood using its receptors — this lowers LDL by 30–50%, stabilizes plaques, reduces inflammation, and cuts the risk of heart attack and stroke by about 25–35% over five years.
8. If statins are not enough, or if familial hypercholesterolemia is severe, adding ezetimibe or PCSK9 inhibitors can lower LDL even further and save lives. — why: Ezetimibe blocks cholesterol absorption in the gut (lowers LDL another 15–20%), and PCSK9 inhibitors (like evolocumab, alirocumab) are injections that help the liver pull LDL out of the blood faster (lowers LDL another 50–60%) — these are critical for people with genetic high cholesterol or those who cannot take statins.

Spot it — what you see, and why

- Usually no symptoms at all: High cholesterol and triglycerides do not hurt or feel different on their own; they quietly build up inside artery walls without warning, so most people feel completely normal until a serious problem (heart attack or stroke) happens.
- Xanthomas (small yellow bumps on skin, especially over tendons): When cholesterol in the blood stays extremely high for a long time, some of it leaks out and collects under the skin or in tendons, forming soft yellow lumps (like wax deposits); this is most common in familial (inherited) forms of high cholesterol.
- Xanthelasma (yellowish patches on eyelids): Extra cholesterol in the blood can also settle in the thin skin of the eyelids, making flat or slightly raised yellow patches; these are harmless by themselves but signal that cholesterol levels may be very high.
- Corneal arcus (white or gray ring around the colored part of the eye): Cholesterol can deposit in the edge of the cornea (the clear window at the front of the eye), creating a faint ring; in younger adults this often means inherited high cholesterol, though in older adults it can be normal aging.
- Pancreatitis (sudden, severe belly pain that may reach through to the back): When triglycerides climb extremely high (usually above 1,000 mg/dL), they can inflame the pancreas (the organ that makes digestive juices and insulin), causing intense pain, nausea, and vomiting; this is a medical emergency.

- Chest pain or pressure (angina): Over many years, high cholesterol causes waxy plaque to narrow the arteries that feed the heart muscle; when the heart does not get enough blood during exercise or stress, it sends pain signals in the chest (like a cramp from not enough oxygen).

Red flags — act now

- Sudden severe belly pain with nausea and vomiting (may be pancreatitis from very high triglycerides)
- Chest pain, pressure, or tightness, especially with activity or stress (sign that plaque is blocking heart arteries)
- Sudden weakness, numbness, slurred speech, or vision loss (possible stroke from a clot breaking off plaque)
- Multiple close family members with heart attack or stroke before age 55 in men or 65 in women (suggests inherited severe high cholesterol)
- Triglycerides above 1,000 mg/dL (high risk of pancreatitis)

Treat it — in this order

1. High-intensity statin (atorvastatin 40-80mg or rosuvastatin 20-40mg daily) → Blocks the enzyme that makes cholesterol in the liver, so less LDL particles get made and fewer stick to blood vessel walls. This slows plaque buildup before it causes a heart attack.
2. Lifestyle changes: Mediterranean diet, 150 minutes exercise per week, weight loss, smoking cessation → Eating better and moving your body tell your liver to make less cholesterol and burn fat instead of storing it. This fixes the broken upstream steps — the actual causes, not just the number.
3. Ezetimibe (10mg daily) if LDL stays above goal after statin → Blocks cholesterol from entering the bloodstream through the intestines, so fewer fat particles are available to build plaque in vessels.
4. PCSK9 inhibitor (evolocumab or alirocumab) for familial hypercholesterolemia or ASCVD with LDL >70 despite statin + ezetimibe → Stops the liver from destroying LDL receptors, so more LDL gets pulled out of the blood and does not accumulate in vessel walls.
5. Icosapent ethyl (2g twice daily) or fibrate (fenofibrate) if triglycerides >200 despite statin → Lowers triglyceride particles that also trigger inflammation and plaque growth in blood vessels when LDL is already high.

Your top priorities at the bedside

1. Assess for signs of acute coronary syndrome: ask about chest pain quality, duration, radiation to jaw or arm, associated shortness of breath or sweating, and obtain 12-lead ECG if any cardiac symptoms present — why: Cholesterol plaque can rupture suddenly and form a clot that blocks a coronary artery, causing heart attack; early detection and treatment within 90 minutes restores blood flow and prevents permanent heart muscle death
2. Check blood pressure, heart rate, and peripheral pulses in both arms and both legs; listen to carotid arteries for bruits (whooshing sounds) — why: High cholesterol causes plaque throughout the arterial system; weak or absent pulses indicate severe blockage in peripheral arteries, blood pressure differences between arms suggest subclavian artery narrowing (stenosis), and carotid bruits warn of stroke risk from narrowed neck arteries
3. Review most recent lipid panel results: total cholesterol, LDL, HDL, and triglycerides; calculate 10-year ASCVD risk score if patient has no prior cardiovascular events — why: Treatment intensity depends on absolute LDL number and overall cardiovascular risk; patients with LDL above 190 mg/dL or 10-year ASCVD risk above 20 percent need high-intensity statins, while triglycerides above 500 mg/dL require immediate intervention to prevent pancreatitis