

Clinical significance of lipid peak in in-vivo 1H-MR spectroscopy of ovarian thecomas/fibrothecomas

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[Introduction] Gynecologic tumors exhibiting totally or partially low signal intensity on T2-weighted images are suggestive for benign ovarian fibrous tumors such as fibromas, thecomas, Brenner tumors or adenofibromas, or for uterine leiomyomas. Ovarian thecomas are benign ovarian tumors, which belong to the sex cord-stromal tumor group affecting postmenopausal women. Thecoma may secrete estrogen and cause endometrial thickening with genital bleeding. To distinguish ovarian thecomas from other benign fibrous tumors or subserosal leiomyomas is important because estrogenic effect of thecoma may lead to endometrial hyperplasia and endometrial carcinoma. Thecoma is composed of lipid-containing tumor cells resembling theca interna cells with abundant fibrous components. Okajima et al. reported two cases of thecomas of the ovary, in which intratumoral lipid was detected using dual-echo chemical shift magnetic resonance imaging (J Comput Assist Tomogr 34, 2010). However, this finding is not always observed in thecomas undergone chemical shift imaging. 1-H MR spectroscopy (MRS) provides metabolic information, and may add valuable information for the diagnosis. The lipid peak (1.3 ppm) is observed in malignant tumor with necrosis such as uterine cervical cancer (Mahon et al. NMR Biomed 17, 2004; Lyng et al. BMC Cancer 7, 2007), whereas normal tissue and most of benign tumors do not show high lipid peaks associated with necrosis. We hypothesized that high lipid concentration may be observed in ovarian thecomas reflecting abundant intracellular lipid, and may contribute to distinguish thecomas from other benign fibrous tumors and uterine subserosal leiomyomas.

[Materials and Methods] Pathologically diagnosed 7 ovarian thecomas/fibrothecomas, 6 other benign ovarian solid tumors (2 fibromas, 3 adenofibromas and 1 fibromatosis), and 7 subserosal leiomyomas were retrospectively evaluated. All lesions showed totally or partially low signal intensity on T2-weighted images. MRS (PRESS, TR/TE = 2000ms/144ms) was performed in all subjects on a system with a 3T superconducting units (Signa HDx 3T, General Electric, Milwaukee, WI) with 8ch body-array torso coils. Single voxel of interest (VOI=8ml) was placed on solid tumoral components. The lipid peak was visually evaluated by two radiologists. They were blinded to the histopathological and clinical diagnoses of the lesions. The metabolite concentration level was classified into three classes, no, low, and high. Agreement between the two radiologists was reached in consensus after careful individual evaluation.

[Results] High lipid peaks were observed in all 7 thecomas/fibrothecomas, whereas low lipid peak was observed in only one fibroma of 6 ovarian tumors. The other 5 ovarian tumors and all 7 leiomyomas showed no lipid peak. The high lipid peaks in thecomas/fibrothecomas are possibly due to abundant intracellular lipid contents, and considered as specific metabolite concentration for thecomas/fibrothecomas. Low lipid peak was observed in one fibroma. The cause of this peak is not clear, however, fibromas may often contain thecomatous components and possibly be able to show low lipid peak.

[Conclusions] We conclude that the presence of high lipid peak may be specific for thecomas/fibrothecomas reflecting abundant intracellular lipid contents, and useful for the differential diagnosis of gynecologic tumors exhibiting low signal intensity on T2-weighted images.

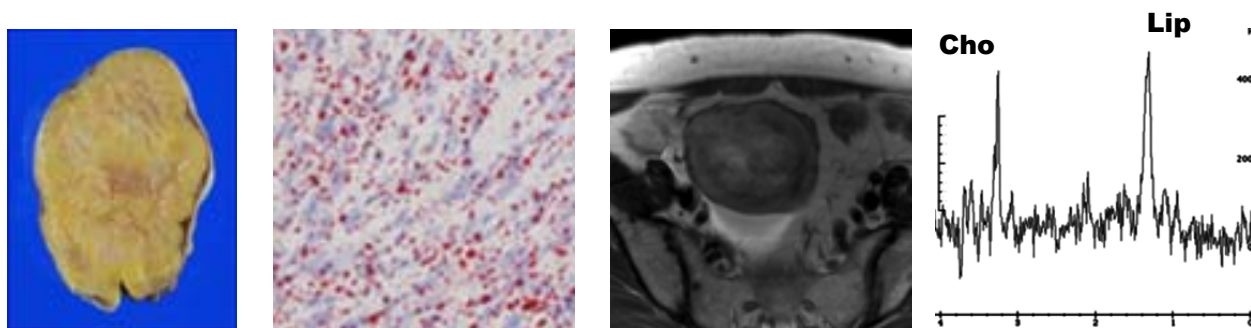


Fig. 1: Cut surface of thecoma shows yellowish color reflecting abundant intracellular lipid contents.

Fig. 2: Photomicrograph of the specimen with fat stain (oil red) demonstrates the tumor cells containing abundant intracellular lipid contents.

Fig. 3: Thecoma shows low to slight high intensity on T2-weighted image, and bimodal peaks of choline and lipid.

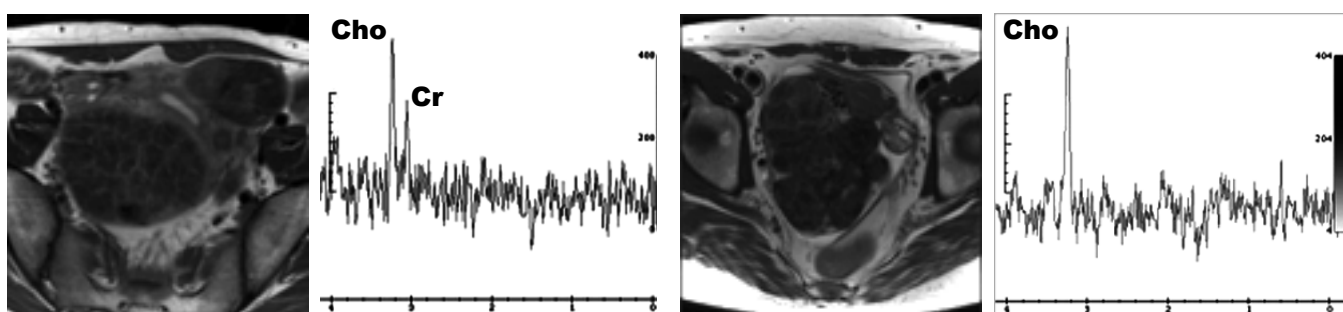


Fig. 4: Subserosal uterine leiomyoma shows low intensity on T2-weighted image, and bimodal peaks of choline and creatine with no lipid peak.

Fig. 5: Fibroma shows low intensity on T2-weighted image, and single choline peak with no lipid peak.