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Motion Compensated Free-Running 3D Fetal Magnetic Resonance Imaging: Initial Feasibility

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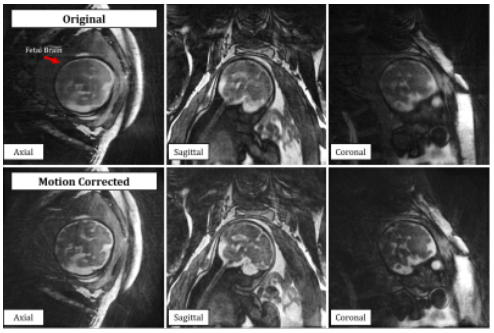
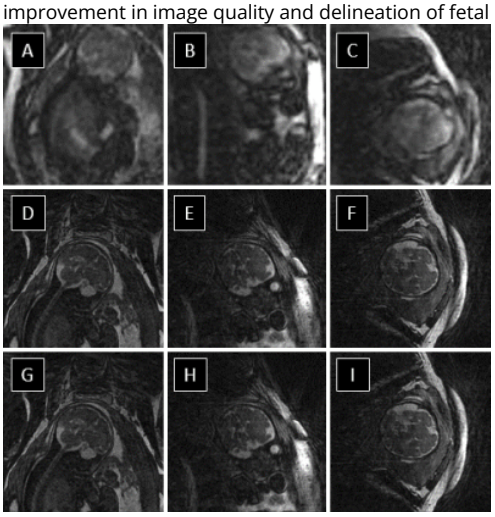
A novel framework for 3D MRI of the fetus with retrospectiive motion compensation is developed enabliing high isotropic resolutiion imagiing of the entiire fetus iincludiing the braiin andl heart.



Representative reconstructions from the proposed motion correction strategy for 3D MRI of the fetus with isotropic millimetric spatial resolution. The top row shows the originally acquired (motion-blurred) data in approximate axial, sagittal, and coronal reformats while the bottom row shows substantial improvement in image quality and delineation of fetal brain structures after applying retrospective motion correction to the same data.



Animated figure depicting motion-resolved reconstructions of free-running 3D fetal MRI data. A-C) A low spatial resolution real-time image series with 500 ms temporal resolution demonstrates maternal respiration and gross fetal movement in three perpendicular planes. D-F) High spatial resolution images created from unique motion states identified in A) shown in the same views centered on the brain, allowing for co-registration to “stabilize” anatomical features of interest (G-I).