

“The Cardiovascular Cure”
How to Strengthen Your Self-Defense
Against Heart Attack and Stroke
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(Excerpts from book)

You are only as old as your endothelium. -PAUL VANHOUTTE, *Mayo Clinic* (1983)

THERE IS magic within us. It is a magic that arises from the genetic code, taking form within the complex interaction between cells and tissue. It is a magic that can lengthen your life, a magic that can be strengthened or weakened depending on how you nourish it. What you do with the magic is up to you.

This book will introduce you to the magic that is inside your blood vessels. It comes in the shape of a molecule, one of the simplest molecules found in nature. This molecule is nitric oxide, or NO, a substance so powerful that it can actually protect you from heart attack and stroke. Best of all, your body can make it on its own. NO is your body's own built-in, natural protection against heart disease.

Today, thanks to new research in cardiovascular medicine, we know much more about blood vessels than we did just a few years ago. In fact, we now know that cardiovascular disease affects not only the heart, but also the miles of blood vessels throughout the body. We know that blood vessels are more than passive pipes that get blocked. We also know much more about atherosclerosis, or hardening of the arteries, the disease of the blood vessels that results in heart attack and stroke and is the number one cause of death in this country:

We now recognize that the inflammatory process plays an important role in the buildup of plaque. And that this buildup is more than

deposits in a pipe that need to be mechanically removed, dilated with a balloon, or bypassed surgically. This book will introduce you to this new concept in vascular medicine. The body is capable of healing itself. Damaged and blocked vessels can open up and function normally again.

When I was in medical school in the mid-1980s, we were taught that atherosclerosis was an end-stage condition, a disease that every- one would get as they grew older. But that's just not true. We now know that we have a choice regarding this disease. With a diet and lifestyle that channels the natural forces of the blood vessel, atherosclerosis can be prevented, brought to a halt, and even reversed.

You can take care of your blood vessels, just as you can take care of other parts of your body. Blood vessels are alive and vital like any other organ in the body: They can change their diameter and control the blood flow through them. You have 100,000 miles of blood vessels in a complex network throughout your body. A roadblock anywhere can lead to a serious medical problem, such as debilitating leg pain, stroke, or heart attack.

If you haven't given much thought to blood vessel health until now, you're not alone. Most internists, and even cardiologists, know very little about blood vessels and vascular disease. (There are only about a dozen medical schools in the u.s. where vascular medicine is taught.) Instead, physicians trained in cardiovascular medicine spend most of their time concentrating on the heart as a pump. Many cardiologists are focused on catheter-based interventions, performing angioplasties and putting in stents. These can be useful procedures in certain situations. But I think that there is too much emphasis on technology to get rid of symptoms and not enough focus on strengthening the body's own healing process.

My cardiac specialization has been in vascular medicine--concentrating on the function and health of blood vessels. Physicians in vascular medicine conduct research in, and take care of patients with, vascular disorders. We are interested in how blood vessels control the flow of blood; how they keep the blood from clotting; how vessels prevent their walls from thickening. We study the processes that lead to blockages in vessels and how these blockages can be prevented.

As director of vascular medicine at Stanford University, I run one of the first NIH-created centers for vascular medicine. Stanford has a history of excellence in this field. Heart transplantation in the U.S. originated

here and many high-tech devices were created here to both detect and treat heart disease. In addition, there is an honorable tradition of research in disease prevention. In that tradition, I conduct research, see patients in our Vascular Medicine Clinic, and teach the use of diet and lifestyle changes to improve the health of blood vessels.

In the course of the last few years, we have learned some surprising new things in our study of blood vessels and through our care of people with heart and vessel disease. This new knowledge may save your life. I am convinced that if you use the knowledge in this book, you will live a longer and healthier life.

Say Yes to NO (Nitric Oxide) ONE OF the most exciting new findings in cardiovascular medicine involves the molecule nitric oxide, or NO. We now know that our bodies produce nitric oxide in the endothelium (pronounced en-do- theel-e-um), a delicate tissue that is the inner lining of the blood vessel. The endothelium is so significant to blood vessel health that I predict that in the next few years the health of your endothelium will become as important as cholesterol to you and your doctor.

In 1998, three American researchers won the Nobel Prize in Medicine for their discoveries concerning NO in the cardiovascular system. (One of the researchers named it EDRF, which stands for endothelium-derived relaxing factor; the two names-EDRF and NO-refer to the same thing.) Previously believed to be a hazardous air pollutant outside the body; nitric oxide was found to provide a host of benefits inside the body. Nitric oxide was hailed as an important molecule not only in the field of cardiovascular medicine but also in many medical disciplines, including infectious medicine, pulmonary medicine, and oncology. (As early as 1992, *Science* magazine named it the "molecule of the year," based on the incredible amount of evidence pointing to its importance in the healthy function of our bodies.)

The discovery of nitric oxide had a great impact on the world of cardiovascular medicine. We learned that the endothelium was much more than it seemed. It was the proverbial "silver" lining. The endothelium creates NO, its own heart medicine!

The way NO works is simple yet revolutionary. Its power is due, in part, to the fact that it is 100 percent natural. Healthy individuals produce NO in their blood vessels. The healthier you are, the more NO you make. You are probably, and rightly, wondering, If NO is so potent and so protective, then why is there so much heart and vessel disease in this country? Unfortunately, most Americans are not producing enough NO in their blood vessels. Why not? Because many people have high blood pressure or high levels of cholesterol, sugar, and fat in their blood. They may smoke. These people all make less NO. And finally; there is a risk factor that we are all susceptible to-aging. Unfortunately; in many people, these risk factors begin a downhill course that leads to reduced vitality; less ability to exercise, and eventually symptoms of heart and vascular disease.

But the good news is that the human body is remarkably restorative (and forgiving) when it comes to vascular health. In my lab at Stanford and others around the country; we are learning about how to restore the body's production of NO and to harness its power for vascular and heart health.

NO's Contribution to Cardiovascular Health

THE NOBEL laureates won their prize for discovering that NO is a potent relaxer of blood vessels. But since this landmark finding, we have learned much more about how NO contributes to cardiovascular health. We have also learned how to improve the production of this lifesaving molecule through nutrition and lifestyle changes.

Based on the work of many research groups, including my own, we now know that when someone has heart disease or risk factors for heart disease, their endothelium is impaired. When the endothelium is not healthy; the vessel constricts and, over time, the vessel wall thickens. Blood cells are more likely to stick to the vessel, and this accumulation may lead to the formation of a blood clot or the development of atherosclerotic plaque.

However, when the endothelium is healthy; it releases NO, which relaxes the blood vessels, prevents cells from sticking to the vessel wall, and prevents the vessel wall from thickening.

A healthy endothelium is like Teflon, a nonstick surface that enhances the flow of blood. By contrast, an unhealthy endothelium is like Velcro, with white blood cells and platelets sticking to it. Together, NO and its sister molecule prostacyclin act together to maintain the vessel in a relaxed state and to prevent the development of blood clots and plaque.

What exactly does NO do for your blood vessels?

NO opens blood vessels and keeps them relaxed. To keep your circulatory system as healthy as possible, you will want your blood vessels to be as relaxed and pliable as possible. NO is the strongest natural relaxant of blood vessels. By causing blood vessels to open up, NO increases blood flow through them. As a cardiologist I have several vasodilating drugs that I can administer to my patients. I use these drugs to improve blood flow and to lower blood pressure. But by ensuring that your body makes NO on its own, you have a natural vasodilator right in your own body: Like nitroglycerin, NO acts on the blood vessels immediately:

NO prevents atherosclerosis. NO is a natural substance that protects us from hardening of the arteries. It does this by preventing platelets (particles in the blood that form blood clots) and white blood cells from sticking to the vessel wall. NO also reduces the production of free radicals, which can cause your vessels to age rapidly. NO also suppresses the abnormal growth of vascular muscle cells, which can thicken the vessel. All of these processes—the sticking of blood cells to the vessel, the production of free radicals, and abnormal cell growth—contribute to atherosclerosis. By halting these processes, endothelium-made NO is your body's strongest self-defense against heart attack and stroke. NO can prevent hardening of the arteries and even reverse it. This process may take some time and is one of the long-term benefits of NO.

THE LAST few years have been exciting for me and for other scientists working in this area of vascular medicine. We have uncovered many secrets of the body and the blood vessels. However, it is even more gratifying for me to use these secrets to enhance vessel health. I believe that it is important for people to learn how to enhance the healing power within—and to benefit from the body's natural defense against heart attack and stroke. It is for this reason that I created the program for endothelial health, an evidence-based, scientifically designed diet, exercise, and nutritional supplement program. Based on the research of the Nobel laureates, my laboratory; and many others, the endothelial health program is designed to stimulate the natural mechanism within our bodies that can fight vascular disease of all kinds, including peripheral artery disease, coronary artery disease, and stroke.

Can NO help you? The answer is yes—by helping to keep your vessels relaxed and open and by preventing atherosclerosis. It is never too late to learn about the power of NO. I have seen people with very unhealthy blood vessels become more healthy. The endothelium can be repaired. Atherosclerosis can be reversed.

When the lining of the blood vessels in healthy cells don't stick, clots don't form, arteries don't harden, and you won't die of a heart attack or stroke. The cardiovascular cure is a healthy endothelium. This is certainly promising news for all of us.