

Coronary image with plaque burden

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Atherosclerosis is the major pathophysiologic mechanism for the development of plaque of CAD. Several intravascular imaging techniques such as intravascular ultrasound (IVUS), Virtual histology IVUS (VH-IVUS), Near-infrared spectroscopy (NIRS-IVUS) and optical coherence tomography (OCT) allow in vivo assessment of plaque burden, plaque morphology and response to therapy. In addition, non invasive assessment using coronary artery calcium (CAC) score allows risk stratification and plaque burden assessment whilst computed tomography coronary angiography (CTCA) allows evaluation of luminal stenosis, plaque characterisation and quantification. Grayscale intravascular ultrasound (IVUS) allows robust quantitative measurements including lumen, vessel, and plaque area. Based on echogenicity, plaques are classified in four categories by grayscale IVUS; soft plaque, fibrous plaque, calcified plaque, and mixed plaque. While grayscale IVUS has the limited ability to analyze components within atherosclerotic lesions, VH-IVUS enables a detailed analysis of plaque composition. OCT is a novel intravascular imaging modality using near-infrared light (1,300 nm). Compared to IVUS, OCT provides images of in vivo plaques with approximately 10 times higher resolution which is up to 10 μm in an axial resolution and to 20 μm in a lateral resolution. Spectroscopy is the measurement of the electromagnetic spectrum through interaction of light with molecules. Based on this method, NIRS imaging within coronary artery allows for the characterization of biological tissues and can be used to assess lipid and protein content in atherosclerotic plaques. Various invasive imaging modalities allow to evaluate both plaque burden and composition. And, plaque imaging provides a unique opportunity to identify vulnerable plaques, elucidate atherosclerotic mechanisms contributing to coronary events and the effect of anti-atherosclerotic medical therapies on coronary atheroma. Although there are many limitations of each modalities, several future directions can be considered to overcome these limitations.