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Underwriting and Ultra-fast CT Scans of the Heart

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Medical technology has provided life insurance with another underwriting variable: ultra-fast CT scans of the heart (computerized tomography or CT scans are pictures of structures within the body created by a computer that takes the data from multiple X-ray images and turns them in pictures). Like the advent of PSA testing, ultra-fast CT scans have arrived on the medical scene surrounded by controversy. This article looks at that controversy and its impact on the underwriting of life insurance.

Ultra-fast CT scans are also known an electron-beam CT or EBT. It is a $400 test that, among other things, measures the amount of calcium build-up in the heart arteries. The calcium build-up is reported as a "calcium score" or CAC (coronary artery calcium). The controversy surrounds what the score really means.

Before we discuss using the CAC in underwriting, let's look at how the CAC is reported. The most widely used scoring system to report CAC is the Agatston scoring method. Below is a typical reference chart for quantifying and interpreting CAC scores.

CAC	Artery Blockage	Risk	Recommendations
0-10	5% of lower probability of significant obstruction	Very-Low to Low	No further work up in an asymptomatic patient
11-100	Less than 20% chance significant obstruction is present	Moderate	Based on number of additional risk factors present
101-400	High likelihood of moderate non-obstructive CAD	Moderately High	Based on number of additional risk factors present

Exercise stress testing should be considered |
| >400 | High likelihood of at least one obstructive coronary stenosis. | High | Based on number of additional risk factors present

Exercise stress testing |

should be considered

There is agreement in the medical community that the CAC is an indication of artery blockage. It tells you how much disease is there. What it can't tell you is the location of the blockage or how severe it is. Further controversy surrounds over how well CAC foretells the future. Establishing disease, in this case coronary artery disease, and estimating risk are two different things. Many doctors consider EBT to be the newest, high tech, moneymaking gimmick (with the chance of generating a false sense of security in individuals who may have a low CAC, but still a high risk of cardiac disease) while others find it a revolutionary breakthrough.

The key to EBT, as with other new tests like PSA, is whom you test. Attempting to use EBT with a low risk population for heart disease only leads to needless expense and anxiety. In the western world nearly everyone over the age of 20 has some plaque buildup. Low risk populations (i.e. normal blood pressure, cholesterol, weight, non-smoker, etc.) should not be subjected to EBT testing. In this population you wind up creating more disease (stress and anxiety) than you find.

Populations with established risk factors are another issue. In individuals with two or three risk factors (i.e., history of smoking, high blood pressure, high cholesterol levels, etc.), EBT may provide the rationale to take the next step in evaluating potential heart disease. Consider the following studies.

In an article published in the *Annals of Epidemiology* in March 2003, Hoff and associates performed EBT/CAC screening on 30,908 asymptomatic individuals aged 30 to 90. **They found that the risk factors for heart disease are associated with higher CAC scores in men and women.** As important, their study demonstrated an important link between subclinical disease (i.e., finding an elevated CAC score) and clinical disease (i.e., documented coronary artery disease, or CAD). This argues that the subclinical form of CAD can be detected by EBT in an at risk population with no apparent symptoms of CAD. Again, it is whom you test with EBT.

In an article published in the *European Heart Journal* in October 2002, Vliegenthart and associates conducted EBT on 2,013 participants with a mean age of 71. **They concluded that there was a strong and graded association between CAC and heart attacks**. The higher the CAC score, the higher the risk for a heart attack. This study supports the position that high CAC scores in asymptomatic patients represent a substantial cardiac risk that need prompt evaluation.

Lastly, in an article published in the *Journal of the American College of Cardiology* in January 2002, Wayhs and associates looked at the natural history of asymptomatic individuals with very high CAC scores (i.e., >1000). None of the study participants (98) had any additional cardiac testing after the initial EBT. During the follow-up period, averaging 17 months, 35 participants suffered what was termed "hard coronary events" or HCE (i.e., heart attack or death). **The authors concluded that a high CAC (i.e., >1000) in persons without symptoms of CAD "portends a very high risk of a HCE in the short term."**

Underwriting Implications

EBT of the coronary arteries is being promoted to the general population as the "45 second non-invasive method of detecting coronary artery disease." More and more applicants for life insurance will have CAC scores in their medical file.

The biggest and most frequent underwriting challenge comes in determining how to use CAC scores with applicants who have no history or symptoms of CAD: the asymptomatic applicant.

All CAC scores below 100 in asymptomatic applicants need to be put into the context of the overall cardiac risk factor profile. If the applicant has only one or two other risk factors (i.e., older age, male gender), then the CAC score should not have an adverse impact on the underwriting rating. With additional risk factors (i.e., smoking history, diabetes, hypertension), the CAC suggests the need for further testing.

All CAC scores above 100 in asymptomatic applicants require a careful review of the risk factor profile. Since an increase in CAC suggests the advancement of "silent CAD," it is important to identify which factors may be contributing to the development of the disease. **The closer you get to a CAC of 400, the more you are going to need additional cardiac testing (i.e., exercise stress testing) to evaluate the true CAD risk.**

All CAC scores above 400 in asymptomatic applicants need further cardiac testing before the true risk can be assessed.

Conclusion

EBT of the coronary arteries is a growth industry. **However, the American Heart Association and the American College of Cardiology do not recommend making EBT screening available to the general public without a specific request by a physician. They do note that the greatest potential for EBT in risk determination is in elderly asymptomatic individuals.**

For the present, we must use the most current studies to quantify the CAC score. **It is clear that CAC scores cannot be ignored in the underwriting process.** The goal is to place them in the context of the applicant's overall cardiac risk profile to arrive at an accurate assessment of life expectancy.