

Weatherhead P.E.T. Center for Preventing and Reversing Atherosclerosis
The University of Texas-Houston Medical School and Memorial Hermann Hospital



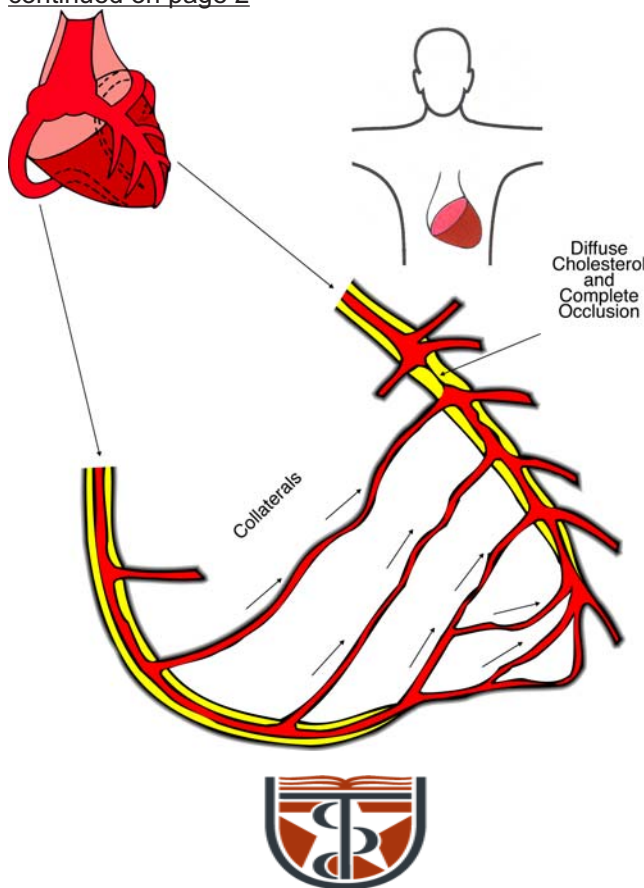
Heart News

Collaterals- the Natural Bypass

One question frequently asked at the Weatherhead PET Center for Preventing and Reversing Heart Disease is whether patients with advanced heart disease can benefit from Reversal Therapy. The answer is unequivocally YES; but it is not a simple answer. How that benefit occurs entails explaining stabilization of atherosclerotic plaques and development of collaterals, the body's natural way of bypassing blockages.

In most patients, the buildup of cholesterol in the walls of the arteries is slow, accumulating over many years, commonly starting when a person is twenty to thirty years old. Smoking, high cholesterol levels, high blood pressure, fatty food, genetic tendencies, inactivity, and other risk factors increase cholesterol accumulation. This cholesterol build up in the walls of the artery causes inflammation that weakens the cap covering the cholesterol plaque and separating it from blood flowing in the artery. The weakened cap may rupture leading to thrombosis or a blood clot in the artery that blocks the blood flow and causes a heart attack. Without risk factor treatment, the risk of sudden heart attack or death is high. Reversal treatment is beneficial at any stage of coronary atherosclerosis because it stabilizes the plaque thereby preventing rupture and heart attack. Both in the early stages when blockages are just beginning before any symptoms; and later when the disease is advanced causing angina or after a heart attack. Reversal treatment with low fat diet, smoking cessation, weight control, moderate exercise, and achieving cholesterol and blood pressure targets, reduces the amount of cholesterol in the walls of the artery. This removal of cholesterol from the walls of the artery takes 18-24 months with associated modest decrease in severity of narrowings. More importantly, the walls of the arteries stabilize, with reduced risk of plaque rupture, heart attacks, cardiac death, unstable chest pain, and need for bypass surgery or balloon dilation.

In most people without risk factor treatment, a sudden heart attack or death is the first clinical sign of coronary heart disease due to sudden plaque rupture and thrombosis of a coronary artery. Other people slowly accumulate cholesterol in the coronary arteries without the plaque breaking or rupturing loose. Complete blockage of the coronary artery may take months or years. This slow progression allows the growth of new blood vessels from other coronary arteries into the branches of the blocked artery. These new blood vessels are called collaterals. They may grow sufficiently to form a natural bypass around the blockage. Well-developed collaterals [continued on page 2](#)





in some people may become so effective that the blood flow is as good as in the original native artery before it was blocked. Collaterals that are less well developed may provide enough blood flow to support normal heart needs and function during resting conditions but not during exercise. Consequently, chest pain may occur only during exercise; when coronary blood flow is inadequate. Repeated controlled exercise with mild to moderate chest pain stimulates the growth of more collaterals. Improved blood flow through this bigger network of collaterals then helps prevent chest pain during exercise and allows progressively greater intensity of exercise before chest pain occurs. The extent to which collaterals develop is partly genetically determined but low cholesterol levels and regular exercise also enhances collateral development.

The PET scan can indicate the presence of collaterals to the heart muscle beyond a severely narrowed coronary artery by demonstrating a particular pattern called “myocardial steal”. During the pharmacologic stress used with the PET scan, the coronary artery supplying blood flow to the collaterals momentarily pulls back or “steals” back the blood flow that it normally supplies to the blocked area. This “myocardial steal” causes the characteristic abnormality on the PET images associated with collaterals and sometimes angina, as with exercise. This effect is very transient, occurring only during the few minutes of giving the stress drug and is completely reversed by the antidote medication that stops the stress. The PET scan thus provides important information indicating whether the collaterals have formed a natural bypass around the blocked coronary artery.

Sometimes coronary artery narrowing is so severe and hardened by calcium deposition that it cannot reverse even partially. However, reversal treatment usually stops progression or slows it enough for collaterals to grow. In this situation, reversal treatment “buys time” while the collateral circulation improves. The collaterals then may provide enough blood flow to heart muscle to prevent heart attack if the artery blocks off completely. However, with severe coronary artery disease, the predictability or reliability of collaterals growing big enough soon enough may be uncertain. Therefore, after a very abnormal PET scan, a coronary arteriogram may be necessary to obtain additional information on the size, extent, and source of the collaterals. If the collaterals are too small or the artery feeding the collateral vessels is also about to occlude, then balloon dilation or bypass surgery may be necessary.

Although collateral development is important in preserving heart function, the blood flow through even extensive collaterals is very sensitive to high cholesterol or triglyceride levels, high blood pressure, fast heart rate, high stress, cold weather, and big meals. People with

blocked arteries and extensive collaterals that prevent heart attack or even prevent angina during exercise with an empty stomach may develop angina after eating a large meal because the after-eating fat surge in the blood partially paralyzes the blood flow capacity of the collaterals. High blood pressure, fast heart rate, high stress levels and cold weather also impair the blood flow capacity of the collaterals. Lowering cholesterol or triglyceride levels, controlling blood pressure, eating small meals and slowing the heart rate with beta blocking medications such as Toprol or Atenolol improve collateral blood flow to heart muscle beyond a blockage. Therefore, reversal therapy is not only important in stimulating collateral blood flow but is necessary for maintaining the natural bypass vessels as well.

Corner Pharmacy

Zetia-a partner for the Statins

Ezetimibe or Zetia, is the newest drug made available in the fight to lower cholesterol. ZETIA works in a manner unique to cholesterol medications in the way it reduces the amount of cholesterol that is absorbed from the digestive tract. There are two sources of cholesterol in the body; the dietary intake of animal products and the cholesterol produced naturally in the liver. Part of the liver production is to make bile acids which are supplied to the intestine for digestion. The statin drugs reduce the livers production of cholesterol and Zetia reduces the absorption of cholesterol in the gut from food and the bile acids.



Alone, Zetia has only a moderate effect on LDL cholesterol but it works well in combination with the statin drugs without causing any additional strain on the liver. In our experience so far, it appears to be very effective especially in patients who have become resistant to the statin drugs requiring very high doses or in patients who cannot tolerate the statin drugs.

Two pharmaceutical companies have teamed up to create Vytorin, a combination of the generic Zocor (simvastatin) and Zetia (ezetimibe). In one pill, Vytorin blocks the production of cholesterol in the liver as well as the absorption of cholesterol in the stomach. Vytorin, as well as Advicor are both examples of combination drugs in the fight against lipid abnormalities. In Dr. Gould’s program for the last 15 years, it has not been uncommon for us to use two or three drugs in combination to treat specific lipid abnormalities. However, the production of such combinations by the pharmaceutical industry demonstrates the evolution of standard cardiology practice to using more than one drug to fight lipid abnormalities.



Heart Star

As he approaches his 80th birthday this month, Charles Beecher feels great but continues to seek ways to improve his lifestyle. At his last office visit, Dr. Gould suggested that Mr. Beecher further improve his exercise regimen by adding back his light weightlifting routine.

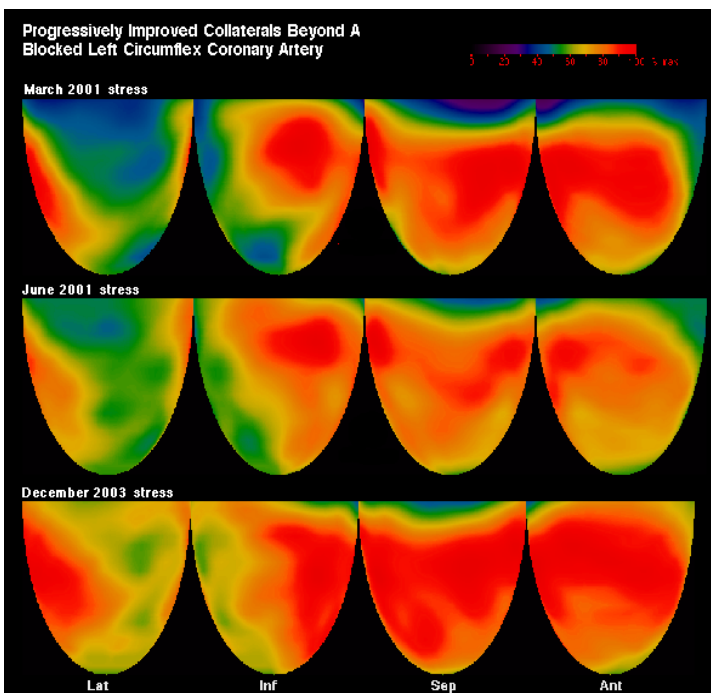
By the time he knew he even had a heart problem in the year 2000 at the age of 76, Mr. Beecher's coronary artery disease was quite severe. His first PET scan showed a severe blockage limiting blood flow to the back and side of his main heart pumping chamber, the left ventricle. However, the PET scan also showed the typical "steal" pattern which indicated that he had developed new blood vessels, called collaterals around the blockage forming a natural bypass. An arteriogram confirmed the severely calcified 90% blockage in the Circumflex artery and the presence of well-developed collaterals supplying the heart muscle beyond the blocked artery. The pumping function of Mr. Beecher's heart was normal with an ejection fraction of 60%, indicating that 60% of the blood in the left ventricle was ejected into the aorta with each heartbeat. Therefore, he had no permanent heart damage that would impair the heart's pumping function. His coronary artery blockages had developed slowly without the plaque suddenly breaking or rupturing loose that causes coronary thrombosis and heart attack. This slow progression allowed the growth of new blood vessels from other coronary arteries into the branches of the blocked artery. In people with severe coronary artery disease, intense lifestyle and pharmacologic treatment may not be able to reverse the disease but the treatment slows the rate of blockage, thereby giving time for collaterals to form that prevent a heart attack when the artery finally blocks completely.



Perhaps it was his 42 years at Shell as a chemical engineer that attracted him to Dr. Gould's methodical preventive approach to treating heart disease. Mr. Beecher had always been very active; he exercised by walking or jogging and occasionally had done calisthenics for the previous 25 years. However, after meeting with Dr. Gould for the first time, he worked on improving his lifestyle further by losing 10 lbs, cutting out fat in his diet, changing medication to get his LDL cholesterol below 70, and controlling his blood pressure.

He reached his target weight of 160 lbs within 4 months and has been able to maintain it. He admits that Dr. Gould's constant monitoring of his cholesterol, blood pressure, and lifestyle through regular visits helps him "stay in line".

"I feel much better at the lighter weight and I was able to reduce my blood pressure medications in half", says Beecher. He advises others to develop a "habit" of exercise and good diet because the results are well worth it. Exercise stimulates the growth of collaterals around a severe blockage, as demonstrated by a series of PET scans done on Mr. Beecher through research protocols; his heart continues to show improvement as illustrated in his PET scans below, earning him the title of HEARTSTAR.





Living Healthy

Keeping Food Portions under Control



According to a recent report from the Centers for Disease Control and Prevention, Americans continued to gain weight over the past 30 years despite eating less fat as a percentage of total calories. The report confirmed that Americans are eating too much, much more than they ate before, and most of it is in the form of carbohydrates. Adult women are now eating 335 more calories per day than they did in 1971, while adult men have upped their daily intake by 168 calories. This over-eating combined with less physical activity due to mechanization of previously physical daily activities by elevators, remote controls, riding lawn mowers, video games, leaf blowers etc. has led to an obesity rate of 30.9 percent of all Americans.

How do you avoid it? The first step to avoiding overeating is to learn to recognize and use appropriate portion sizes. Don't fall for the marketing strategies of many major U.S. companies that have "super-sized" servings of commonly eaten foods and drinks. Servings of French fries and sodas are often two to five times larger than when they were first introduced. For example, an original serving of Coca-cola was in a 6.5 oz. bottle, now the bottles are at least 16-20 ounces. Unhealthy foods are cheaper, heavily marketed, and readily available. Take advantage of the large servings provided at restaurants by asking for a "to go" box so you can use 1/2 of it for another meal or split the meal with your dining partner.

The American Dietetic Association recommends keeping portion sizes down by equating them to common household items as below:
continued. . . .

Three ounces of cooked meat, fish or poultry is the size of a deck of cards—150 calories

Two tablespoons of peanut butter is the size of a golfball— 190 calories

A medium piece of fruit looks like a baseball - 110 calories

A medium bagel is the size of a hockey puck or shooting skeet ————— 150 calories

One ounce of cheese is the size of four dice - 100 calories

A small baked potato is the size of a computer mouse, no dressing —————100 calories

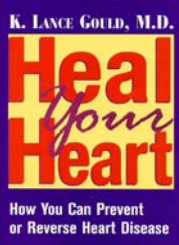
The serving size for raw vegetables, yogurt and fruit is one cup — 100 calories (an avg. woman's handful)

However, all of the above as one small meal add up to 900 calories. Two meals per day of this size is 1800 calories/day, three meals of this size would be 2700 calories, both of which will put weight on most people over 40 years old. Only 250 calories/day eaten daily in excess over calories burned adds 3500 calories every 2 weeks that are equivalent to 1 pound gained every two weeks; 250 calories is approximately equivalent to 35 minutes at 3.5mph or 2 miles at a two degree incline on a treadmill; 3500 calories, equivalent to one pound, would take 7 hours or 14 miles on that treadmill to burn off the pound of excess calories. IT IS EASIER TO EAT LESS!

Dorothy's Yellow Squash Monterrey

- 2 yellow squash cut in 1 1/2 in. thick slices
- 1/4 cup fat-free French dressing
- 3 Tbsp. Italian seasoned bread crumbs
- Generous pinch of chili powder
- 2 Tbsp grated fat free cheese of choice

Combine bread crumbs, chili powder and cheese. Dip squash in dressing and coat with bread crumb mixture. Arrange in a single layer on a baking pan sprayed with cooking spray. Bake at 450 degrees for 10-15 minutes.



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