

Line Scan Echo Planar Spectroscopic Imaging of the Prostate at 3T: Feasibility Study

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Purpose: A line scan echo planar spectroscopic imaging (LSEPSI) sequence is an attractive method which can rapidly give us the metabolites information. The lack of any phase encoding and the “snapshot” sampling of individual columns both help minimize motion ghosting artifacts. In this study, we generated 1D CSI acquisitions of the prostate tissue columns and assessed the characteristics of obtained data at 3T.

Materials and Methods: 1) Prostate phantom: Prostate phantom was consist of two center hemispherical containers (50 mm in diameter), one contained choline (30 mM), creatine (10 mM), citrate (10 mM), the other contained choline (10 mM), creatine (10 mM), citrate (30 mM). Both contained also small amount of air (about 1.5 cc), with surrounding 10 mm thickness olive oil layer, and outer container contained CuSO₄ solution.

2) Volunteer: The sixty-five-year-old male volunteer with high PSA value was examined by LSEPSI. After this examination, prostate biopsy was performed, and there were no malignant findings.

3) MR examination: The custom-made transceive coil was used with a whole body 3 T MR scanner (Signa VH/i 3 T, GE, Milwaukee, WI). The LSEPSI sequence was implemented on a same 3T scanner. The 90° and 180° pulses selected mutually orthogonal, 10-mmthick slices inclined by 45° from the normal of the slice to be sampled. Rapid, successive column sampling was achieved by varying the RF pulse frequencies. TR, 2000 ms; TE, 140 ms; NEX, 64; FOV, 24 cm; Slice thickness, 10 mm; Frequency direction, R-L; ETL, 256; echo interval, 1.184 ms; Acquisition time, 4 min 32 sec.

Results: Figure 1 shows 1D CSI column and spectra of the prostate phantom using LSEPSI. The spectral pattern is different between two central hemispherical containers. Figure 2 shows T2-weighted axial image and 1D CSI column sampled from a 65-year-old male volunteer. Citrate resonance of the prostate can be identified. In addition, the spatial resolution is good to separate the tissue border.

Conclusion: The LSEPSI at 3T was feasible method to assess the prostate citrate in vivo. When the imaging condition is optimized, LSEPSI may give us precise spectral and spatial information.

Reference: Oshio K, Kyriakos W, Mulkern RV. Magn Reson Med. 2000; 44(4): 521-524.

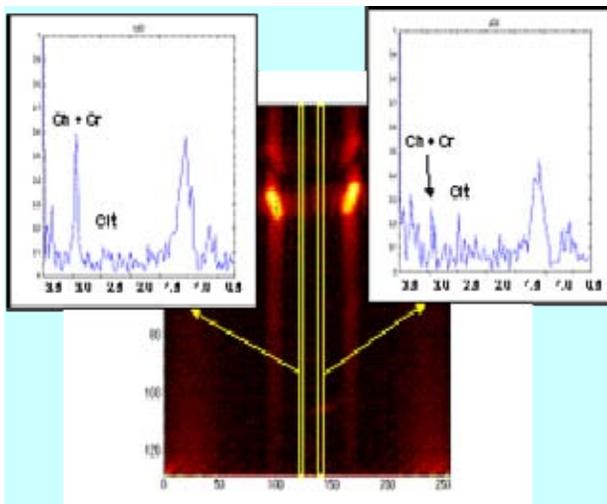


Fig.1 LSEPSI spectra from the prostatic phantom

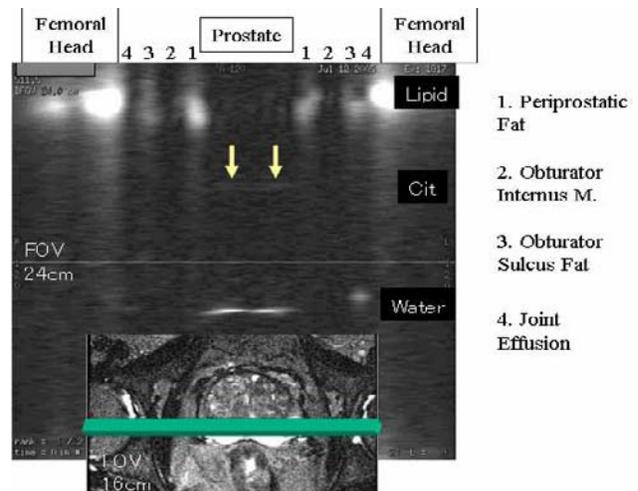


Fig.2 T2-W axial image and 1D CSI column sampled from a 65-y.o. male.