Letters to the Editor will be published, if suitable, as space permits. They should not exceed 1000 words (typed double-spaced) in length and may be subject to editing or abridgment.

Letter by Baumann et al Regarding Article, "Fractional Flow Reserve and Coronary Computed Tomographic Angiography: A Review and Critical Analysis"

To the Editor:

With interest we read the review of Hecht et al[1] in the July issue of *Circulation Research.* The authors present the technical principles and prerequisites of fractional flow reserve derived from computed tomography (CT-FFR) as a novel noninvasive technique using computational fluid dynamics to calculate FFR from standard coronary computed tomography angiography data sets without the administration of a pharmacological stress agent or repeat CT acquisitions. In several large trials, the feasibility of CT-FFR has been proven with promising results. It was demonstrated that the technique primarily improves the specificity and positive predictive value of CT, while the test's traditionally high sensitivity and negative predictive value are preserved. A substantial correlation with invasive FFR has also been shown.

Although the technique was approved by the Food and Drug Administration in late 2014, the exact use and benefit of this approach remain unclear, and it is still perched on the verge between a research application and a clinical tool. To date, the data sets require transfer to an external supercomputer to create a patient-specific 3-dimensional pressure map of the whole coronary artery tree. The whole process remains time consuming (≈3–7 hours), which limits its clinical practicability. For this reason, simplified on-site workstation-based calculations of CT-FFR represent an interesting and fast alternative (<1 hour) with promising initial results as conveyed by the review.[2,3]

We would like to complete the references of the excellent review by adding a few important landmark and other studies using the fast on-site CT-FFR algorithm. The retrospective, single-center study by Coenen et al[4] included 189 vessels of 106 patients and showed an improvement of the specificity from 37.6% (95% confidence interval, 28.5%–47.4%) for coronary computed tomography angiography alone compared with 65.1% (95% confidence interval, 55.4%–74.0%) by CT-FFR. Similar results were presented in a smaller Swedish study with 21 patients, demonstrating CT-FFR a specificity of 76% per lesion 80% per patient.[5] Furthermore, Yang et al[6] performed the first head-to-head comparison of this on-site CT-FFR software with stress CT myocardial perfusion in patients with coronary artery disease with a per-vessel specificity of 66% for coronary computed tomography angiography, 77% for CT-FFR, and 91% for CT myocardial perfusion, respectively. The diagnostic performance of coronary computed tomography angiography (area under the curve=0.856) was significantly improved by combination with CT-FFR (area under the curve=0.919; *P*=0.004) or CT myocardial perfusion (area under the curve=0.913; *P*=0.004).

The use of local, reduced-order computed fluid dynamics and machine-learning–based CT-FFR validated against invasive FFR is currently being evaluated in the Machine leArning Based CT angiograpHy derIved FFR: a Multi-ceNtEr (Machine) registry (ClinicalTrials.gov ID: NCT02805621) with an estimated enrollment of 352 patients in 5 centers to determine the actual diagnostic performance of this technique. This development could be the next step in establishing the feasibility for the routine application of a game-changing one-stop-shop approach.[7]

The authors are to be congratulated for their review, as it covers a highly topical and frequent subject of discussion that will likely be of great interest to readership.

Disclosures

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