Author's response to reviews

Title: Three-dimensional echocardiography using single-heartbeat modality decreases variability in measuring left ventricular volumes and function in comparison to four-beat technique in atrial fibrillation

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Author's response to reviews: see over
To the Editor

We hereby submit a revised version of the paper” Three-dimensional echocardiography using single-heartbeat modality decreases variability in measuring left ventricular volumes and function in comparison to four-beat technique in atrial fibrillation. We have carefully read the comments and made changes accordingly, and present a point-by-point description of the changes made.
We are prepared to make additional changes if deemed necessary. We now hope that you will find the paper suitable for publication in the Cardiovascular Ultrasound.

Best regards
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Point-to-point description of the changes made:
Reviewer 1

1. Please tone down the first sentence in the abstract.

Response: We have changed the first sentence in the abstract section.

2. Please provide more details on the study population under investigation: reasons to undergo echocardiography:

Response: We have added additional details regarding patient population/indication of echo (see table 1).

3. Try to list advantages and disadvantages of the use of single beat acquisitions.

Response: This is already listed in second paragraph in the background section.

4. Is there any role of contrast in the subset of patients with poor acoustic window?

Response: We did not use contrast agents in these patients since we did not have ethical approval regarding the use of contrast in this specific study. Patients were excluded when two or more segments were not fully jugdeable.

5. The intra- and inter-observer variability is lower than 10% for all the measurements in group A whereas is higher in Group B. Please address.

Response: We have tried to explain a possible reason in the discussion part (p 11, ½ half).
6. Please define the two groups also in the tables.

**Response:** We have now redefined the two groups in the tables.

7. No comparison with 2D is given.

**Response:** The aim of this study was not to compare 2D and 3D but to investigate the observer variability in two 3D techniques. 3D has proven to be superior to 2D in measuring LV volumes and EF in sinus rhythm patients but not in patients with irregular heart beat. For that reason we wanted to study the observer variability of LV volumes and EF in AF patients using single-beat and multi-beat modality.

8. In the limitations of the study, the use of only 1 type of 3D machine is acknowledged. A comment on standard technology in order to avoid the far-west that has characterized tissue Doppler should be given.

**Response:** We have added some clarifications in the limitation section.

9. Please expand the clinical implications of the study.

**Response:** We have added a new section (**clinical implications**) before the conclusion part.

10. You may be interested in citing the following article: Baseline and follow-up assessment of regional left ventricular volume using 3-dimensional echocardiography: comparison with cardiac magnetic resonance. Jenkins C, Marwick TH. Cardiovascular Ultrasound (19 Nov 2009)

**Response:** Thank you for your information. We have added the above mentioned reference in the manuscript.

**Reviewer 2**

1. In the results paragraph the part reproducibility: the numbers are just presented in Table 4 and is not necessary in the text

**Response:** This is now removed.

2. Should be interesting to add the time resolution of the 2 modality used.

**Response:** We have in the result section mentioned the mean ± SD time resolution of the two 3D modalities.