Screening Coronary CT Angiograms Find Treatable Heart Disease in 83% of Patients

White Paper Authors: Benjamin Zhang and Kimberly Brockenbrough, MD

Abstract / Summary:

Our retrospective analysis evaluated 100 consecutive patients who underwent both coronary computed tomography angiography (CCTA) and coronary artery calcium score (CAC) for screening identified noncalcified (soft) atherosclerotic plaque in 83% of patients. Noncalcified (soft) atherosclerotic plaque is more likely to rupture and can be eliminated with widely available medications. A calcium score is commonly used as a solitary method to determine cardiovascular risk. However, our data suggests that CCTA identifies atherosclerosis in a significant portion of patients who would be classified as low risk by their CAC scores. 43% of patients had a calcium score of zero. 69.8% of patients with a calcium score of 0 had noncalcified (soft) atherosclerotic plaque detected by CCTA. These findings challenge the idea that a zero CAC score excludes coronary artery disease and highlight the diagnostic value of CCTA.

Introduction:

Cardiovascular disease remains the leading cause of death worldwide according to the American Heart Association (Martin et al., 2025). The coronary artery calcium score (CAC) has become a popular method for assessing coronary artery disease. However, this method has its limitations. CAC scoring only determines the presence and amount of calcified plaque, but it does not evaluate noncalcified atherosclerotic plaque which is more prone to rupture (Williams, MC, et al, 2020).

Coronary CT angiography (CCTA) utilizes a multidetector CT scanner to take cross sectional images of the heart. Analysis for presence of calcified and noncalcified plaque, plaque morphology, and evidence of stenosis can then be performed by a radiologist. This study aims to evaluate how often CCTA detects noncalcified atherosclerosis in patients who would otherwise be classified as low risk based on a calcium score of zero.

Methodology:

A retrospective analysis was performed on the first 100 consecutive patients (ages 38-78 years old) from 2024 (January 3, 2024 to March 19, 2024) who underwent cardiovascular risk evaluation on a GE Optima CT Scanner at Cardia Vision, LLC, Bellevue, WA. All patients received a CCTA and CAC scoring. Images from the CCTA were then analyzed to determine the

type and location of plaque as well as evidence for stenosis. A 95% confidence interval was calculated using the Wilson confidence interval.

Findings:

83 of the 100 patients (83%) had noncalcified atherosclerotic plaque. 43 had a calcium score of zero and 30 of those patients had noncalcified atherosclerotic plaque. Of the patients with a calcium score of zero, 69.8% had noncalcified atherosclerotic plaque detected on the CCTA. Wilson's confidence interval indicates that the true prevalence of noncalcified atherosclerotic plaque in patients with CAC score of 0 lies between 54.0% to 81.4%.

Conclusion:

83% of our patients had noncalcified (soft) atherosclerotic plaque identified on their CCTA. This represents potentially vulnerable, yet highly treatable, coronary artery disease. The SCOT-HEART trial demonstrated that noncalcified atherosclerotic plaque is more likely to rupture than calcified plaque (Williams, MC, et al, 2020). The LOCATE trial showed that elimination of noncalcified atherosclerotic plaque occurs with high dose statins and PCSK9-inhibitors (Weichsel, L, et al, 2024).

CCTA identified noncalcified (soft) atherosclerotic plaque in 69.8% of patients with a calcium score of 0. The Miami Heart Study examining 2,359 asymptomatic individuals reported as much as 15% of those with CAC = 0 had noncalcified atherosclerotic plaque (Nasir, K., et al., 2022) The SCAPIS trial examined 30,154 individuals ages 50 to 64 without known coronary disease found that 5.5% of CAC=0 score individuals had noncalcified atherosclerotic plaque (Bergström, G., et al, 2021). The results of our study support the emerging idea that CAC scoring does not fully capture the burden of coronary atherosclerosis.

Findings challenge the current model of relying on CAC scoring as a standalone screening tool and support the integration of CCTA to supplement cardiovascular risk assessments. The early detection of coronary artery disease enables treatment with widely available medications, such as statins and PCSK9-inhibitors, prior to a heart attack or sudden death.

References

Martin, S. S., Aday, A. W., Allen, N. B., Almarzooq, Z. I., Anderson, C. A. M., Arora, P., Avery, C. L., Baker-Smith, C. M., Bansal, N., Beaton, A. Z., Commodore-Mensah, Y., Currie, M. E., Elkind, M. S. V., Fan, W., Generoso, G., Gibbs, B. B., Heard, D. G., Hiremath, S., Johansen, M. C., & Kazi, D. S. (2025). 2025 Heart Disease and Stroke Statistics: A Report of US and Global Data From the American Heart Association. *Circulation*, *151*(8). https://doi.org/10.1161/cir.0000000000001303

Williams, M. C., Kwiecinski, J., Doris, M., McElhinney, P., D'Souza, M. S., Cadet, S., Adamson, P. D., Moss, A. J., Alam, S., Hunter, A., Shah, A. S. V., Mills, N. L., Pawade, T., Wang, C., Weir McCall, J., Bonnici-Mallia, M., Murrills, C., Roditi, G., van Beek, E. J. R., & Shaw, L. J. (2020). Low-Attenuation Noncalcified Plaque on Coronary Computed Tomography Angiography Predicts Myocardial Infarction: Results From the Multicenter SCOT-HEART Trial (Scottish Computed Tomography of the HEART). *Circulation*, *141*(18), 1452–1462. https://doi.org/10.1161/CIRCULATIONAHA.119.044720

Weichsel, L., André, F., Renker, M., Breitbart, P., Overhoff, D., Beer, M., Giesen, A., Vattay, B., Buss, S., Marwan, M., Schlett, C. L., Giannopoulos, A. A., Kelle, S., Frey, N., Korosoglou, G., & LOCATE Investigators. (2024). Effects of high- versus low-intensity lipid-lowering treatment in patients undergoing serial coronary computed tomography angiography: results of the multi-center LOCATE study. *Clinical Research in Cardiology : Official Journal of the German Cardiac Society*, 10.1007/s00392-02402502-6. https://doi.org/10.1007/s00392-024-02502-6

Nasir, K., Cainzos-Achirica, M., Valero-Elizondo, J., Ali, S. S., Havistin, R., Lakshman, S., Blaha, M. J., Blankstein, R., Shapiro, M. D., Arias, L., Saxena, A., Feldman, T., Budoff, M. J., Ziffer, J. A., Fialkow, J., & Cury, R. C. (2022). Coronary Atherosclerosis in an Asymptomatic U.S. Population: Miami Heart Study at Baptist Health South Florida. *JACC: Cardiovascular Imaging*, *15*(9), 1604–1618. https://doi.org/10.1016/j.jcmg.2022.03.010

Bergström, G., Persson, M., Adiels, M., Björnson, E., Bonander, C., Ahlström, H., Alfredsson, J., Angerås, O., Berglund, G., Blomberg, A., Brandberg, J., Börjesson, M., Cederlund, K., de Faire, U., Duvernoy, O., Ekblom, Ö., Engström, G., Engvall, J. E., Fagman, E., & Eriksson, M. (2021). Prevalence of Subclinical Coronary Artery Atherosclerosis in the General Population. *Circulation*, *144*(12), 916–929. https://doi.org/10.1161/circulationaha.121.055340