Poster Session -- Poster session 2

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Cine short-axis image quality optimisation on 3T cardiac MR

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Background: Cardiac magnetic resonance (CMR) is the gold-standard for ventricular volume and function determination. Therefore, to achieve reproducible results, it relies on optimal image quality, which depends on patient collaboration and vary with different scanner features and sequence parameters, particularly noticed on higher field strengths.
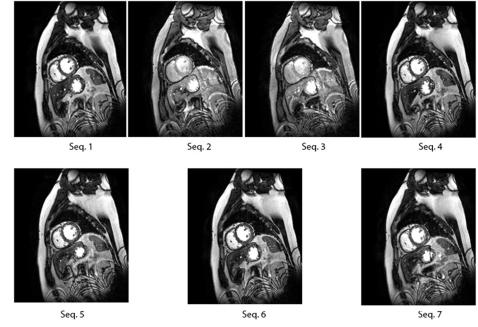
Purpose: This study aimed to optimise cine short-axis sequences on a 3T scanner, by comparing image quality and accuracy of the same sequence ran with different parameters, according to a qualitative assessment of three experts on CMR.

Materials and Methods: We scanned 20 healthy volunteers (46.8 ± 20.2 years old) on a 3T scanner, acquiring 7 cine short-axis sequences per patient (1 mid-ventricular slice). The sequence currently in clinical use had the following key parameters (between others): Flip angle (FA) = 60◦; parallel acquisition factor (PAF) = 2.5; k-space segments = 10. Sequences 2 to 7 were progressively generated, by changing FA to 20◦ and 40◦, PAF to 2 and 3, and k-space to 16 and 8 segments (example on figure). Three observers evaluated signal-to-noise ratio (SNR) and contrast-to-noise ratio (CNR) of each sequence, by using a 5 point Likert scale, ranging from very poor (1) to very good (5). Cronbach's alpha and Kendall's W tests were used to measure inter-observer agreement.

Results: A total of 140 sequences were acquired, all usable for comparison. Likert scale results indicate that decreasing FA (sequences 2 and 3) had the lowest scores for SNR and CNR (1.10 ± 0.31 to 2.40 ± 0.68 and 1.15 ± 0.37 to 1.85 ± 1.18, respectively), while increasing K-space segments to 16 (sequence 6) offered the highest (3.70 ± 0.86 to 4.15 ± 0.99 for SNR and 3.70 ± 0.92 to 4.30 ± 0.86 for CNR). For both SNR and CNR, sequences 3, 6, and 7 presented better inter-observer agreement (>0.60), while sequence 2 showed the worst.

Conclusion: Increasing K-space segments produced the best cine image quality, with good inter-observer agreement, while decreasing FA produced the worst. CMR is a dynamic examination, therefore its scanner parameters may be adjusted for particular patients, in order to improve accuracy.

Abstract P418 Figure. Still images of sequences 1 to 7.