

Testing Non-MRI-Compatible IV Pumps with Synaptive's 0.5T MRI

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Problem

It is not uncommon for patients with IV pumps to require imaging. As typical IV pumps are not MRI-compatible, the pumps need to be located outside of the MRI room. This requires IV extension, can be a time-consuming process, and is additionally a potentially dangerous process for patients on vasopressors. It would be advantageous if standard IV pumps could be brought into the exam room.

Test Setup

Synaptive's 0.5T MRI has a very compact fringe field such that the 5 Gauss line does not extend far from the magnet (within 1.5m on all sides). As such, non-MRI compatible equipment can be brought into the magnet room without being exposed to high magnetic fields. Two non-MRI-compatible pumps were used in this experiment, positioned at the foot of the bed (Figure 1). Due to the compact fringe field of the Synaptive system, the fringe field at the end of the patient bed is approximately 1 Gauss. Where the pumps were placed at the foot of the bed, 3 m away from the 0.5T gradient coils and RF, there is no appreciable magnetic field and therefore impact to the pumps is not expected. To mimic normal use, the pumps were set to on, and the saline was pumped into a bucket.



Figure 1. Room setup with non-MRI-compatible pumps.

Methods

Typical clinical protocols were run on a phantom placed inside the 16-channel receive only head coil. The performed scans included: Ax SWI, Ax FLAIR, Ax T2, and Ax DWI with typical clinical settings. Four runs were performed: a) with the door closed and no pumps in the room, b) with pump #1 running at the foot of the bed, c) pump #2 running at the foot of the bed, and finally d) with the magnet room door open and no pumps in the room.

Results

The images from all scans are shown in Figure 2. No artefacts were visible in any of the images. SNR was unchanged across all images compared to the baseline setup.

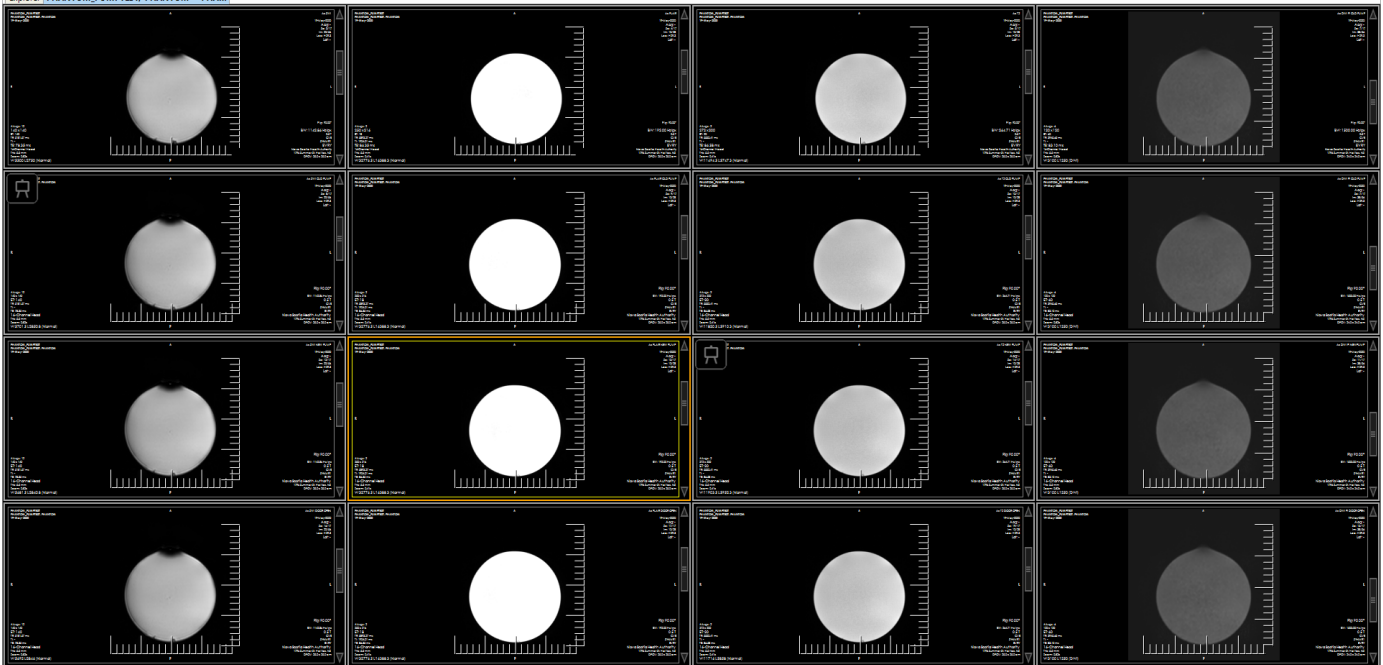


Figure 2. Imaging results, left to right: Ax SWI, Ax T2 FLAIR, Ax T2, Ax DWI. Top row: Normal operation. Second row: Pump #1 operating inside the magnet room with the RF door closed. Third row: Pump #2 operating inside the magnet room with the RF door closed. Fourth row: RF door open.