

Developing a cardiac gating system for magnetic resonance imaging of a mouse

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In vivo magnetic resonance imaging (MRI) of a mouse's heart is highly susceptible to motion artifacts due to rapid movement of its hearts (typically 325-780 beats/minute) and lungs (typically 94 - 163 breaths/minute). In order to obtain high quality image of a mouse's heart, a gating technique is required. This technique enhances the image quality by repeatedly image the heart at exactly the same location for a great number of times. A novel cardiac gating system has been developed for an MRI animal system (9.4T, 21cm bore). Electrocardiographic (ECG) signal is measured from left and right legs and tail of the mouse using a novel double-shielding technique. This shielding technique can electromagnetically protect ECG signal from the MR noise which usually causes errors in the gating system. The cardiac gating system generates gating pulses from the R-wave of the measured ECG signals. The shielding is economy and easy to implement. The results demonstrated significant reduction of motion artifacts and improvement of anatomical details.