

# Increase your Bore



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Most machines have tubes. They function to carry fuel, or exhaust, or information. We are no different. Our bodies have all sorts of tubes which carry air, waste, sound, but particularly blood. The arteries and veins of our bodies are the life-sustaining pipelines to every cell in our bodies. Any blockage or leakage immediately brings evidence of problems.

The leading cause of death in America is said to be heart trouble, but it really isn't heart trouble which kills



## Dollars & Sense

### FREE KIT

In the Fall of 1994, The National Institute of Diabetes, Digestive and Kidney Diseases (NIDDK) launched The National Diabetes Outreach Program. The primary message of this program is that improved blood sugar control reduces diabetic eye, kidney and nerve damage.

The program is offering a patient information kit about improving blood sugar control. The kit includes a booklet on managing insulin-dependent diabetes based on DCCT results, a fact sheet on the DCCT, a fact sheet on diabetes and a card with questions to ask the doctor about improving one's blood sugar control. Kits are available through a toll-free number 1-800-GET LEVEL.

Persons calling this number can leave their names and addresses to receive the kits.

us, but artery trouble. When one of these conduits becomes blocked by a chunk of cholesterol or clot or both, then a heart attack or a stroke or cold foot or painful bowel results, depending on the blockage site. A heart attack, or myocardial infarction, or coronary thrombosis, or occlusion (all synonyms) results when one of the three major arteries to the heart becomes shut off. If caught very early, it is sometimes possible to unblock the artery by angioplasty, but most times, it is too late and the heart muscle is damaged. A scar results. Survival depends on how much of the heart is destroyed and how much pumping capacity remains.

This briefly is what a heart attack represents and is the major killer of both men and women. Most medical attention is drawn naturally to the circumstances which lead to the attack, high cholesterol levels, cigarette smoking, high blood pressure, and stress. Each is clearly a villain. But very few physicians have paid any attention to the size of the artery in the first place.

There is a physical law first promoted by Pouisselle which points out that the flow through a tube is directly proportional to the radius of the tube to the fourth power. This means that any slight diminishment or enlargement will have a huge effect on flow. How big then are our arteries? Small. Eminent exercise physiologist, Per Astrand of Stockholm has shown that greyhounds have relatively big hearts. Fish and domestic animals have small hearts. So what? The heart is, when all is said and done, a bag of muscle, and like any muscle, it enlarges when it is used and shrinks when it isn't. Consequently, our small hearts are due to our

sedentary existence. A small heart then leads to small arteries — easier to become plugged.

If this is so, what happens when you exercise? I had long been interested in the report of the autopsy on Clarence Demar, who ran the Boston Marathon dozens of times and won it eight times. When he died in his sixties from cancer, Dr. Paul Dudley White surveyed the size of the arteries to his heart and found them to be huge — as expected. Others have done the experiment in animals — measuring heart and artery size before and after physical training.

Two years ago, a group of us at Stanford decided to see what this was all about. We enlisted twelve extremely fit middle aged men — all ultramarathoners. We performed coronary arteriograms on them and quantitated their artery size. At rest, their arteries were slightly above average in width, but when we simulated exercise in them, their arteries became huge. I was present at the first of these tests, and when stimulated, the artery puffed out so much that I was afraid we had caused harm.

We reported these findings at the American Heart Association meeting and in a major medical journal. To me, this finding has vast implications. Like other parts of medicine, we physicians are so busy patching up the troubles that we fail to pay attention to the very basic situations in the first place.

The importance of this to the diabetic is even greater. Seventy to 80% of diabetics die prematurely of circulatory problems. The diabetic person has an additional problem with blockage of small vessels, a condition responsible for diabetic complications in kidneys, eyes and nerves. Diabetic people are at even greater risk because of small vessel disease.

For the diabetic, exercise is just as important as the prescription for insulin or diabetes pills.

So go exercise and feel your arteries grow! ♦