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Moving toward silent MRI acquisitions: Increasing patient comfort by reducing the acoustic noise

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Abstract

In the current clinical setting, patient comfort remains a significant priority for MR imaging. Common complaints from patients include the confining space, uncomfortable positioning, and loud acoustic noise. Recent advances have been made to increase the diameter of the MRI system bore and improve RF coil design to create more comfortable patient positioning. However, acoustic noise still remains a challenge particularly as the MRI system magnetic field gradient performance increases resulting in greater forces placed on the gradient coils. Several groups have looked at methods to reduce the acoustic noise during MR image acquisition. These quiet or silent MR methods achieve reduced acoustic noise by employing techniques ranging from more traditional approaches such as gradient waveform shaping and derating to less traditional approaches such as non-Cartesian zero-TE radial acquisition methods. However to gain clinical adoption it will be critical to understand the diagnostic capabilities of these silent or quiet acquisition strategies. Studies from our group have included imaging of clinical volunteers using a silent zero-TE acquisition (Silenz, GE Healthcare, Waukesha, WI) followed by an image review and scoring by two board trained radiologists. Images were scored for the diagnostic capability and image quality, and compared to images acquired using standard clinical image acquisition protocols. Preliminary results obtained using the silent acquisition showed image quality and diagnostic capabilities comparable to those achieved with the much louder conventional fast gradient-echo T1w methods. The acoustic level of the MR acquisition was found to be <3dB above the ambient noise level of the room.

Biography

James H. Holmes has completed his M.S. in Physics at the University of Iowa and Ph.D. and postdoctoral studies at the University of Wisconsin-Madison in functional lung imaging including hyperpolarized gas MRI. He is currently an MR scientist with the Global Applied Science Laboratory in the advanced applications and workflow team of GE Healthcare, a premier worldwide healthcare manufacturer and developer. He holds an honorary fellowship appointment with the University of Wisconsin-Madison. He has published 19 papers in reputed journals and was a Young Investigator Award finalist during the 2009 Annual Meeting of the International Society for Magnetic Resonance in Medicine.