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View Abstract

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TITLE: Advances in Imaging for Early Detection of Subclinical Atherosclerosis: A Systematic Review

PRESENTATION TYPE: Any Format

CURRENT CATEGORY: 13.73 Non-Coronary Vascular Imaging (CT/MRI/Other)

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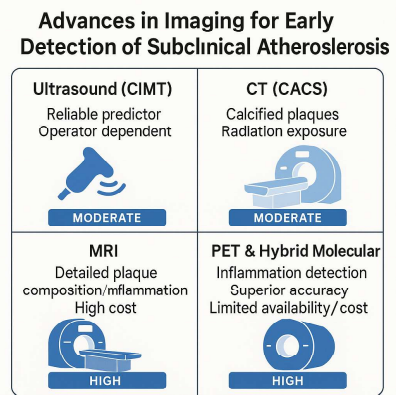
Abstract Body (Do not enter title and authors here): Background:
Early identification of subclinical atherosclerosis permits timely preventive intervention to reduce cardiovascular events. Although carotid intima-media thickness (CIMT) and coronary artery calcium scoring (CACS) are established, novel molecular and hybrid imaging approaches may offer superior lesion characterization and risk stratification.

Methods: Following PRISMA guidelines, we searched PubMed, Scopus, Embase, and Web of Science for studies published January 2010–December 2024 evaluating imaging modalities for subclinical atherosclerosis in asymptomatic or high-risk adults. Two reviewers independently screened titles/abstracts and full texts against predefined inclusion (original research or reviews reporting diagnostic performance or clinical utility of CIMT, CACS, MRI, PET, molecular, or hybrid imaging) and exclusion (symptomatic cohorts, animal studies, case reports, editorials) criteria, resolving discrepancies by consensus. Data were extracted via a standardized form—capturing study design, population, imaging technique details, plaque/molecular endpoints, and diagnostic metrics—and study quality was appraised using QUADAS-2. Given the heterogeneity of modalities and outcomes, findings were synthesized narratively by imaging modality.

Results:
Nine studies met inclusion criteria. CIMT and CACS demonstrated moderate sensitivity and specificity for detecting early atherosclerosis. Advanced MRI and PET-based methods provided enhanced plaque composition and inflammatory assessment. Molecular imaging probes and hybrid PET/MRI further improved detection of high-risk lesions but were limited by cost and accessibility.

Conclusions:
CIMT and CACS remain valuable for population screening, but emerging MRI, PET, molecular, and hybrid modalities offer deeper insights into plaque vulnerability. Standardization of imaging protocols and cost-effectiveness analyses are urgently needed to facilitate integration of these advanced techniques into routine clinical practice.

KEYWORDS: Cardiac MRI, Cardiac CT, Carotid intima-media thickness (CIMT), Cardiovascular imaging, Atherosclerosis.



Abstract Graphic/Image Description: The infographic presents four imaging modalities: Ultrasound (CIMT) offers moderate accuracy but is operator dependent; CT (CACS) also yields moderate accuracy, detecting calcified plaques at the cost of radiation exposure; MRI provides high accuracy for detailed plaque composition and inflammation assessment but comes with high cost; and PET & Hybrid Molecular imaging delivers superior accuracy for inflammation detection, though its use is limited by availability and expense., NA, NA

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