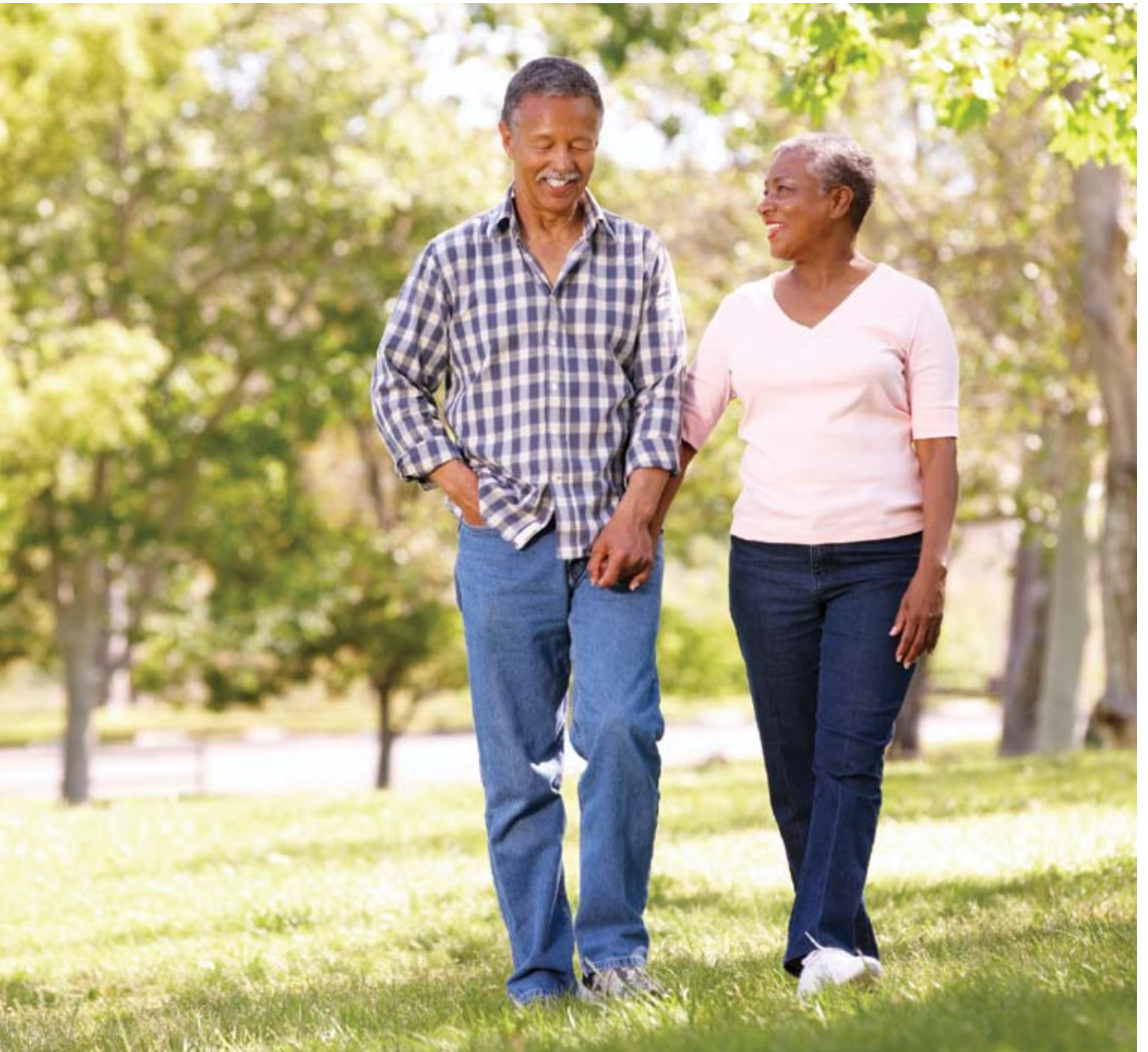


The aging



heart

*As we age, our hearts age, too—
but there are steps you can take to slow the aging process*

BY TOM VALEO

No matter what you do, your heart will keep getting older. The changes brought about by aging will cause your heart to reduce the number of times it can beat per minute and the amount of blood it can deliver per beat.

The cause of these inevitable changes begins in individual muscle cells, which become less efficient over time, making the heart less able to increase its output when you run up a flight of stairs, for example, or carry heavy packages.

These muscle cells, known as myocytes, decline in number over time, and those that remain tend to get larger, which can reduce their efficiency even more. A man may lose nearly one-third of his myocytes by the time he's 70, and with them much stamina and energy.

The sinoatrial node at the top of the heart, which triggers each contraction, loses some cells over time too, causing the signal to weaken slightly (see *A look at the heart* on page 15).

Your heart also shrinks a little each year, according to researchers at Johns Hopkins University in Baltimore, Md. By analyzing the hearts of 5,004 people between the ages of 45 and 84, they determined that the amount of time between beats gets longer over time and the amount of blood pumped decreases.

In addition to these inevitable age-related changes, almost everyone develops some degree of cardiovascular disease as they get older. "It's very rare that people don't develop some lesions in the heart as they age," says Benico Barzilai, M.D., head of cardiovascular medicine at the Cleveland Clinic. "In general, most people develop coronary artery blockages. Another big problem is leaking of the aortic and mitral valves. Then there are people who reach old age and develop heart failure."

Over time, the inner wall of the arteries that deliver blood to your heart and the rest of your body will probably start to accumulate fatty deposits that develop into plaques, which narrow the diameter of the arteries and slow down blood flow—this is

called atherosclerosis. These accumulations combine with other age-related changes to make the arteries stiffer, forcing the heart to pump harder to push blood through the vessels, raising blood pressure.

The aortic valve, which opens to allow oxygen-rich blood to begin its trip through the body, tends to build up calcium over time, making it stiff and unable to open fully. As a result, the heart has to work harder to push blood through the narrower opening, and the left ventricle, which does the majority of the pushing, becomes thicker with muscle cells in an effort to make up for it. Also, the aortic and mitral valves, thickened by calcium, may no longer close tightly between beats, allowing some blood to flow backwards through them with each contraction, reducing the amount of blood delivered to the body by the heart with each beat.

The rhythm of your heart may go haywire, too. The electrical signals that make heart muscle cells contract in the proper sequence may start to get scrambled as they age, causing atrial fibrillation, or a-fib, in which the upper chambers of the heart, known as the atria, beat out of sync with the ventricles below. The result is a rapid or an irregular heartbeat that can cause dizziness, fainting and anxiety.

A-fib also allows blood to pool momentarily in the heart, and whenever the blood stops flowing it tends to clot. If the clots travel to the brain they can cause a stroke. The American Heart Association estimates that 2.7 million Americans a year experience a-fib, which increases the risk of stroke by five times.

What does an aging heart feel like? The irregular rhythm produced by a-fib may produce a flutter in the chest, or a feeling that the heart is beating too fast or too slow, but most of the changes caused by age, even hardening of the arteries and high blood pressure, produce no obvious symptoms at first. Eventually, however, you may notice shortness of breath when you walk up stairs or exert yourself. You may feel excessively tired after you're physically active and experience tightness and discomfort in your chest. Your ankles and legs may swell, and you may feel dizzy at times.

TREATING THE AGING HEART

Preserving heart function in the face of age-related decline may seem like an impossible challenge, but all of these problems have effective treatments that have been improving significantly.

Treating a-fib, for example, used to require surgery to open the chest so doctors could search for the source of the irregular heartbeat and destroy that spot of tissue. Now doctors can prescribe effective drugs to restore normal rhythm to the heart, and if those fail they can perform a procedure called catheter ablation. During this procedure, the doctor inserts a catheter into a small incision in the groin, snakes it up into the heart and delivers radiofrequency waves or ultrasound to destroy spots of tissue where the irregular heartbeats originate. Since the scar tissue created by this procedure doesn't conduct electricity as well as normal tissue, the irregular electrical activity is interrupted and the heart returns to a normal rhythm. A recent study in the *New England Journal of Medicine* found that catheter ablation works just as well as drugs for controlling an irregular heartbeat.

High blood pressure now responds to about a dozen different

medicines. Physical activity and weight loss also help. Drugs known as statins, which reduce levels of low-density lipoprotein (LDL), the cholesterol that accumulates in artery walls, work very well, and appear to contribute significantly to reducing death from heart attacks.

"If you give a statin to someone after a heart attack you can show reduction in mortality almost immediately, but that plaque has been accumulating over many years," says Barzilai. "How can a drug produce an immediate effect if it's just lowering cholesterol? Statins must be doing something else, such as stabilizing plaque."

Arteries already clogged by plaque can be opened with the help of a stent—a mesh cylinder delivered with a catheter to the site of the blockage and then opened so it presses against the artery wall, holding it open. Ideally, the cells that line the artery wall grow over the stent, surrounding it.

If your aortic valve becomes so narrow that you find yourself breathless at the slightest exertion, it can be replaced with an artificial valve made out of tissue from a pig or a cow. Until recently, replacement required opening the chest to provide surgeons with access to the heart, but minimally invasive surgery is now available, and a new procedure known as TAVI (transcatheter aortic valve implantation) delivers the new valve with a thin tube. The new valve is compressed into a thin cylinder at the tip of the catheter, which is inserted in the groin and pushed up into the heart. When the tip of the catheter is in the aortic valve, the new valve is pushed out of the catheter and expanded with a balloon until it crushes the original valve. Then the new valve begins working immediately, and the catheter is withdrawn.

"This is being done on people at 90 years of age," says Donald LaVan, M.D., a professor of medicine at the University of Pennsylvania in Philadelphia, Pa. and a spokesman for the American Heart Association. "With this procedure they don't require open-heart surgery."

The tissue valves last about 15 years and then must be replaced. A mechanical valve that lasts a lifetime is also available but requires traditional open-heart surgery. Also, because the mechanical valve has a tendency to create clots, the patient must take blood thinners every day.

If your heartbeat grows weak due to the accumulation of calcium, or because of damage

Trying to slow the aging process

The ultimate treatment for the aging heart—and for the aging body—would involve slowing the aging process itself.

"If you don't change the rate of aging itself, you're just treating specific diseases," says Nir Barzilai, M.D. (no relation to Benico Barzilai), a professor of medicine and genetics, and director of the Institute for Aging Research at the Albert Einstein College of Medicine in the Bronx. "Advances in treating the heart are far ahead of treatments for diabetes, cancer and Alzheimer disease, so if you survive the heart attack, within a few years you [may] have cancer, diabetes or Alzheimer disease because we're not treating aging itself. If we find something to delay aging, it will delay the aging of the heart, too."

Of course, the aging process has resisted all efforts to slow it down, but Barzilai keeps trying. For example, he and his colleagues have published a study showing that a group of 213 Ashkenazi Jews with a mean age of nearly 100 carried a gene that produced lower levels of cholesteryl ester transfer protein (CETP), which is linked to heart disease.

Finding an inhibitor for CETP seemed like an obvious strategy for reducing heart disease, since it would increase levels of protective "good" cholesterol, but torcetrapib, the first such drug tested, actually increased heart attacks and death. Another drug, dalcetrapib, did no harm, but produced no benefit either.

Despite such discouraging results, Barzilai intends to keep trying to slow aging. "Everybody knows we humans age at different rates, but why do some age faster than others?" he wonders. "That's what I'm trying to find out—what are the protective genes that allow people to get to 100? We hope our efforts will lead to the delay of heart disease, and of other diseases as well."

A look at the heart

A normal rhythm starts in the sinoatrial (SA) node and spreads down to the atrioventricular (AV) node as the atria contract and force blood into the ventricles. The ventricles then contract and pump blood out of the heart as electrical signals reach ventricular muscle cells.

from a heart attack, you can receive a boost from a pacemaker implanted under your skin that delivers regular pulses through a wire leading to the heart.

"When the heart slows down because the natural pacemaker no longer works properly, the heart rate may drop from 60 or so down to 30 or even 20," says Barzilai. "A person then might faint. A pacemaker doesn't allow the heart rate to get too slow."

Damage from a heart attack may make the heart susceptible to ventricular fibrillation, or v-fib, in which muscle cells in the lower chambers of the heart start to fire erratically, causing the heart to twitch unproductively rather than contract forcefully enough to eject blood. The result is sudden death, which can be prevented only by the application of electricity from a defibrillator that can discharge the erratic signals all at once so a normal rhythm may resume. Since paramedics are seldom on hand with a defibrillator when a person's heart goes into v-fib, people at risk can have a tiny defibrillator implanted under their skin to monitor their pulse and, if needed, deliver a shock to the heart through a wire that will restore a normal rhythm.

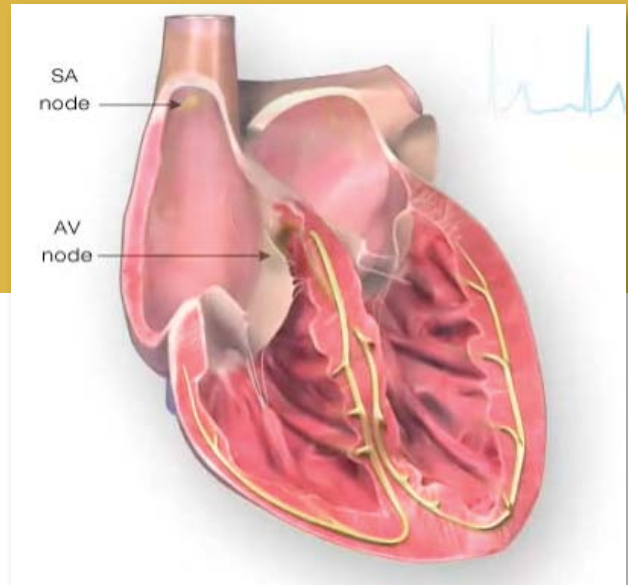
"It's like an insurance policy—you hope it never goes off," says Barzilai. "If it works right, every time it goes off it saves your life."

TAKE PRECAUTIONS TO HEART

Although age is the ultimate threat to your heart, you can take precautions to protect it. For example, taking an aspirin every day can reduce the risk of recurrent heart attacks by about 20 percent.

Start a healthy eating plan by choosing foods low in saturated fat, trans fat, cholesterol, sodium and added sugars and sweeteners. Eat plenty of fruits and vegetables, whole grains, fish (at least twice per week), nuts, legumes and seeds. Try eating some meals without meat. Go for fat-free and low-fat dairy products and lean meats and poultry. Limit sugar-sweetened beverages.

One of the best medicines for the aging heart is physical activity, which produces an apparent paradox—while high blood pressure is recognized as a risk factor for heart disease, exercise, which increases blood pressure during activity, protects the heart. But high blood pressure is a chronic problem. The pressure is always too high, which puts a strain on the heart and the arteries.



When a person stops exercising, however, blood pressure returns to normal and the blood vessels relax and retain greater elasticity. "If people exercise we see this long-term effect where average blood pressure and pulse go down, and they're in much better cardiovascular shape," says Barzilai.

Increase your physical activity by working up to at least 2½ hours (150 minutes) of moderate-intensity aerobic physical activity (like brisk walking) every week or an hour and 15 minutes (75 minutes) of vigorous aerobic physical activity (such as jogging or running), or a combination of both, every week. Add muscle-strengthening activities that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders and arms) at least two days a week.

As you get older, your body burns fewer calories so you'll need to watch your weight. Excess weight causes your heart to work harder and increases the risk for heart disease, high blood pressure, diabetes and high cholesterol. Exercise regularly and eat smaller portions of nutrient-rich foods.

If you're over age 60, ask your doctor about an ankle-brachial index (ABI) test. Starting in your 60s, an ABI test should be done every one to two years as part of a physical exam. The test assesses the pulses in the feet to help diagnose peripheral artery disease, where plaque builds up in the leg arteries.

"The thing I find most beneficial is some form of physical activity every day," says Barzilai. "When I was starting out we told people, you have heart disease—don't do anything! Now we know that is totally wrong. Even people with heart disease should engage in some sort of activity, even if it's just walking. Even patients with bad hearts can be physically active every day." ■