AbstractID: 10117 Title: High Spatial Resolution 1H Magnetic Resonance Spectroscopic Imaging Of Human Breast Cancer At 3T

Purpose:
To demonstrate the feasibility of high spatial resolution 1H magnetic resonance spectroscopic imaging (MRSI) of human breast cancer in a clinical setting at 3T.

Method and Materials:
The pulse sequence consists: outer volume pre-saturation (OVP), independent CHESS pulses for water and lipid suppression, and standard PRESS pulse sequence with an elliptical weighted k-space sampling scheme. Ten patient studies were performed in a 3.0 Tesla whole-body clinical imager (Siemens Trio). A four-channel breast coil (two for each breast) was used for both MRI and MRS. Patients lay prone with their breasts in the coil wells; when possible, gentle breast compression was applied to minimize motion. After global shimming, clinical DCE-MRI was performed which defined the volume of interest for MRSI. Data processing consisted of line broadening, standard fast Fourier transformations, and phasing.

Results:
All ten studies were technically successful. The spectra were acquired with FOV = 120x120mm^2; TR of 1500ms, TE of 80ms, slice thickness of 14mm, and 24x24 elliptical weighted k-space sampling with 2 averages for total acquisition of 11.9minutes. All spectra are good in spectral quality, and Cho signals are clearly visible in the MRI-lesion area, consistent with malignancy, while there was no detectable Cho in the control area. Interestingly, the distribution of Cho signal was non-uniform across the MRI lesion.

Conclusion:
To our knowledge, this is the first 2D/3D MRSI study of human breast cancer with short TE (less than 135ms) at 3T and highest spatial resolution (up to 0.25cm^3) to date. In summary, we have presented a robust technique for high spatial resolution *in vivo* 1H MRSI of human breast cancer that uses the combined advantages of high field, short TE, multi-voxel, and high spatial resolution itself to overcome shimming and lipid suppression difficulty, and demonstrated its potential for routine clinical examination.