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Noise confounds in functional MRI research and potential solutions

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High field functional MRI (fMRI) is becoming a neuroscience research technique of choice because it is non-invasive and can reveal brain circuitry regulating sensory, motor, and cognitive functions. Unfortunately, rapid scan fMRI results in high noise levels (100-140 dB) that can alter auditory, visual, and pain system function, and also can induce stress, which itself modulates brain responses to various stimuli. These effects can confound fMRI data interpretation. A number of solutions for this problem have been proposed including modifying MRI scanner hardware to reduce noise output, an expensive proposition limited to willing manufacturers, and modifying fMRI pulse sequences to reduce noise output, which is effective within certain limitations. Another approach is to develop acoustic noise isolating equipment that separates subjects from noise. This passive approach confers maximum flexibility because it is both hardware- and fMRI scan sequence-independent. We present initial data documenting efficacy of first generation acoustic noise isolating equipment for animal fMRI studies. As nearly 25% of patients referred for clinical MRIs refuse scans because they are stressful, acoustic noise isolating equipment scaled for clinical MRI scanner use may decrease stress and increase patient compliance, thereby decreasing morbidity and mortality, and improve MRI center workflow.