

## SPACE VS. 3D TSE MRCP AT 1.5T MRI WITH REGARD TO DIFFERENCE OF ECHO SPACING

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**INTRODUCTION:** Sampling perfection with application optimized contrasts using different flip angle evolutions (SPACE) sequence has recently been used to obtain high resolution three-dimensional (3D) images at 3.0T MRI (1, 2). This has the advantage that it reduces specific absorption rate (SAR) by use of the variable flip angle (1). The other great advantage of SPACE is the shortening of echo spacing. However, this has not previously been focused on.

**PURPOSE:** To compare the image quality of SPACE to conventional 3D turbo spin-echo (TSE) magnetic resonance cholangiopancreatography (MRCP) at 1.5T MRI with regard to the difference of echo spacing.

**MATERIALS AND METHODS:** The prospective single-institution study was approved by the Institutional Review Board of this facility. Informed written consent was obtained from each of the 20 healthy volunteers. Navigator-triggered SPACE and 3D TSE MRCP at 1.5T MRI with the same parameters except for the echo spacing were prospectively performed. Quantitative analyses of signal-to-noise ratio, contrast-to-noise ratio, relative contrast, and contour sharpness index of each segment of the pancreaticobiliary tree were compared using paired t-tests. Qualitative analyses on a five-point scale (1, excellent; 5, poor) scored by two independent radiologists were compared using the Wilcoxon signed-rank test.

**RESULTS:** The signal-to-noise ratio, contrast-to-noise ratio, and contour sharpness index of each segment of the SPACE sequence were found to be significantly better than those for 3D TSE ( $P < 0.05$ ) (Table 1). No significant difference was observed with regard to relative contrast and subjective image quality ( $P > 0.05$ ) (Table 2).

**Table 1** Quantitative analysis of SPACE and 3D TSE MRCP\*

	SPACE	TSE	P
Signal-to-noise ratio			
Extrahepatic duct	210.5 ± 82.1	140.1 ± 62.3	<0.05
Gallbladder	227.7 ± 110.6	176.9 ± 115.2	<0.05
Pancreatic duct	82.5 ± 59.3	47.8 ± 28.1	<0.05
Contrast-to-noise ratio			
Extrahepatic duct	206.8 ± 81.6	137.2 ± 61.7	<0.05
Gallbladder	224.1 ± 110.2	174.0 ± 114.4	<0.05
Pancreatic duct	76.8 ± 59.5	43.7 ± 28.9	<0.05
Relative contrast			
Extrahepatic duct	0.96 ± 0.02	0.95 ± 0.02	0.48
Gallbladder	0.96 ± 0.03	0.96 ± 0.02	0.53
Pancreatic duct	0.82 ± 0.17	0.78 ± 0.16	0.38
Contour sharpness index			
Left hepatic duct	89.2 ± 0.5	88.0 ± 2.0	<0.05
Pancreatic duct	88.2 ± 1.4	86.6 ± 3.5	<0.05

\*Values are mean ± standard deviation.

**CONCLUSION:** We verified that SPACE MRCP was quantitatively superior to conventional 3D TSE MRCP at 1.5T MRI due to the shortening of echo spacing.

**REFERENCES:** (1) Haystead CM, et al. Radiology 2008;246:589-595. (2) Arizono S, et al. J Magn Reson Imaging 2008;28:685-69.

**Table 2** Qualitative analysis of SPACE and 3D TSE MRCP\*

	SPACE	TSE	P
Overall image quality	1.7 ± 0.8 (0.35)	1.7 ± 0.7 (0.27)	0.74
Extrahepatic duct	1.3 ± 0.4 (0.25)	1.4 ± 0.5 (0.10)	0.32
Intrahepatic duct	1.5 ± 0.5 (0.29)	1.4 ± 0.5 (0.05)	0.44
Cystic duct	1.7 ± 0.8 (0.44)	1.6 ± 0.9 (0.51)	0.62
Pancreatic duct	1.7 ± 0.8 (0.22)	2.0 ± 0.8 (0.05)	0.07

\*Values are mean ± standard deviation on a scale of 1-5 (1, excellent; 5, poor). In parentheses are the (kappa) values between two reviewers.

**Figure 1.** Examples of MIP images of 3D MRCP with SPACE (a) and 3D TSE (b) for a healthy 33-year-old male volunteer. No large differences can be observed visually between the two sequences.

