



A New Spin on Reducing Motion and Metal Artifacts

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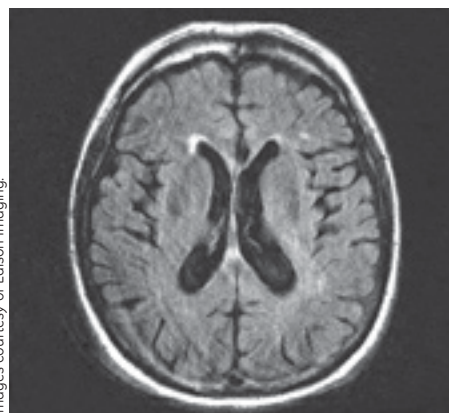
With the introduction of the new Signa® MR750 3.0T platform, GE Healthcare delivers a new, enhanced version of PROPELLER HD™ that will further revolutionize neuro MR imaging. Introduced in 2003, PROPELLER was the first MR technique designed to alleviate the challenge of scanning restless or uncooperative patients, or those with metal implants. It significantly reduces motion artifacts caused by voluntary patient movement as well as tremor and physiological motion including blood and CSF flow artifacts. As a result, clinicians utilize PROPELLER HD to generate high quality MR exams on restless children, adults afflicted with Parkinson's Disease and patients with extensive dental work.

The new PROPELLER HD enables equally strong performance in all imaging planes with the implementation of the No Phase Wrap (NPW) technique. NPW allows virtually ghost-artifact-free, motion-immune scans in sagittal, coronal, axial and oblique planes.¹ Since this technique effectively deals with the aliasing artifact, PROPELLER HD is now more robust performing small field-of-view (FOV) scans.²

A refined algorithm improves PROPELLER HD imaging capabilities in the presence of extensive motion by implementing certain constraints among ETL, FOV and NPW. The use of a "split blade" technique enhances image quality and reduces the presence of common distortions such as eddy current artifacts while a "center-out" view places early, not decayed, echoes at the center of k-space to diminish shading artifacts.³

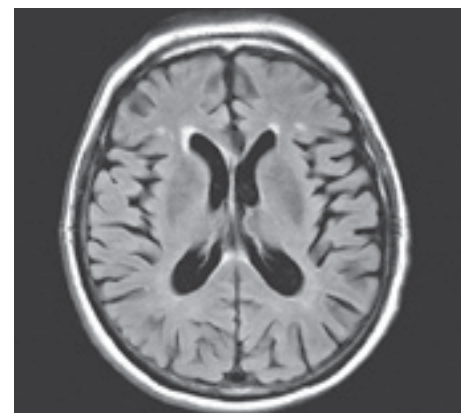
Significantly shortened TE drives SNR increase. Initial investigations suggest that SNR improvements might, in some cases, range from 30 to 100 percent.

For the complete white paper, please visit www.gehealthcare.com/signapulse.



Images courtesy of Edison Imaging.

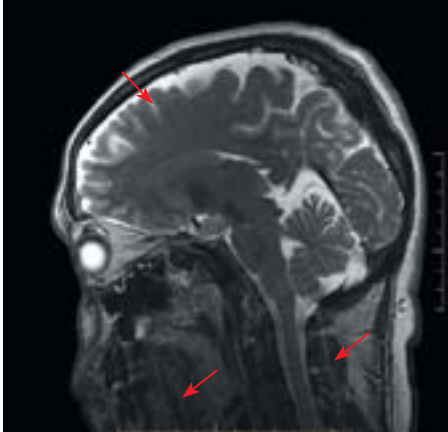
Signa 3.0T T2 FLAIR image quality is severely degraded by motion artifacts.



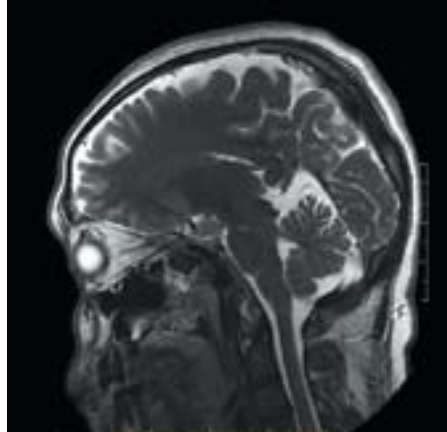
Signa 3.0T T2 FLAIR PROPELLER HD sequence on the same moving patient produced a motion artifact-free image with excellent contrast and detail. Both images were taken using the same matrix, FOV and scan time.

Benefits

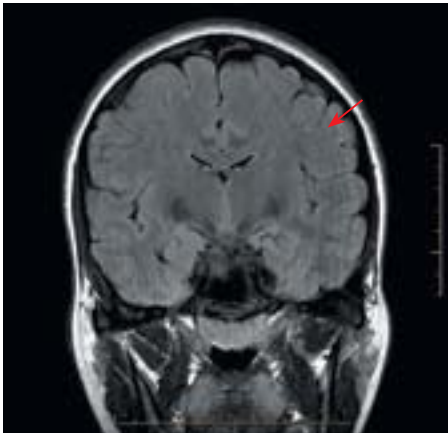
PROPELLER HD™ significantly reduces motion artifacts caused by voluntary patient movement, and tremor or physiological motion including blood- and CSF-flow artifacts. PROPELLER HD also optimizes SNR, capitalized as striking tissue contrast. In addition, PROPELLER HD T2 and T2 FLAIR sequences do not compromise image resolution or increase scan time. When used with DWI, PROPELLER HD greatly reduces tissue-air and bone-tissue susceptibility artifacts, such as those caused by metal implants.



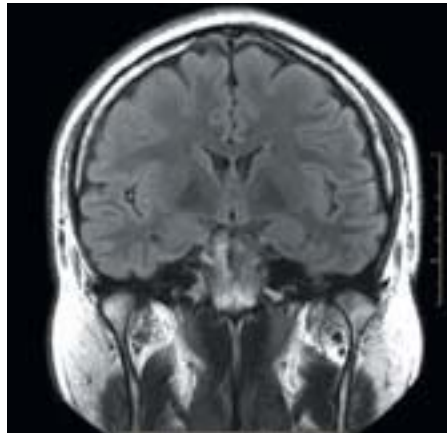
Sagittal T2 FSE showing some ghosting artifacts (see arrows). (Res 512x512)



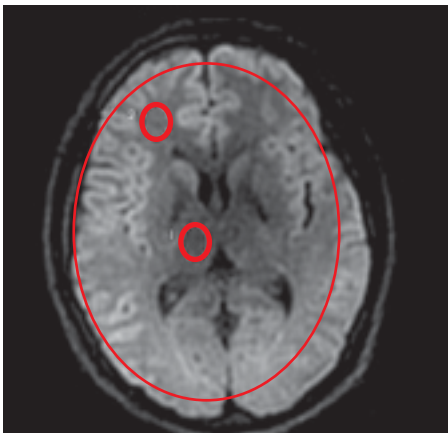
Sagittal T2 PROPELLER HD of the same subject is ghost-free. (Res 512x512)



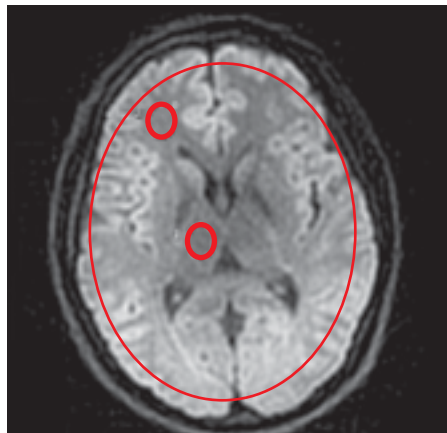
Coronal T2 FLAIR FSE with typical ghosting



Coronal T2 FLAIR PROPELLER HD shows improved tissue contrast and absence of ghost artifacts.



Conventional sequential view order showing a typical shading artifact.



Center-Out view order reduces the shading artifact and boosts the image quality. The improvement is apparent on this PROPELLER HD DWI image and further confirmed by SNR measurements that demonstrate 70 percent inner brain and 30 percent outer brain improvements. Both images were acquired with the same window contrast level.

References

1. Patent US 7023207 B1 "Method and System of MR Imaging with Reduced Radial Ripple Artifacts", A. Gaddipati, R. Peters, M. Hartley, granted in 2006.
2. Shaorong Chang, Xiaoli Zhao, and Ajeetkumar Gaddipati The Investigation of T2 PROPELLER Motion Estimation Efficiency.
3. Xiaoli Zhao, Ajeetkumar Gaddipati, Shaorong Chang, Dawei Gui Shading Reduction and SNR Improvement with Center-Out View Order for Diffusion-Weighted PROPELLER Imaging.