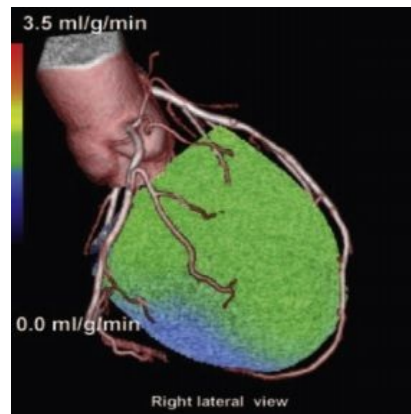




## Multimodality Imaging of the Heart: Is More Better?



In most patients who are referred for work-up of suspected or known coronary artery disease (CAD) by non-invasive cardiac imaging, one single imaging technique is often adequate, according to an article appearing in the journal *Cor et Vasa*, published by the Czech Society of Cardiology. For instance, MRI is able to provide information about morphology (coronary plaques/stenosis), myocardial function and perfusion in a single "one-stop-shop" technique.

Still, the article says, a multimodality imaging approach may be justified under certain conditions: 1) Patients with intermediate pretest likelihood for CAD, in whom the initial imaging test — often coronary CT angiography (CTA) — gives an inconclusive result, additional ischaemia imaging is a guideline-supported option for obtaining a definite diagnosis; and 2) chronic total occlusions (CTO) — beside the evidence of ischaemia associated by an occluded vessel, detailed anatomical information about the occluded vessel is helpful prior to revascularisation attempts.

Multimodality imaging in CAD comprises a combination of information from more than one imaging technique. These combinations, performed in a side-by-side or fusion mode, include computed tomography (CT) and single photon emission computed tomography (SPECT), positron emission tomography (PET) and CT, and PET with magnetic resonance imaging (MRI). Data thus obtained lead to either a summative or synergistic gain of information.

Beyond the diagnostic yield, some of these combinations in multimodality imaging also have prognostic implications. "Combining anatomic and functional information in patients with suspected coronary artery disease also has superior prognostic value. In a study comprising more than 500 patients the combination of coronary CTA and SPECT yielded improved prediction of events (all cause death, nonfatal infarction, unstable angina requiring revascularisation) as compared to the single modalities," the authors, Simon Greulich and Udo Sechtem, both of the Division of Cardiology, Robert Bosch Medical Center, Stuttgart, Germany, write.

Except for MRI and echocardiography, the authors note, other imaging techniques (CT, SPECT, PET) are associated with some radiation exposure. Moreover, additional imaging will entail more expenses for patients. Some of the imaging techniques also are not yet widely available (eg, PET), so their use is restricted to highly specialised medical centres.

Further technological improvements of each imaging technique (eg, higher resolution, lower radiation) and ongoing development of dedicated image fusion software might facilitate a more widespread clinical use of multimodality imaging in the clinical setting, according to the journal article.

"However, major drawbacks of multimodality (hybrid) imaging are increased radiation exposure and higher costs in comparison to a single imaging approach. Further prospective multicentre studies are needed to clarify the future role of its clinical utility, including data about prognosis and cost-effectiveness," the authors conclude.

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**Figure 1.** A 69-year-old patient with stenotic lesions on coronary CTA but normal perfusion by SPECT: (A), (C) and (D) display curved multiplanar CT reconstruction of the left anterior descending artery (LAD, =(A)), the left circumflex coronary artery (RCX, =(C)), and the right coronary artery (RCA, =(D)). LAD and RCA seem to have significant stenoses (see arrows). (B) shows an enlarged projection of the LAD perpendicular to (A) (see arrows), whereas (E) displays a 3D volume rendered reconstruction. On SPECT images (F) no perfusion abnormalities were detected (stress images first, third, fifth rows; rest images second, fourth, and sixth rows).

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