# Motion Robust T2-weighted imaging of C-spine with Propeller with Fast Recovery Modification

A. Gaddipati[1], A. Kumar[1], R. Peters[1], R. Francis[1], E. Kanal[2]

[1]MR, GE Healthcare, Waukesha, WI, United States, [2]University of Pittsburgh, pittsburgh, PA, United States

## INTRODUCTION

Conventional T2 weighted imaging of C-Spine is performed with Fast Recovery(FR) FSE pulse sequence. Even though, this sequence provides good contrast between CSF and spine, it is not very robust to patient motion during image acquisition, such as swallowing and coughing. Propeller on the other hand, gives good T2 weighted C-Spine images, but lacks the contrast of FR-FSE. This abstract discusses integration of FR with Propeller technique to gain the high contrast between CSF and spine provided by FR and the motion robustness provided by Propeller.

## MATERIALS AND METHODS

**Sequence:** Propeller pulse sequence was modified by adding a time reversed first echo and alpha (-90) Rf pulse at the end. Axial only scanning restriction was removed for this feasibility study from the GE product Propeller. Regular propeller reconstruction technique was used for motion correction. **Subjects and MR scanner:** Five healthy volunteer were scanned with FR-Propeller and FR-FSE. Studies were performed with 8-channel CTL array on a GE Signa TwinSpeed 1.5 T scanner equipped with the EXCITE technology. **Image quality analysis:** Images were comparable in still volunteers between FR-FSE and FR-Propeller. Image quality was superior with FR-Propeller for moving volunteers.

**Table 1.** Contrast comparison between FR-Propeller and FR-FSE as average of five volunteers with and without Tailored RF(TRF)

| Exp No | FR-Propeller contrast measured as CSF mean/spine mean | FR-FSE contrast measured as CSF mean/spine mean | TR | TRF | TE | ETL |
|---|---|---|---|---|---|---|
| 1 | 2.42 | 2.41 | 2500 | NO | 120 | 24 |
| 2 | 2.82 | 2.54 | 3500 | NO | 120 | 24 |
| 3 | 2.08 | 1.71 | 2500 | YES | 120 | 24 |

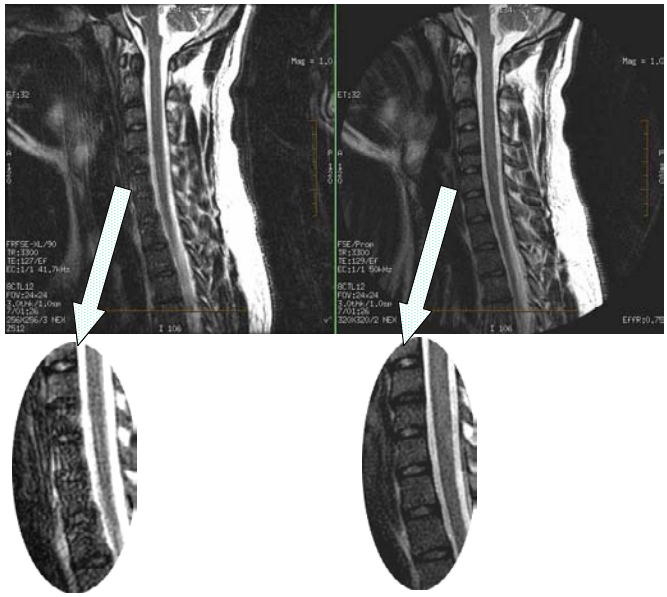

**Figure 1 Volunteer C-Spine imaged with FR-FSE on left and FR-PROP on right. Motion created by asking volunteer to cough.**

## RESULTS and Conclusion

Contrast between CSF and spine is comparable between FR-Propeller and FR-FSE in still volunteers. Both give significantly better contrast without TRF. On still volunteers, FR Propeller gave little higher measured contrast and 50% higher SNR in spine and CSF regions selected. On Moving volunteers, the discs between vertebrae look much sharper with FR-Propeller when compared with FR-FSE. This is illustrated in Figure 1 motion images. The arrows point to zoom in of fourth and fifth discs, which look sharper in FR-Propeller Image. From the feasibility study conducted we recommend using FR-Propeller without TRF imaging option to achieve consistently good image quality with high contrast between CSF and spine on either moving or still patients. Currently work is underway to remove wrap artifact seen at edges of the sagittal propeller images.

## References

Pipe JG, "Motion correction with PROPELLER MRI: application to head motion and free-breathing cardiac imaging", Magn Reson Med 42:963-969, 1999.