



UTILIZING PROSPECTIVE MOTION CORRECTION TO IMPROVE IMAGE QUALITY IN CHILDREN AND ADOLESENTS



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Purpose:

Magnetic Resonance Imaging (MRI) is considered the gold standard for brain imaging. Motion artifacts are the principle cause of repeat and early termination of scans. In the research setting, scanning children and adolescents creates an even greater challenge due to the amount of time required to obtain high quality data. Motion limiting techniques such as watching a movie or listening to music can be an effective tool, but may not always be available or reliable. The purpose of this study is to determine whether an imaging sequence utilizing a real-time prospective motion correction technique (PROMO) is advantageous for imaging children and adolescents. [1]

Methods:

Six children and adolescents ranging in age from 9 to 21 were recruited and screened into this study. Participants were scanned on a MR750W 3 Tesla MRI scanner (GE Healthcare, Milwaukee, WI USA) with a 16 channel head coil. A Fast IR prepped 3D gradient echo (BRAVO) technique was compared to a magnetization-prepared rapid gradient-echo (MPRAGE) sequence with prospective motion correction (PROMO). Both techniques were acquired with the following parameters: FOV=280mm, TR/TE= 8/3ms, Matrix=256x256, NEX=1. Scan times for BRAVO and PROMO were 5:46 and 6:36, respectively. In addition, the PROMO sequence was allowed to scan for up to an additional 60 seconds to reacquire any k-space lines corrupted with motion. Two Neuroradiologists (BP, GB) were blinded to the technique and then rated the images using a five-point scale (0=very poor, 4=excellent) for the following: Motion Artifact, Signal to Noise (SNR), Contrast to Noise (CNR), and Overall Image Quality.

Results:

The results revealed that the Neuroradiologists preferred the PROMO technique over the BRAVO technique. Two examples of the BRAVO (Figure 1a,c) and PROMO (Figure 1b,d) images are shown. PROMO scored consistently higher in all scoring categories. The mean and standard deviation of the overall quality scores are shown in Figure 2.

Conclusion:

Preliminary results suggest that prospective motion correction using navigator pulses is an effective way to minimize motion artifacts in children and adolescents. Although PROMO scan times in this study were longer than the comparison scan, the results indicate that the technique is less sensitive to motion related artifacts in the reconstructed images. Future work could optimize the MP-RAGE PROMO sequence, which was not done for this study.

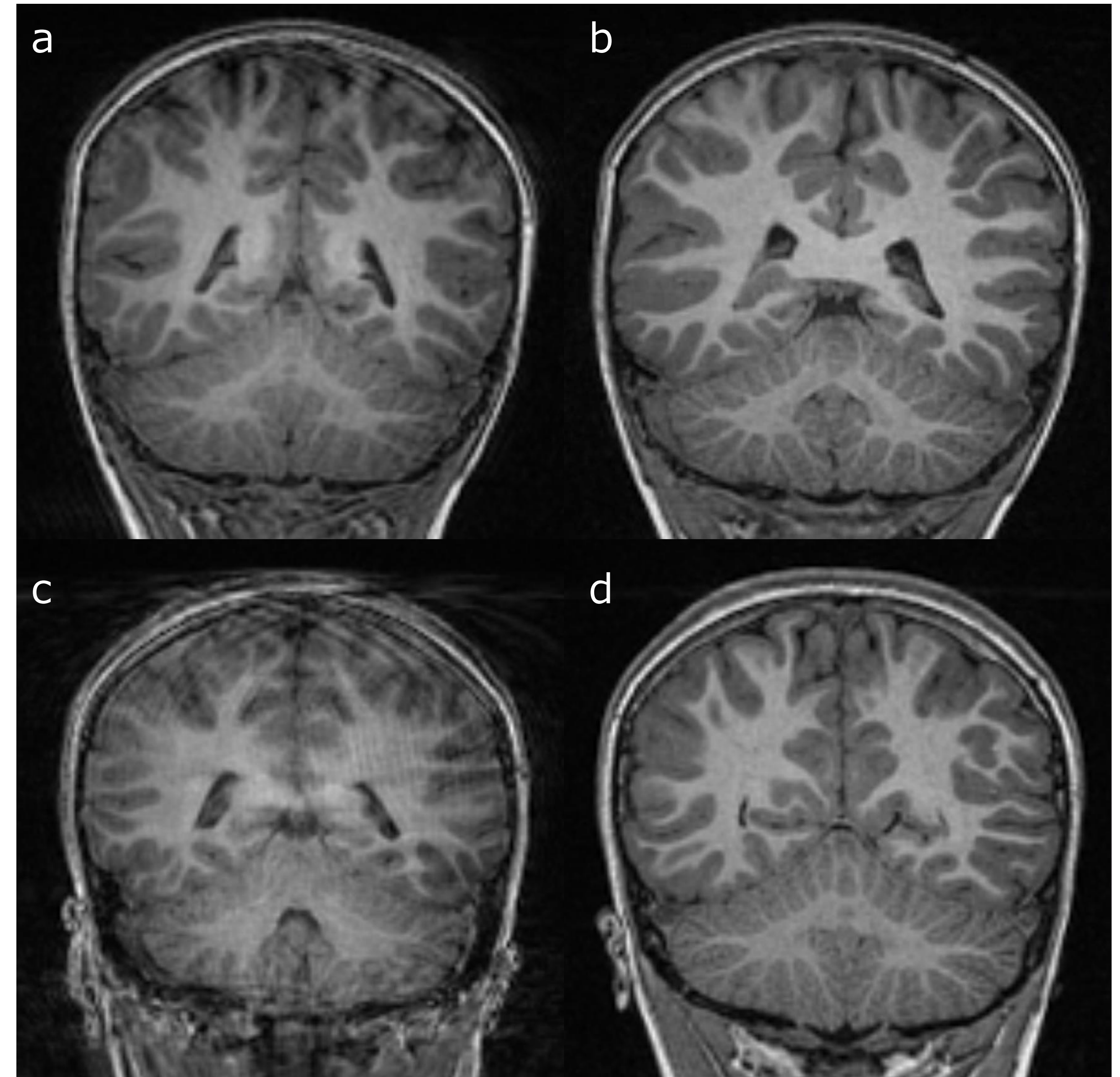


Figure 1. BRAVO images (a,c) PROMO images (b,d)

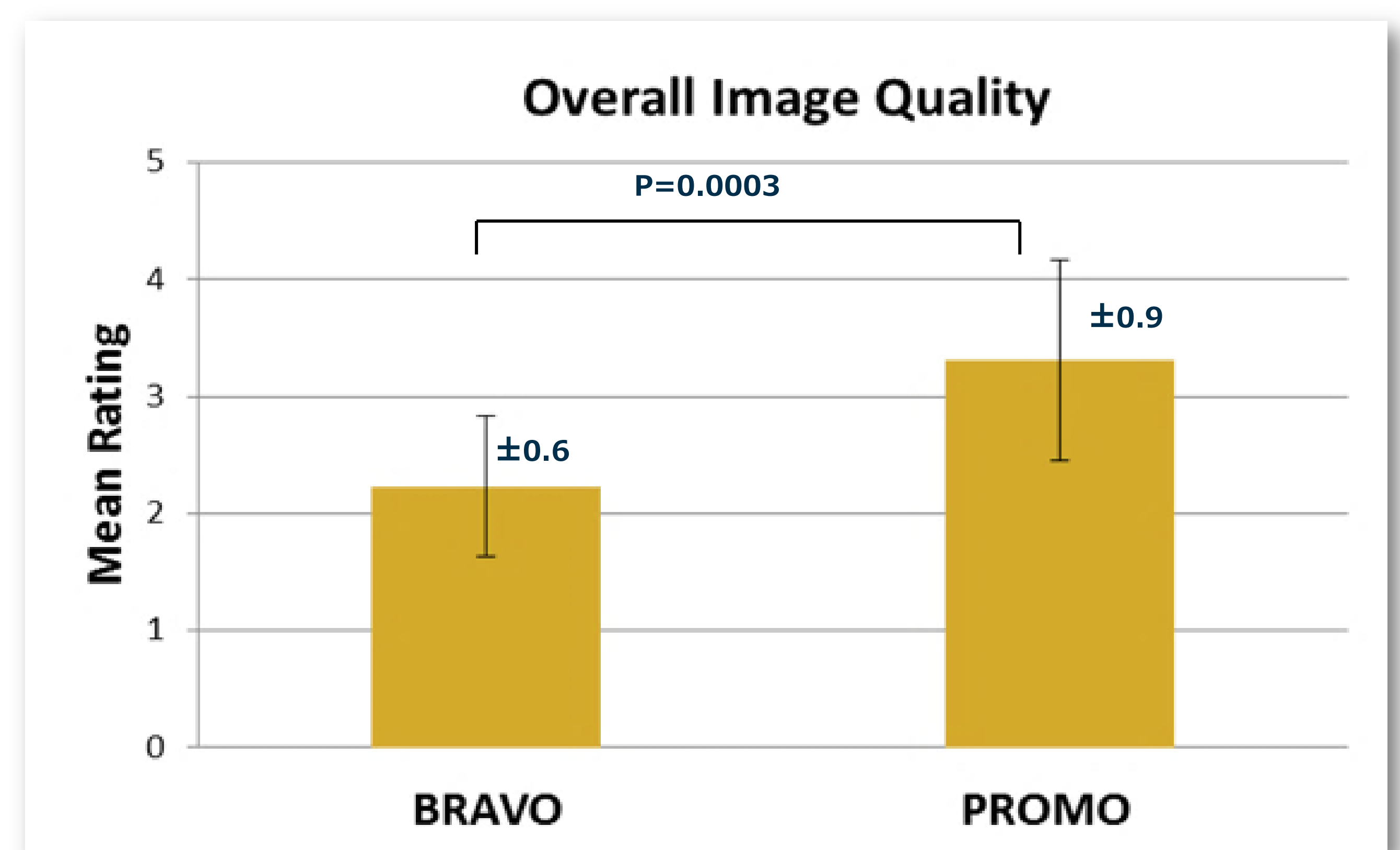


Figure 2. PROMO vs. BRAVO Mean Overall Image Quality with Standard Deviation