**INTRODUCTION**

Following administration of Gd-DTPA, infarcted myocardium exhibits delayed hyperenhancement and can be imaged using an inversion-recovery sequence [1]. Using a conventional segmented acquisition requires a number of breath-holds to image the heart. Single-shot phase-sensitive inversion-recovery (PSIR) true-FISP may be combined with parallel imaging using SENSE to achieve multi-slice full heart coverage with high spatial resolution [2,3]. PSIR techniques have demonstrated a number of benefits [4] including consistent contrast and appearance over a relatively wide range of inversion recovery times (TI), improved contrast-to-noise ratio, and consistent size of the hyperenhanced region.

**METHODS**

The parallel MR SENSE method is applied to 2d multi-slice imaging in the phase encode dimension to reduce the number of phase encodes by a factor R=2. The method has several limitations: first, almost full magnetization recovery must be achieved during each acquired slice for the SENSE acceleration to be effective. Second, the parallel MR SENSE method is applied to 2d multi-slice imaging in the phase encode dimension to reduce the number of phase encodes by a factor R=2. In this manner it is possible to acquire an entire 2d stack of images in a single breath-hold acquisition. Using a true-FISP imaging sequence with rate R=2 SENSE, the complete set of phase encodes for each slice is acquired in a single heartbeat. Using Gd-DTPA with an inversion recovery acquisition sequence it is desirable to use 2 heart beats for almost full magnetization recovery. The sequence timing is illustrated in Figure 1. Phase sensitive cardiac imaging poses unique challenges due to the combination of field inhomogeneity, motion, and low SNR, which make it difficult to obtain a reliable estimate of the background phase and B1 maps. The approach we have taken uses the reference image acquired at the same cardiac phase, during the same breath-hold acquisition during alternate heart beats to estimate both the background phase and surface-coil field maps. This type of acquisition provides a reference image with good spatial resolution and eliminates mis-registration errors due to motion.

**RESULTS**

A stack of short-axis images of the heart for 2 patients with chronic MI are shown in Figures 3 and 4, respectively, acquired using both methods. The measured CNR for the segmented turboFLASH method was approximately 2.7 times that of the true-FISP with SENSE which was close to predicted.

**CONCLUSIONS**

Multi-slice coverage of the entire heart in a single breath-hold acquisition is possible using SENSE accelerated phase sensitive inversion recovery true-FISP. Using SENSE acceleration, it is possible to use single-shot true-FISP without compromising spatial resolution. Since the single-shot method is insensitive to breathing, the multi-slice acquisition, achieved by catenating several single-shot acquisitions, may be either breath-held for better slice registration, or free-breathing in cases where patients have difficulty holding their breath.

**REFERENCES**