

# PORTAL VEIN SUPPRESSION WITH CENTRIC K-SPACE ORDERING ON THREE-DIMENSIONAL SEGMENTED TRUE FAST IMAGING WITH STEADY-STATE PRECESSION MAGNETIC RESONANCE IMAGING

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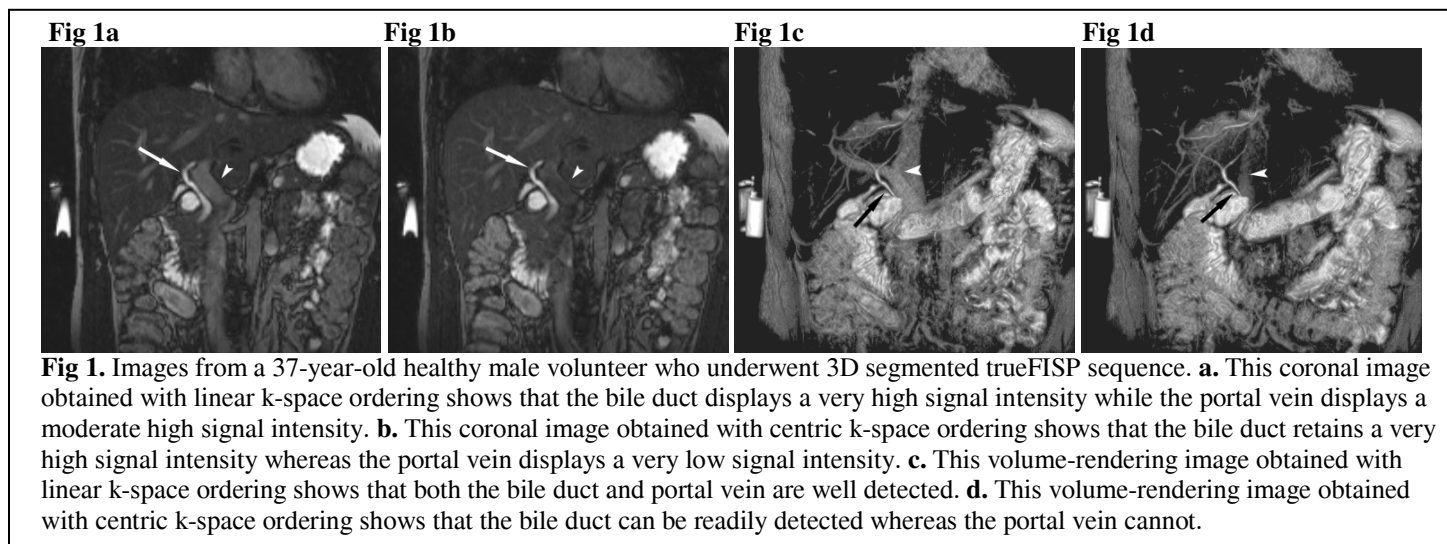
**INTRODUCTION:** A recently developed three-dimensional (3D) segmented true fast imaging with steady-state precession (trueFISP) sequence has been applied to acquire high signal-to-noise ratio and high spatial resolution images in a short period of time [1-4]. It has also been attempted in order to obtain non-contrast enhanced 3D vascular images of the abdominal region along with magnetic resonance cholangiopancreatography and portography [1,2]. However, signal intensities during the transient-state with centric ordering display markedly different behavior and are not sufficiently understood [3,4]. Therefore, this study sought to compare the detectability of the hepatobiliary region, and particularly the bile duct and portal vein, between centric and linear k-space ordering on a 3D segmented trueFISP sequence of MRI.

**MATERIALS AND METHODS:** Institutional review board approval and informed consent were obtained. A breath-hold coronal 3D segmented trueFISP sequence was prospectively performed on 14 healthy volunteers. Images obtained with centric and linear k-space ordering in the k(x)-k(y) plane were compared by two independent radiologists qualitatively with depiction scores on a five-point scale (1, not seen; 5, excellent depiction) using the Wilcoxon signed-rank test and quantitatively with signal intensities for the bile duct and portal vein using a paired t-test.

**RESULTS:** Data for the mean signal intensities are summarized in Table 1. With centric ordering, both the mean depiction scores and signal intensities for the portal vein were significantly lower than those with linear ordering (1.5 vs. 3.5,  $P = .0014$  and  $85.5 \pm 36.7$  vs.  $154.6 \pm 30.8$ ,  $P < .0001$ ) while there were no significant differences for the bile duct (3.9 vs. 3.8,  $P = .72$ , and  $266.9 \pm 51.0$  vs.  $269.3 \pm 51.1$ ,  $P = .70$ ).

**Table 1** Signal Intensities of Various Tissues Provided by Linear and Centric K-space Ordering.

	Linear	Centric	Difference	P-value
Portal vein	154.6 ± 30.8	85.5 ± 36.7	-69.2 ± 35.1	<.0001
Fat	174.7 ± 39.4	148.3 ± 33.2	-26.5 ± 11.1	<.0001
Inferior vena cava	132.4 ± 21.7	107.6 ± 18.2	-24.8 ± 22.8	.0014
Abdominal aorta	122.6 ± 24.8	106.1 ± 24.6	-16.5 ± 22.3	.016
Bile duct	269.3 ± 51.1	266.9 ± 51.0	-2.3 ± 22.1	.70
Air	5.6 ± 2.4	5.3 ± 1.7	-0.3 ± 1.0	.24
Hepatic vein	137.5 ± 37.7	137.6 ± 37.3	0.06 ± 13.6	.99
Muscle	28.2 ± 6.9	40.6 ± 8.5	12.4 ± 4.3	<.0001
Hepatic parenchyma	50.2 ± 11.9	67.7 ± 11.4	17.5 ± 4.8	<.0001



**CONCLUSION:** For bile duct visualization, centric k-space ordering on 3D segmented trueFISP sequence is recommended because the portal vein signal is exclusively suppressed while linear ordering is recommended for portal vein visualization as well.

**REFERENCES:** (1) Coenegrachts KL. Radiology 2004;231:237-242. (2) Wilson MW. Acad Radiol 2002;9:1179-1184. (3) Scheffler K. Eur Radiol 2003;13:2409-18. (4) Amano Y. Acad Radiol 2003;10:901-907.