# CORONARY ARTERY DISEASE SCREENING

***Diabetes is arguably THE major risk factor for developing coronary artery disease (CAD) from atherosclerosis***. Coronary artery disease results from blockage of the coronary blood vessels with deposits of cholesterol, fats and calcium in the walls of these blood vessels. Blocked coronary arteries impair blood flow to the heart and lead to heart attacks, heart failure and death. It's important to understand that once well established, there is no data that says that CAD is fully reversible. Certainly once heart muscle cells die, they are lost forever. The damaged area of the heart will never regenerate. If the damage is severe enough or extensive enough, it will affect the heart's ability to pump blood, and the patient will be left permanently crippled.

Why, then, shouldn't your doctor ROUTINELY screen for CAD in his or her patients with diabetes? The answer to this question is that until recently we have had very few tests that were good screening tools to use for detecting early CAD. In fact, there are really just two.

The first is the traditional Graded Exercise Treadmill (GXT) test. GXTs have been done for more than 60 years, and we have a lot of experience with them. They are good at revealing ESTABLISHED CAD in patients. If a GXT is positive, its ability to correctly predict significant CAD is high. Unfortunately, however, if it is negative, it can be wrong (this is called a "false negative" or another term is "sensitivity"). That means that some people with significant CAD are inadvertently missed when the GXT is read as being negative. What is of more concern however, is that GXTs have NO reliability in detecting ***early*** CAD (the whole purpose of a screening test here is to detect early CAD, when it can be treated aggressively so to prevent the development of established or more severe CAD). Typically, GXTs are only used when patients have established ***symptoms*** that suggest CAD (The symptoms typically associated with CAD are mid-chest pressure or a sensation of tightness or heaviness in the chest. The discomfort classically is described as, "An elephant is sitting on my chest." The discomfort can radiate down the left arm, go to the neck or back. Usually there is some associated shortness of breath, dizziness, sweating or palpitations also.) Under those circumstances, a GXT can be a pretty good test to pick up signs of a real problem underlying the symptoms.

The second tool we now have to screen for developing atherosclerosis is coronary artery calcium (CAC) scoring. This is a screening procedure that can be done with electron beam (EB) equipment or computed tomography (CT). Electron beam CAC scoring is an FDA-approved procedure and the "gold standard" for measuring coronary calcification and associated atherosclerosis. It can pick up atherosclerosis in its very early stages, long before a coronary angiogram, exercise treadmill or nuclear medicine heart study detects a problem. Unfortunately, General Electric, the largest manufacturer of CT scanners in the U.S., bought out the primary EB equipment manufacturerer, and purposely killed that technology to eliminate competition for their CT scanning equipment. The current start of the art CT scanners are multidetector row or multislice CT scaners (MDCT or MSCT). They can image the heart with little or no motion artifact and will give accurate Agatston scores. Since 2010 the American College of Cardiology has set guidelines for using these tools in screening. The guidelines noted that measurement of CAC may be reasonable for patients at low to intermediate risk (6 to

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10% 10-year risk). It is not recommended for patient at low risk or high risk. The radiation of this type of CT exposes an individual to 1-2 mSv of radiation, the equivalent radiation of 10 to 20 chest X-rays.) Because insurance companies consider this a ***screening*** procedure, they typically will not reimburse for it as a medical expense.

If you have a coronary artery calcium (CAC) score screening, what might it show? There are several possibilities. It could be completely negative. That means there are no calcium deposits in your coronary arteries, and by implication it is VERY likely that you do NOT have any significant problems with atherosclerosis leading to coronary artery disease.

Another possibility is that you have a relatively high CAC score. This means that it is VERY LIKELY that you DO have areas of significant blockage in your coronary arteries and you may be prone to a heart attack. This result would lead us to pursue further testing and include referral to a cardiologist for consultation. The good news here at least is that we may still be able to prevent a major problem before it actually occurs.

And the third possibility is that your CAC score indicates that you have some developing atherosclerosis but probably not of the degree that it will cause any symptoms. This is precisely the information that we need to know to give you the **EARLY WARNING SIGN** that something bad is going on and that it's time to change things so that the process does not continue. Some types of coronary atherosclerosis appear to be reversible (so-called "soft" plaques). However, when calcium deposits occur in the vessel walls, this (hard plaque) does not appear to be correctable. Nonetheless, if lifestyle changes and medications (as necessary) halt the progression of atherosclerosis and these calcifications, we will have achieved the major goal of early screening. Serial CAC scoring can be done every few years and will provide us with the information we need to know to determine if our interventions are working.

Presently, I do believe that if you have diabetes and are under 65 years of age, you should consider getting a CAC score done. This will give you a specific risk score for having coronary artery disease. This can be used as a guide to help motivate you to better control risk factors for atherosclerosis and prevent problems before they occur.

Once a diagnosis of CAD is made, management will vary depending upon its perceived severity. If the patient is symptomatic, typically a GXT will be done to identify whether a serious blockage exists. If the GXT is positive, then the patient will be referred for heart catheterization with either the placement of stents to dilate the narrowed vessels and hold them open, or referral for heart surgery to replace the diseased vessels. If a screening test such as a CAC shows some atherosclerosis but the disease is asymptomatic, then aggressive medical therapy is indicated. This means controlling the diabetes as well as possible, aggressively lowering cholesterol levels, keeping the blood pressure under tight control, and lifestyle modifications such as weight loss and regular exercise. These interventions, particularly when used in combination, can show dramatic effects to reduce and probably even reverse the atherosclerotic process. The result is avoiding a heart attack or stroke and extending you life.

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