AbstractID: 10836 Title: Applications of Two Dimensional MR Spectroscopy in Breast Cancer Detection

**Purpose:** Magnetic Resonance Spectroscopy (MRS) allows noninvasive measurements of the concentrations of different metabolites in human breast in vivo. Two-dimensional correlated spectroscopy (2D COSY) of breast tissues showed that in addition to Choline, several other metabolite ratios are different between malignant tumor and healthy tissues. The purpose of this study is to investigate the possibility of using Choline/Noise ratio (CNR) and other metabolite ratios from 2D COSY of breast tissues to detect breast cancer. **Method and Materials:** A total of 31 women participated in this study, including 13 healthy women, 9 subjects with malignant tumors, 9 women with benign tumors. Each 2D spectrum was acquired from malignant tumor, benign tumor, healthy fatty tissue or healthy glandular tissue. The size of each volume of interest was $1 \times 1 \times 1 cm^3$, the total scan time was 12 minutes. All 2D MRS data files were processed using Felix2000 software package. Each 2D spectrum contains : Water (4.8, 4.8)ppm, Fat (1.4, 1.4)ppm ; Methyl Fat (0.9, 0.9) ppm ; Olefinic Fat (5.4, 5.4)ppm ; Choline (3.3, 3.3)ppm ; UFR(2.1, 5.4)ppm ; UFL (2.9, 5.4) ppm; TGFR (4.3, 5.3)ppm. CNR, 9 diagonal and 9 cross peak metabolite ratios were calculated for each spectrum. CNR and two statistical analysis methods (Fisher's linear discriminate, Classification and regression tree) were used to distinguish between malignant tumors from other breast tissues. **Results**: The CNR and 9 metabolite ratios are significantly different ($p <= 0.05$) between malignant tissue and other breast tissues. Using both statistical analysis methods can get better detection accuracy than using only CNR. **Conclusion:** 2D MR spectroscopy can identify the major metabolites in human breast in vivo. CNR and different metabolite ratios can be used as biomarkers to distinguish between malignant tumors from other breast tissues. This method needs to be evaluated using a large cohort of patients.