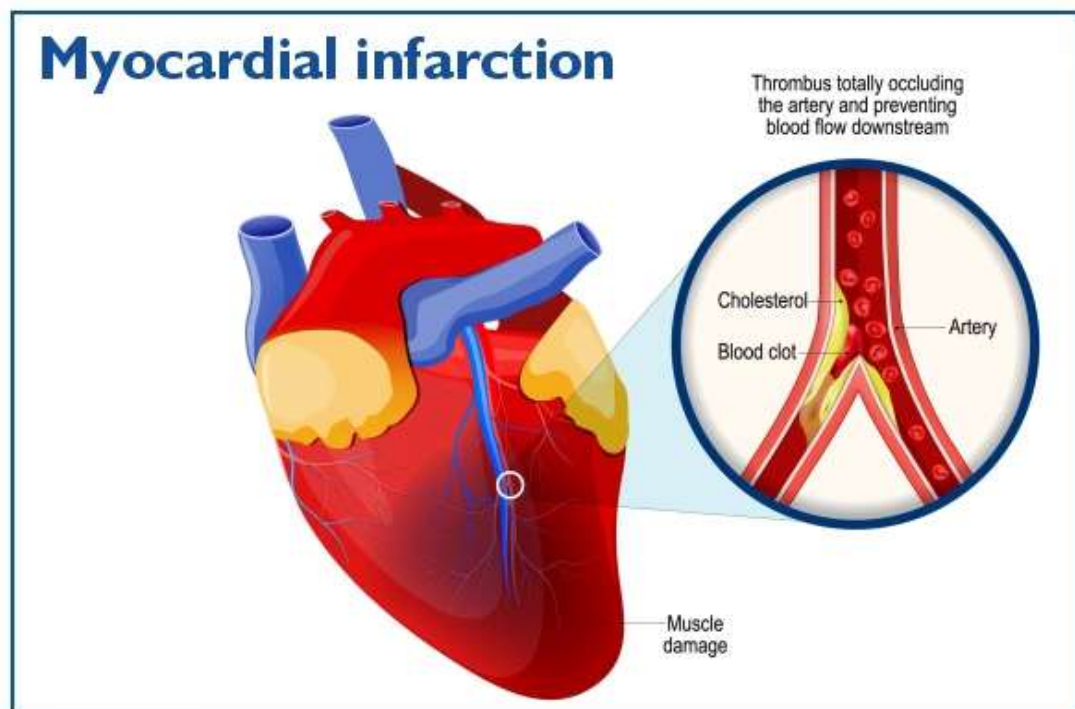


Coronary Atherosclerotic Plaque Activity and Risk of Myocardial Infarction



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Coronary artery disease remains a leading cause of morbidity and mortality worldwide. Recent research has illuminated the role of total coronary atherosclerotic plaque activity across the entire coronary arterial tree in predicting patient-level clinical outcomes. However, the association between vessel-level coronary atherosclerotic plaque activity and the incidence of vessel-level myocardial infarction (MI) has not been fully explored. A recent study published in the *Journal of American College of Cardiology* aimed to determine whether vessel-level coronary atherosclerotic plaque activity is associated with the occurrence of vessel-level myocardial infarction. By focusing on individual coronary arteries, the research sought to enhance our

understanding of localized plaque activity and its implications for myocardial infarction risk.

In a secondary analysis of an international multicenter study, researchers evaluated patients with recent myocardial infarction and multivessel coronary artery disease. Vessel-level coronary atherosclerotic plaque activity was assessed using coronary 18F-sodium fluoride positron emission tomography (PET). This imaging technique allows for the identification and quantification of active atherosclerotic plaques within individual coronary arteries. The primary outcome was the occurrence of vessel-level myocardial infarction, with a comparative analysis between arteries with increased plaque activity and those without.

The study encompassed 2,094 coronary arteries from 691 patients, revealing increased 18F-sodium fluoride uptake in 679 arteries from 414 patients. Myocardial infarction occurred in 24 (4%) arteries with increased plaque activity compared to 25 (2%) arteries without (Hazard Ratio [HR]: 2.08; 95% Confidence Interval [CI]: 1.16–3.72; $P = 0.013$).

Notably, the prognostic significance of increased plaque activity was markedly different between treated and untreated vessels. In vessels that underwent coronary revascularization, increased plaque activity did not significantly correlate with myocardial infarction risk (HR: 1.02; 95% CI: 0.47–2.25). Conversely, in untreated vessels, there was a substantial association (HR: 3.86; 95% CI: 1.63–9.10; $P_{\text{interaction}} = 0.024$).

Furthermore, increased coronary atherosclerotic plaque activity in multiple coronary arteries was linked to a heightened risk of patient-level cardiac events. This included an elevated risk of cardiac death or myocardial infarction (HR: 2.43; 95% CI: 1.37–4.30; $P = 0.002$), as well as first (HR: 2.19; 95% CI: 1.18–4.06; $P = 0.013$) and total (HR: 2.50; 95% CI: 1.42–4.39; $P = 0.002$) myocardial infarctions.

This study underscores the importance of vessel-level coronary atherosclerotic plaque activity as a prognostic marker for myocardial infarction in patients with recent myocardial infarction and multivessel coronary artery disease. The findings highlight that untreated vessels with increased plaque activity carry a significantly higher risk of subsequent myocardial infarction. Additionally, the presence of active atherosclerotic plaques in multiple arteries elevates the overall risk of cardiac events at the patient level. These insights reinforce the need for targeted therapeutic strategies to mitigate the risk associated with high plaque activity in specific coronary arteries.

Reference: <https://doi.org/10.1016/j.jacc.2024.03.419>