

## Feasibility of Vasodilator Stress Testing in a 70 cm Wide Bore 1.5T Scanner

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### Introduction:

The small bore size of standard 1.5T scanners prohibits MR imaging of certain patient populations. Obesity, claustrophobia, and heart failure complicated by orthopnea are all conditions that limit feasibility of cardiac MR examinations in standard bore scanners. Also, obese patients are technically difficult to image by other means. Furthermore, pharmacologic stress testing requires close monitoring of the patient and would be safer and easier to perform in a less confined setting. Many of these problems might be alleviated by a novel 70 cm bore magnet design. We describe our initial experience with performing vasodilator stress MRI exams with a wide bore 1.5T scanner.

### Objective:

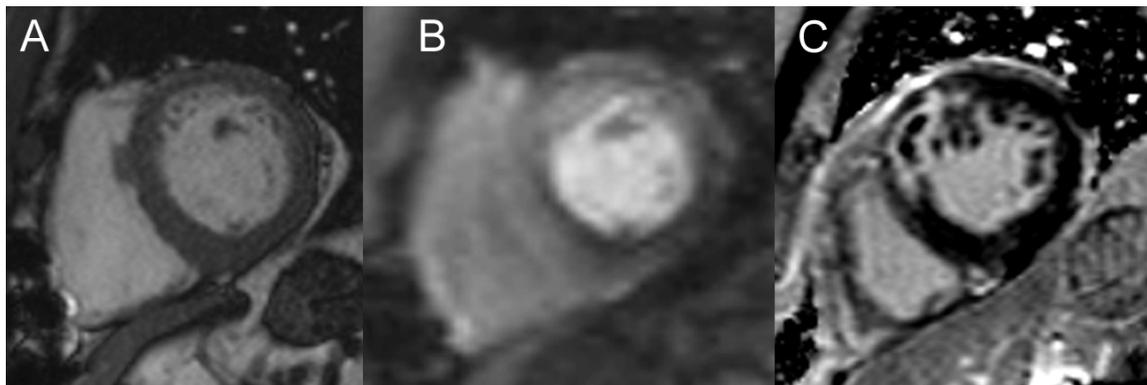
To test the feasibility of performing pharmacologic stress MRI exams in a 70 cm wide bore 1.5T scanner.

### Methods:

Thirteen patients with clinical indications for cardiac stress testing underwent stress testing with dipyridamole 0.56 mg/kg IV over 4 minutes. Imaging consisted of steady state free precession (SSFP) localization, SSFP short and long axis cine, gradient echo accelerated echoplanar (GRE-EPI) first pass perfusion with a TSENSE factor of 2, and phase sensitive delayed enhancement. Images were acquired with a Siemens 1.5 Tesla Magnetom Espree system with a 70 cm bore size and 125 cm length which is 10 cm wider in diameter and 35 cm shorter in length than traditional scanners.

### Results:

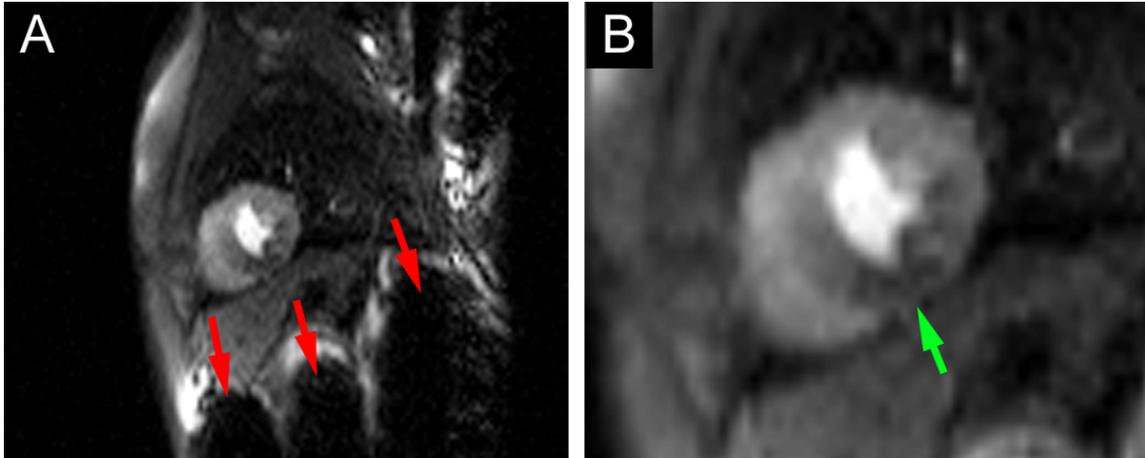
Image quality was deemed good for all cine function studies. Perfusion was judged good in all but 3 cases which were fair due to artifact (2 ghost and 1 gating artifact). Delayed enhancement was of good quality except for 2 cases which were fair due to arrhythmia or poor gating. No portion of the imaging protocol was non-diagnostic in any patient.



**Figure 1.** Examples of cine (A), stress perfusion (B), and delayed enhancement imaging (C) acquired from different patients. Note the severe stress perfusion defect in

the inferoseptal, inferior, and inferolateral walls. The delayed enhancement image demonstrates an anterior and anteroseptal infarct with microvascular obstruction.

Artifacts during first pass perfusion imaging were common, but did not interfere with image interpretation due to the peripheral location of the artifacts (Figure 2).



**Figure 2.** Panel A demonstrates a true positive perfusion exam in full field of view which shows peripheral off-resonance artifacts (red arrows) that do not interfere with interpretation of the inferior perfusion defect (green arrow) as shown in panel B.

### **Conclusions:**

Vasodilator stress MRI exams can be performed on a large bore system with high image quality but with some off-resonance artifacts near the edges of the field of view. In our broader experience with stress and rest MRI studies, we have scanned a patient weighting 404 lbs, a patient requiring 3 pillows for orthopnea, and a patient previously claustrophobic in a traditional bore scanner demonstrating that imaging patients previously unsuitable for MRI is possible. In an era where obesity and heart failure are increasing clinical problems, the feasibility of performing high quality non-invasive cardiac testing in these populations is a clinically important advance.