

# The value of intravascular ultrasound in interventional cardiology

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## Abstract

Intracoronary ultrasound (ICUS) is a new imaging technique with the unique ability to study vessel wall morphology in vivo, accurately displaying the details of vessel structure. The coronary angiogram represents only a projectional image of the vessel lumen without providing any information concerning vascular wall architecture. Interventional cardiology has developed over the last years with the appearance of new devices and consequently new challenges. The selection of an appropriate device and the assessment of any intervention, as well as the understanding of its mechanisms is essential to perform a better intervention. The use of a tool, such as ICUS, able to identify vessel wall anomalies, complementing coronary angiography, seems to be an appropriate method in the regard. The last years have witnessed an array of studies demonstrating the advantages and disadvantages of ICUS in the setting of interventional cardiology. Despite some contradictions in the literature, the result of a new technology still under scrutiny, it is possible to summarise some of the major achievements: Lesion assessment before coronary interventions for selection of treatment, including calcium detection, plaque eccentricity, diffuse atherosclerotic disease, type of vessel remodelling; ICUS during balloon angioplasty has helped in balloon diameter selection, identification of pseudo successful results and presence/severity of wall dissections, as well as the search of predictors of restenosis; during rotational and directional atherectomy, ICUS can help in the definition of the lesion most suitable for rotational atherectomy, showing if there is a diffuse sub endothelial calcification, excluding unsuitable lesions, selecting cut direction and directly assessing the adequacy of plaque removal; during stent implantation it helps to determine if there was a complete apposition, detect residual narrowing or proximal/distal stenoses or dissections requiring further treatment. Some new concepts have been introduced by ICUS, such as the negative remodelling as one of the mechanisms of restenosis. New developments are under way, including combined devices, looking forward ultrasound, high frequency probes, imaging wires, tissue characterisation and three dimensional technology. Therefore, ICUS has reached enough maturity to be considered an important tool in the catheterization laboratory, complementing the information provided by coronary angiography. However, some more research needs to be done to answer some important questions regarding the whole array of potential applications in an environment of cost containment as the one we live in today.