Menstrual Cycle Related Magnetic Resonance Spectroscopy of Normal Uterus

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Objective: To investigate the feature of normal uterus' MRS, and its relationship with menstrual cycle.

Materials and methods: Seven generative healthy female volunteers (aged between 24 and 39, mean age 34.5) underwent pelvic MR scanning at three different time point of their menstrual cycle: postmenstrual (immediately after menstruation), ovulatory and premenstrual (just before menstruation) phase. Routine MR images and MRS were acquired. The MRI instrument was a 1.5T scanner (GE Echospeed, Waukesha, USA). MRS was performed with 8 channel phased-array body coil, by the point resolved spectroscopy (PRESS) technique with a long TE (135 msec). To achieve convincingly MRS lines excluded operation factors, ROI was tried to put at the same location and be as large as possible to cover the entire uterine body every time for every case. Set signal to noise ratio (SNR) no less than 2 as the base line of a discernable peak in MRS.

Result: Choline is the only signal that could be detected in every case, while its peak varies according to different point of a menstruate cycle, highest in premenstrual phase, lowest in postmenstrual phase. Lactate and creatine signals could be occasionally detected, most of which were under the set line.

Discussion: As MR spectroscopy more widely used from head to body, to help identify the characteristics of a lesion, its significance in female pelvic diseases are still uncertain and mentioned by few reports. The results of our experiment on normal uterus showed that choline signal is a normal peak, which varies according to different menstrual phase, so it may correlate with the hyperplasia of endometrium. It may be wrong to consider it a sign of malignant tumor when choline peak appears. Though there were several reports about other peaks as lactate and creatine, we are not sure about their existence, for most of these metabolites' SNR is too low to be analyzed convincingly.

Conclusion: Contrary to the significance showed in other part of the body, choline is a normal signal in normal uterus' MRS. Its peak are well related to menstrual cycle, indicating that it maybe derived from endometrium.

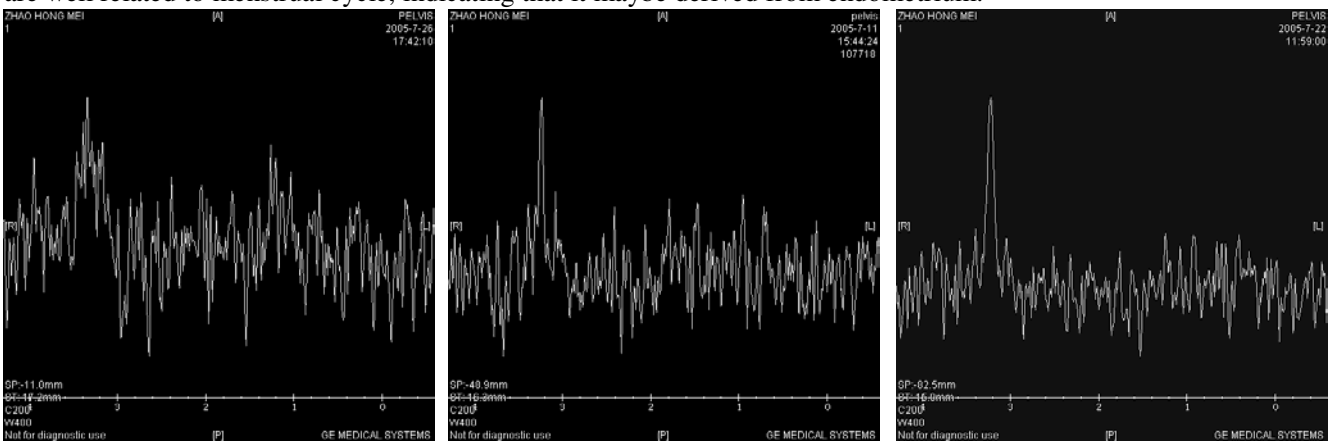

Fig: The above three MRS lines were acquired from the same woman during three phase of her menstrual cycle. Choline signal, assigned at 3.2ppm, can be discerned in every picture. Left: immediately after menstruation, . Middle: at ovulatory phase (the 14-15th). Right: just before menstruation.