

Harvard Heart Letter

Do-it-yourself bypass

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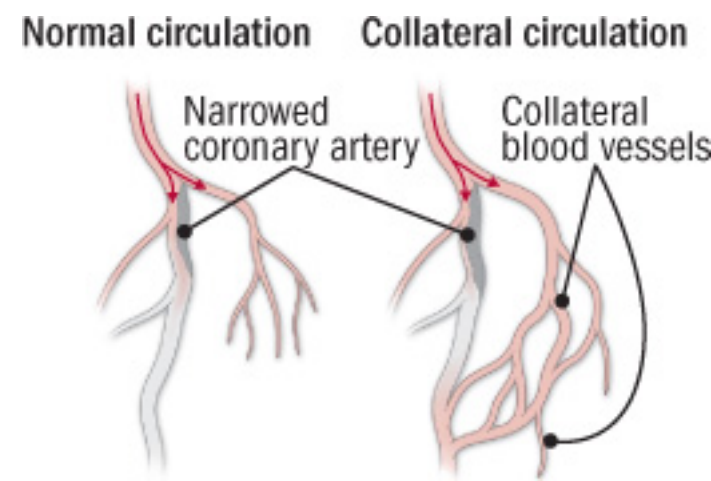
Helping your heart grow new blood vessels is a natural way to bypass cholesterol-clogged coronary arteries.

Picture this: You are driving down a city highway when traffic grinds to a halt. You can see a miles-long backup behind a distant construction crew that has closed off the two right lanes. Knowing the area, you merge over to a nearby exit, then follow a detour onto streets that run almost parallel to the highway. Once beyond the bottleneck, you re-enter the highway.

That's similar to what happens when cholesterol-filled plaque begins to narrow a coronary artery. Blood vessels respond to the slow, stealthy attack of artery-clogging atherosclerosis by generating a host of chemical and physical signals. An immediate action of these signals is to improve blood flow beyond the narrowing. They also bulk up tiny blood vessels that have been sitting idly in the heart since birth. As these collateral vessels grow larger, more muscular, and more interconnected, they begin to reroute some of the blood flow around the blockage (see "Growing around blocked arteries"). Such a natural bypass can keep the heart well supplied with oxygen-rich blood, much as its surgical counterpart can do.

Scientists have been trying for years to nudge collateral blood vessels to develop and prosper, but without great success. You can do it at home without anything more high-tech than a comfortable pair of shoes.

Growing around blocked arteries



When cholesterol-filled plaque or another obstruction restricts blood flow (red arrows) through a coronary artery, chemical and physical signals stimulate the development of small collateral blood vessels. They form new routes for blood that can keep the heart muscle nourished.

Collaterals for insurance

Measuring the extent of collateral circulation, or blood flow through it, isn't easy. That's one reason why it has been difficult to document the impact of having, or not having, good collateral circulation. That said, studies from the 1950s onward highlight the potential of this network of recruitable blood vessels. They can:

Limit heart attack damage. Japanese researchers have shown that people with well-developed collateral circulation have smaller areas of damaged muscle after a heart attack than those with poorer collateral circulation.

Provide extra time for emergency heart attack therapy. Artery-opening angioplasty offers the best way to halt a heart attack. Ideally, such emergency angioplasty should be done no more than two to three hours after heart attack symptoms start. A German team has shown that this treatment window might stay open longer in people with healthy collateral circulation.

Improve survival. In a study published in 2007 of more than 800 men and women with stable coronary artery disease (chest pain with exertion or stress), 89% of those with good collateral circulation were still alive after 10 years of follow-up, compared with 71% of those with low collateral flow.

Bypass before surgery

Most Americans, including those without any outward signs of heart disease, have a narrowed coronary artery or two. They are the byproducts of desk jobs, plentiful food, stress, lack of exercise, and a host of other factors.

If the development of collateral vessels was the body's fail-safe response to atherosclerosis, relatively few people would have angina or other forms of ischemic heart disease (the kind caused by poor blood flow to the heart muscle). Unfortunately, not everyone is genetically programmed to effortlessly grow collateral blood vessels. Unhealthy habits also get in the way.

Researchers have tried to stimulate collateral blood vessels by bathing them with protein growth factors and bombarding them with growth-promoting genes. So far, these efforts haven't paid off. You can succeed where they haven't "" by exercising.

When you exercise, you dramatically boost blood flow through the coronary arteries. The inner lining of the arteries responds to this "stress" much as it does to the stress of atherosclerosis, by stimulating tiny collateral blood vessels to elongate, widen, and form new connections.

A little bit of exercise won't do the trick. You need to push your heart. If you aren't used to exercising, that may mean brisk walking. If you walk, add in spurts of race walking or jogging. Swimming, bicycling, hiking "" any activity that gets your heart beating faster "" will do as long as you keep it up for 20 to 30 minutes a crack and do it several times a week.

Exercise is a great way to prevent heart disease. And a host of studies show that it can help some people with narrowed coronary arteries safely avoid bypass surgery or angioplasty. It's also good for the bones, brain, and just about every other part of the body. So why not give yourself a natural bypass before you need a surgeon to perform a more painful and hazardous one?

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