

## Comparison of Spectral Spatial PRESS with TE averaged PRESS in Breast Choline Detection

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**Introduction:** Choline peak in 1H MRS is used as the marker of malignant breast lesion. Many literatures focused on its specificity and sensitivity<sup>(1)</sup>. Among them, the TE-averaged PRESS sequence, or so-called J-resolved PRESS (J-PRESS) has advantage in its ability to maximize the Choline signal and reduce the side band of lipid<sup>(2)</sup>. However, during clinical practice, the lipid peak at 1.3 PPM always causes failure during “center frequency”, “gradient shimming” or “water suppression” period of spectral prescan, because of its comparable height as water signal. In this study, we investigate the usage of Spectral Spatial PRESS (SS-PRESS) sequence to deal with this problem.

**Method:** 109 patients with 153 breast lesions were scanned by SS-PRESS, all of which have pathology result (75 were malignant tumor). Among all these lesions, 72 were scanned again by J-PRESS. A 1.5T scanner (GE SIGNA EXCITE) with 4-channel breast coil was used. Single voxel spectral was acquired on each lesion (voxel size 2.0-6.0 CC) after 10 minutes contrast enhanced scan to make a precise localization. In another experiment group, we have verified that contrast agent won't degrade the MRS signal in this experiment design. Dual band SS-PRESS<sup>(3)</sup> was scanned with parameter TE: 110ms, TR: 2.0s, Acq: 128, NEX: 8; J-PRESS was acquired with TR: 2.0s, initial TE: 140ms, 4 steps of 5ms distance and 32 acquisition per TE. Spectral data was processed by SAGE included 3.0Hz Gaussian line broadening, zero filling to 4K points, Fourier transformation and phase correction. All SS-PRESS data was also reconstructed by scanner imbedded default program and compared them with SAGE processed result.

**Result:** SS-PRESS demonstrates stable result in most exams. Typical automatically reconstructed SS-PRESS spectrum is shown in figure 1. Average water line width (LW), average water suppression level (WS), sensitivity (SE) and specificity (SP) of the comparison group between SS-PRESS and J-PRESS are listed in table 1. For the 153 lesions group, total sensitivity of SS-PRESS is 50.7% and its specificity is 85.4%. If limited the lesion diameter to 1.5cm and upper, the sensitivity of SS-PRESS is increased to 76.7% (33 out of 43).

**Discussion:** In the comparison group, SS-PRESS demonstrates better water line width and water suppression level in prescan than J-PRESS. This is because of simple spectral shape during shimming and water suppression period. The sensitivity and specificity of this two sequence is nearly identical. However, analyze the raw data shows that two malignant tumor only demonstrate Choline peak in SS-PRESS sequence, because of better SNR, but another two malignant tumor only show Choline peak in J-PRESS, because of the narrower side lobe of 2.8ppm lipid signal. This result is consistent with expectation: SS-PRESS aimed to have better SNR while J-PRESS can narrower the lipid peak. However, SS-PRESS has more clinical advantages, one for it can achieve more successful prescan, one for it can be automatically reconstructed by imbedded program and generate DICOM image, which makes breast MRS more clinical practicable. Future work may include the development of a SS-PRESS with TE average to combine their advantages together.

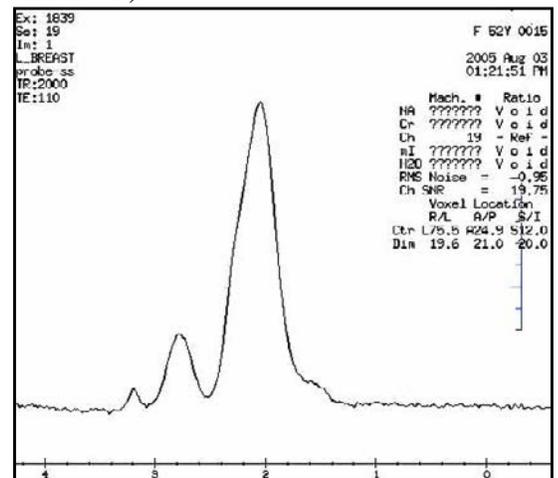


Figure 1. Typical automatically reconstructed single voxel SS-PRESS.

	LW(Hz)	WS(%)	SE(%)	SP(%)
SS-PRESS	12	90.4	55.9	82.6
J-PRESS	12.4	64.7	55.9	86.3

Table 1. Comparison result of line width (LW), water suppression level (WS), sensitivity (SE) and specificity between SS-PRESS and J-PRESS

### References

- <sup>1</sup>Katz-Brull *et al* (2002) J. Natl. Cancer Inst. 94 1197-1203.
- <sup>2</sup>Bolan *et al* (2002) Mag. Reson. Med. 48 215-222.
- <sup>3</sup>Schircker *et al*. Mag. Reson. Med 46: 1079-1087(2001)