Recently, there has been a surge of interest by cardiologists, internists and patients in Electron Beam Computed Tomography (EBCT). This letter will serve as an update on important scientific studies and reviews relating to EBCT that have appeared in the medical literature over the past year. If you would like to receive any of these articles, please contact our office (310) 222-2773 and we will send a copy to you.

In December 1999, the American Heart Association (AHA) in its year-end report highlighted EBCT as one of the top research advances for 1999. Specifically, the Report stated that:

“EBCT accurately measures the volume and distribution of calcium in the coronary arteries. Studies show that EBCT is a good measurement of the amount of coronary disease in an individual’s coronary arteries and may help physicians better focus their treatment recommendations to those patients most at risk of experiencing a cardiac event.”

In July 2000, the AHA and American College of Cardiology published guidelines for use of EBCT. The report stated:

“A positive calcium score might be valuable in determining whether a patient who appears at intermediate CHD risk is actually at high risk. Conversely, a low or absent EBCT calcium score may also prove useful in determining a low likelihood of developing CHD. This may be particularly beneficial in elderly asymptomatic patients in whom the management of other risk factors may be modified according to the calcium score.” ACC/AHA Expert Consensus Document, Circulation 2000, 102:126-140.


- **Background**: Detection of subclinical coronary artery disease (CAD) before the development of life-threatening cardiac complications has great potential clinical relevance. EBCT is currently the only noninvasive test that can detect CAD in all stages of its development and thus has the potential to be an excellent screening technique for identifying asymptomatic subjects with underlying coronary atherosclerosis.
- **Hypothesis**: Coronary artery calcium score severity measured by EBCT can identify a high-risk group of patients with silent myocardial ischemia among an otherwise low-risk heterogeneous population with cardiac risk-factors.
- **Results**: EBCT was more sensitive than either exercise tolerance testing (ETT) or myocardial single photon emission computed tomography (SPECT imaging) for detecting subclinical CAD in which aggressive risk factor modification is warranted. Furthermore, EBCT can identify a subset of individuals at high risk for silent myocardial ischemia in whom additional diagnostic testing and treatment are advisable.
- **Conclusion**: The results of this study support the role of EBCT as a primary screening tool for identifying individuals with various degrees of subclinical coronary artery disease, particularly those at high risk for short-term events, in whom aggressive diagnosis and therapy are advisable.


- **Background**: There is a clear relationship between absolute calcium scores and severity of coronary artery disease
- **Methods**: 632 asymptomatic patients screened by EBCT were followed for 2.7 years.
- **Results**: The majority of events (myocardial infarction and death) occurred in patients with calcium scores >75th percentile based upon age and gender. Calcium scores high for age- and gender constitute a 21 fold increased risk of future myocardial infarction. 98% of all events occurred in patients with significant coronary calcium.
- **Conclusions**: The risk of future coronary events over the subsequent 3 years with a score of zero is negligible.

Coronary score percentiles (age and gender adjusted) constitute an effective screening method to stratify individuals at risk.
3. **Prediction of Coronary Events with Electron Beam Computed Tomography**  
   - **Background:** To determine the prognostic accuracy of EBCT scanning at 3-4 years
   - **Methods:** 1,172 asymptomatic persons were followed up at 3.6 years for coronary events
   - **Results:** For the prediction of myocardial infarctions and deaths, the odds ratios for a coronary calcium score >160 was 22.2. After adjustment for all cardiac risk factors, the odds ratios remained high (20.2)
   - **Conclusions:** In asymptomatic adults, EBCT of the coronary arteries predicts coronary death and nonfatal MI. No patient with a score of zero (over 800 in the study) had a coronary event over the subsequent 3.6 years.

4. **Evaluation of Chest Pain in Patients With Low to Intermediate Pre-test Probability of Coronary Artery Disease by Electron Beam Computed Tomography**  
   - **Hypothesis:** EBCT might be an effective and cost-beneficial technique for the identification of angiographically obstructive CAD (>50% stenosis) in patients with low to intermediate pretest probability of disease.
   - **Results:** The Bayesian model used predicted substantial cost savings when EBCT was used as the initial test instead of an exercise tolerance test (ETT), with decreasing benefit as the prevalence of disease increased. The diagnostic pathway starting with EBCT provided a 45% to 65% cost saving over the ETT pathway.

5. **Coronary Calcification by Electron Beam Computed Tomography and Obstructive Coronary Artery Disease: A Model for Cost and Effectiveness of Diagnosis as Compared With Conventional Cardiac Testing Methods**  
   - A model was used based upon published sensitivities and specificities for the diagnosis of obstructive coronary artery disease (CAD > 50% stenosis) in an ambulatory patient population. Population prevalence was tested for coronary angiography alone, or treadmill exercise test (ETT), stres echocardiography, stress thallium or EBCT calcium score, followed by coronary angiography if indicated.
   - **Conclusion:** In ambulatory patients evaluated for obstructive CAD, a testing: pathway utilizing quantification of coronary calcium by EBCT as an initial noninvasive testing approach minimized direct costs, and maximized cost-effectiveness in population groups with low-to-moderate disease prevalence.

6. **Electron Beam Computed Tomography: Screening for Coronary Artery Disease**  
   This review article addresses the clinical utility of EBCT for screening coronary artery disease (CAD) concluded that EBCT
   - is safe, reproducible, and noninvasive;
   - both detects and quantitates preclinical disease, and represents a major advance over other tests for CAD;
   - has both prognostic and diagnostic significance, predicting future cardiac events and the extent of coronary atherosclerosis.

7. **Electron Beam Computed Tomographic Coronary Calcium Scanning: A Review and Guidelines for Use in Asymptomatic Persons**  
   This article critically reviewed current, pertinent literature regarding EBCT coronary calcium scanning from a clinical perspective with particular emphasis on studies that evaluatd it as a measurement of atherosclerotic coronary disease. The authors concluded that:
   - the EBCT calcium score can help identify persons at higher than anticipated risk of future coronary events; with the higher the EBCT coronary calcium score, the greater the extent of athrosclerotic plaque disease.
   - coronary calcium is specific for atherosclerotic plaque that can be sensitively detected and accurately quantified using EBCT.
   - Coronary calcium score can help guide initiation of clinical prevention programs as part of a risk stratification and management scheme aimed at improving outcomes in patients determined to be at highest risk of coronary artery disease for their respective age and gender.