

T2-relaxation Time Measurement of Metabolite Peak in Gastric Tissue using ex vivo Proton Magnetic Resonance Spectroscopic Imaging

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Introduction

MRS provides a noninvasive method for observing the biochemical process in vivo and has great potential for the diagnosis and study of cancer and for monitoring cancer therapy[1]. In vivo MRS has been being performed in brain, prostate, cervix, colon, etc. Gastric cancer is one of the most common tumors in Asian countries and Eastern Europe. And its prevalence rate and mortality rate in these regions are higher than those of western countries. In previous study, authors published ex vivo single-voxel MRS study of gastric tissue to find biochemical metabolites peak[2-3]. In this study, we assessed T2-relaxation time and biochemical metabolite map to compare them using ex vivo ¹H multi-voxel MRS.

Methods

MRSI was obtained using resected gastric tissue which had been fixed in a syringe (50ml) filled with saline solution within 4 hours. MRI scans were performed with 1.5T MRI system (Echo speed, General Electronics Co., Milwaukee, U.S.A.). Data were obtained using MV(multi-voxel) PRESS sequence and its parameters were TR/TE=1500/35,144 msec, voxel size=3×3×3mm³, NA=256. Acquired data were analyzed by MV (Multi voxel) MRS processing software developed by authors. T2-relaxation time was calculated from metabolite peak area according to various TEs. T2-relaxation time map was compared with biochemical metabolites map. Hand-made small rf coil with I.D.=10□ and L=15□, shown in Fig 1, was used to improve SNR and reliability of measured data.

Results

MR images of normal (left) and abnormal (right) gastric tissue are shown Fig1. Fig 2 shows multi-voxel spectroscopic images overlayed to MR images of TE=35 ms and TE=144. Spectra obtained from ROI's of normal (top) and abnormal (bottom) gastric tissues were showed in Fig 3. T2-relaxation time map of lipid methylene peak at 1.2 ppm was shown in Fig 4.

Discussion & Conclusion

In this study, lipid methylene peak was highest metabolite peak in gastric tissue. This result is the same as the result of single-voxel MRS[2]. We found that T2-relaxation time map of lipid-methylene peak has similar to biochemical metabolites map. But T2 map of metabolite peak provides somewhat quantitative information compared with biochemical metabolites map.

References

- [1] Frank Trāber, et al. Magn. Reson. Imag vol.19, pp.537-545, 2004.
- [2] C.W. Mun, et al. Magn. Reson. Imag., vol.22, pp.861-870, 2004.
- [3] Cho JY, Choi KS et al. ISMRM, 2003, p. 1478.

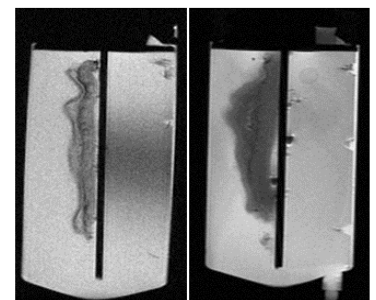


Fig 1. Normal (Left) and Abnormal (Right) Gastric tissue Image

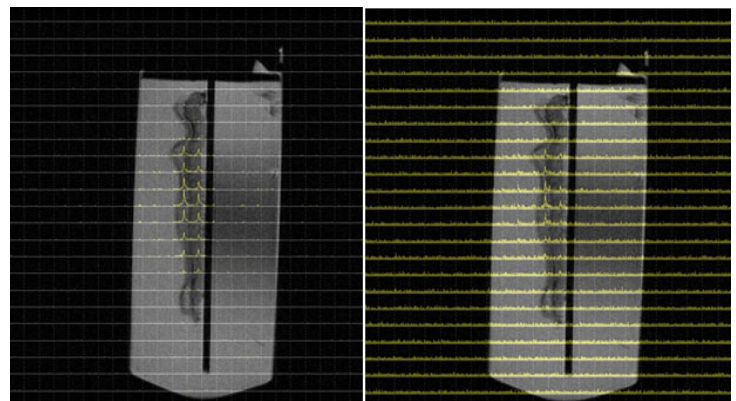


Fig 2. Multi-voxel spectrum of gastric tissue (left : TE=35, right : TE=144)

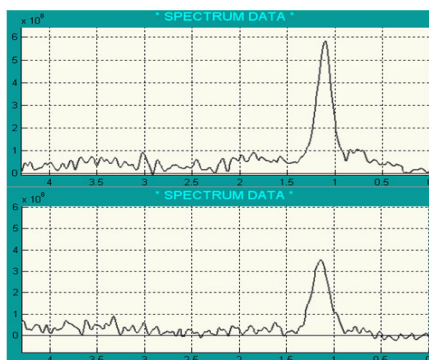


Fig 3. Normal and Abnormal Spectrum
(Top : Normal, Bottom : Abnormal)

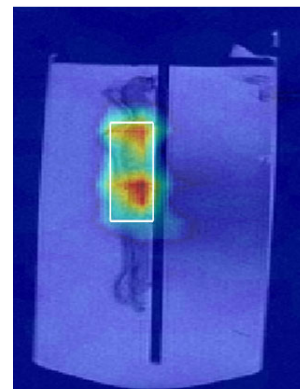


Fig 4. T2 map of Lipid methylene