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EDITORIAL COMMENTARY

Myocardial perfusion quantitation with PET: time to do our homework

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The first works on myocardial perfusion quantitation in humans date back to the early 1990s [1–4]. Since then, the advantages of quantitative perfusion measurement in myocardial imaging have been regularly highlighted. Quantitative perfusion PET has been recommended for early detection of patients at risk of coronary artery disease as well as for monitoring the effects of therapeutic interventions [5]. Besides, measuring regional flow reserve leads to an improved detection of multivessel disease and the possibility of assessing not only the culprit lesion but also lower grade stenosis [6, 7].

So why is it after all these years of myocardial quantitative perfusion measurement and its uncontested clinical relevance that the paper by Sergey V. Nesterov et al. [8] is important enough to be published in this journal?

In my opinion the reason is that we have not yet done our homework. We need tools that are readily available, reliable and well validated to be able to introduce the quantification of myocardial blood flow into clinical routine. I would like to compare perfusion PET with gated myocardial SPECT in this light. For gated SPECT there are several software solutions, which are both well validated and user-friendly. Performance of gated SPECT has been extensively validated, e.g. by comparison with magnetic resonance imaging [9]. Every manufacturer can sell you a SPECT system that is able to acquire and analyse gated SPECT out of the box. We are far away from that in perfusion PET imaging and will be falling behind even further because modern PET/CT scanners are increasingly optimized for oncological whole-body imaging. How about the interpretation of the results of an investigation with regard to patient prognosis and the need for intervention? Once again there is a huge database on myocardial SPECT, reflected in the number of publications in this area [10–13]. The prognostic value of both perfusion scores and left ventricular ejection fraction derived from gated SPECT has been clearly shown [14]. In myocardial perfusion PET, one will even have problems to find normal values for coronary flow reserve or coronary resistance in humans. And we are even much further away from having substantial data on the prognostic value of quantitative myocardial perfusion PET.

In my opinion, it is time to get perfusion PET ready for the future before it becomes another forgotten method of the past because it was too cumbersome to apply. Integrated cardiac PET/CT imaging offers the opportunity to reveal both the location of anatomical stenoses and their physiological significance [15]. This development will most probably strengthen the role of noninvasive cardiac imaging in the future. I do not think it would be wise to give away our special advantage and reduce myocardial perfusion PET to high-resolution myocardial SPECT. So the presentation, validation, and dissemination of software tools such as the one presented in this paper are the key to the future of quantitative myocardial perfusion PET and this warrants publication in this journal.

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