(SPECT) (2,3), and the extent of edema was unchanged 1 week after infarction in patients (3). Nordlund et al. (4) recently showed that MaR is stable over the first week, which does not support a bimodal pattern of edema after infarction in humans. The same study (4) also demonstrated that T2w CMR is sequence dependent, which could explain variations seen between vendors.

We acknowledge that histopathological determination of MaR using microspheres would have facilitated a comparison to previous studies. However, this was not part of the study design.

Dr. Schaaf and colleagues comment on the variability of salvage in our study (1) and whether this challenges the findings of trials in which salvage was used as an endpoint. We only studied salvage at days 0 and 7; how salvage varies when CMR is performed at interim time points needs investigation.

Dr. Schaaf and colleagues remark on the "archipelago-like" progression of infarction as an explanation for the rapid resorption of infarct size. We agree that the most likely explanation for the overestimation acutely is edema in MaR close to the infarct zone that resorbs over 1 week, but we cannot rule out other pathophysiological explanations.

Finally, Dr. Schaaf and colleagues inquire how ex vivo T2w imaging is affected by gadolinium. Experimentally, ex vivo T2w imaging with and without gadolinium agrees with SPECT for determination of MaR (2).

In summary, we again stress that timing of infarct imaging using late gadolinium enhancement CMR is important.

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Please note: Dr. Arheden is a shareholder in Imacor. Drs. Engblom, Heiberg, Carlsson, and Arheden have been part-time employees for Imacor. Dr. Heiberg has reported that he is the founder of Medviso AB.

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## 3D Echocardiography and Level III Training

Echocardiography is the most widely used diagnostic imaging modality in cardiology. It is invaluable in the assessment of cardiac structure and function and as such it is a mandatory part of cardiology fellowship training. In most instances, the general cardiologist on entering the workforce is prepared for independent interpretation of echocardiograms. This is designated by the guidelines for training (COCATS) as level II (1). The education of level III echocardiographers, however, is more extensive because these trainees must possess the tools to direct echocardiography laboratories, teach future trainees, and advance the field with research and innovation.

The most recent training guidelines, COCATS 4, were published by the American College of Cardiology in 2015. COCATS 4 briefly and unclearly outlines knowledge on 3-dimensional (3D) echocardiography as a prerequisite for the level III echocardiographer (1). However, widespread incorporation of 3D echocardiography beyond academic or large training institutions is often viewed as challenging or unnecessary. We strongly believe that ensuring competency in 3D echocardiography during level III training will enhance the skills of new echocardiographers and improve the use and comfort level with 3D echocardiography in the community. We further believe that this is the opportune time to draw attention to this issue in advance of the anticipated advanced training statements in echocardiography (1).

The literature strongly supports the role for 3D echocardiography. The current 2015 American Society of Echocardiography/European Association of Cardiovascular Imaging chamber quantification guidelines recommend that when possible laboratories

should report left and right chamber volumes using 3D measurements (2). Data have recently been published on the incremental prognostic utility of quantification using 3D over 2-dimensional echocardiography (3). Furthermore, there are numerous examples detailing the value of 3D echocardiography in the assessment and treatment of valvular heart disease, particularly mitral valve pathology, and also regarding the guidance of percutaneous interventions for structural heart disease, such as paravalvular leak and atrial septal defect repairs (4).

We read with great interest the Editor's Page recently published in *iJACC* by Chandrashekhar et al. (5). We strongly agree that the multimodality imaging community is best organized as a pyramid with the base composed of level II trained imagers and the apex composed of level III experts. However, we worry that many level III echocardiographers are not well versed in 3D imaging. As young cardiologists transition away from training, it becomes increasingly difficult to learn and incorporate new techniques into routine practice because of time constraints and the burden of multiple responsibilities. Indeed, learning how to acquire and analyze 3D echocardiographic datasets has its own learning curve that cannot be rushed. In an era where echocardiography has shown great advances with the advent of 3D imaging, it is imperative that cardiology fellows (especially those pursuing level III training in echocardiography) and echocardiography laboratory directors are adept at acquisition and interpretation of 3D imaging.

Ahead of future consensus statements on echocardiography education/training and guidelines we propose the following:

1. 3D echocardiography should be included as an integral part of future advanced training statements in level III echocardiography.
2. Competency in 3D echocardiography should be specifically detailed in training statements.
3. Future generations of echocardiography laboratory directors should be proficient in all aspects of 3D transthoracic and transesophageal echocardiography, including acquisition, manipulation, interpretation, and analysis of datasets.
4. Current laboratory directors without competency in 3D imaging should strongly consider gaining experience through continuing medical education initiatives.
5. Level III echocardiographers and laboratory directors should actively work to ensure 3D echocardiography is incorporated across the country.

The level III echocardiographer carries immense responsibility in disseminating knowledge to fellows, sonographers, and serving as the echocardiography consultant for cardiologists and patient providers. 3D echocardiography skills are an essential component of the imaging armamentarium and undoubtedly contribute to improved skills in 2-dimensional interpretation.

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