The goal of research into the in vivo detection of vulnerable plaques is to provide a clinician with a diagnostic tool that identifies vulnerable plaques prospectively to prevent acute events. This tool must have both a high positive predictive value and a high negative predictive value in the clinical setting (not just against histopathology) and cannot require specific expertise or core-laboratory analysis to determine whether a plaque should be treated pre-emptively—in other words, a yes/no, red light/green light, treat/don’t treat tool. Optical coherence tomography (OCT) has been proposed to be that tool. OCT criteria for a thin-cap fibroatheroma (TCFA), the most common type of vulnerable plaque, include the presence of lipid with an overlying, macrophage-containing thin fibrous cap.

Despite these criteria, OCT is often not perfect. OCT may sometimes be radiographically indistinguishable from histopathology. OCT is currently a laboratory tool that requires expertise and calibrating filters. OCT criteria were not always met in some studies, and OCT may not detect some plaques. OCT may also not detect plaques in some regions of the coronary tree. OCT is currently far from a perfect tool to detect plaques prospectively to prevent acute events. This tool must have both a high positive predictive value and a high negative predictive value in the clinical setting (not just against histopathology) and cannot require specific expertise or core-laboratory analysis to determine whether a plaque should be treated pre-emptively—in other words, a yes/no, red light/green light, treat/don’t treat tool. Optical coherence tomography (OCT) has been proposed to be that tool. OCT criteria for a thin-cap fibroatheroma (TCFA), the most common type of vulnerable plaque, include the presence of lipid with an overlying, macrophage-containing thin fibrous cap.

The opinions expressed in this article are not necessarily those of the editors or of the American Heart Association.

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reasons for limitations are important, at some point, it is necessary to move beyond correlations to clinical outcomes studies—as first as prospective registries, but ultimately as multicenter outcomes trials in which events are actually reduced. Imaging findings that reliably predict (or exclude) events are more important than studies showing that one or another technology (or any combination of technologies) correlate (or do not correlate) with histopathology with a greater (or lesser) degree of accuracy. This has been done in PROSPECT (Providing Regional Observations to Study Predictors of Events in the Coronary Tree),31 VIVA (VH-IVUS in Vulnerable Atherosclerosis),32 and ATEROREMO-IVUS (European Collaborative Project on Inflammation and Vascular Wall Remodeling in Atherosclerosis-IVUS)33 despite the highly critical animal study by Thim et al34 questioning the validity of VH-IVUS; and it is being replicated in PROSPECT-II that includes both a prospective registry and an embedded, randomized outcomes substudy called PROSPECT-Absorb.

Disclosures

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