MRS detected metabolic changes of prostate cancer during endocrine therapy

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Purpose:

Using MRS to detect metabolic changes of prostate cancer during endocrine therapy.

Methods:

22 patients with prostate cancer were included in this study. Their ages ranged from 62 yrs to 77 yrs, mean 70.2 yrs. They all underwent endocrine therapy after they were diagnosed as having prostate cancer according to the results of biopsy. 3D MRS was performed before therapy and after a period of endocrine therapy respectively. Their serum PSA tests, MR examination and clinical examination did not detect any abnormality characteristic of tumor recurrence. The patients were divided into three groups according to the date of MRS examination: group 1, included 4 patients whose MRS examination was performed in 3 months after the beginning of endocrine treatment; there were 12 patients in group 2, they were examined with MRS in the period of 3 months to 20 months during therapy; 6 patients in the group 3 underwent MRS examination after 20 months endocrine therapy. The tumor regions were identified due to the results of sextant biopsy, and 4 to 8 ROIs were prescribed based on the size of the tumor. Every ROI was located on the tumor, containing one voxel, and the ratios of metabolite were measured. Statistical analysis was performed using SPSS 10.0 software package. T test was conducted to compare the metabolic levels before and during endocrine therapy.

Results:

For group 1, there are obvious metabolic peaks in the MRS of prostate cancer before and after therapy, and the ratio of (Cho+Cre)/Cit rise up after several months (<3 months) endocrine therapy. (Table 1, Fig1)

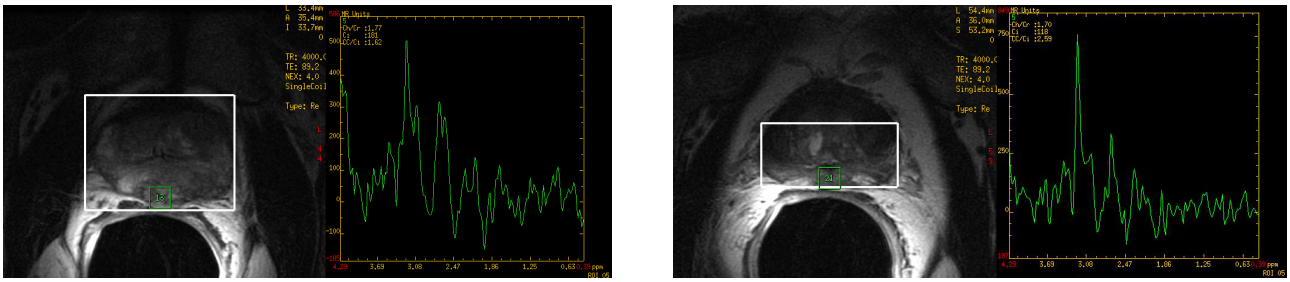
Table 1 Quantitative analysis of (Cho+Cre)/Cit changes during endocrine therapy(<3 months)

	Before endocrine therapy	During endocrine therapy(<3 months)
ROIs	22	22
The mean ratio of (Cho+Cre)/Cit	1.51	2.18
Std. Deviation of (Cho+Cre)/Cit	0.26	0.36
Difference between groups	t=7.03, P<0.05	

The MRS in group 2 could not detect any meaningful peak of Cit after 3 to 20 months endocrine therapy, so the comparison of pretherapy and posttherapy was not able to be performed. Cho peak still could be detected in 10 patients and Lip peak (2.0-2.4ppm) appeared in 6 patients. Only one patient in group 3 had detectable Cho peak in MRS after about 20 months endocrine therapy, and the other four patients exhibited nonmetabolic noise, but apart from these, Lip peak was found in three patients.

Conclusion:

MRS can quantitatively evaluate the metabolic change during endocrine therapy. The patterns of the changes of Cho and Cit in the prostate cancer are different during endocrine therapy. The detection of Lip peak after a long period of endocrine treatment may indicate necrosis of the tumor tissue.



a b

Fig 1 T2WI image and MRS of prostate cancer in peripheral zone. (a) The low T2 signal nodule was detected in peripheral zone, ROI was located on the nodule, the ratio of (Cho+Cre)/Cit was 1.62. (b) After 2 months endocrine therapy, the volume of the low T2 signal nodule deceased, and the ratio of (Cho+Cre)/Cit inceased to 2.59.