Hypointense Ovarian Lesions on T2-WI: MR–Pathologic Correlation
Rare Pathologies, which are NOT Fibromas, Thecomas or Endometrial Cysts

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[Introduction]
Hypointense lesions of the ovary on T2-WI of MRI are unusual findings and form a special diagnostic category. These lesions have some histopathologic characteristics which shorten the T2 relaxation time of tissues and help to make differential diagnosis. Dense fibrous stromal proliferation in the stromal tumors such as fibromas and thecomas may cause hypointensity of the solid tumoral component. Intracystic hemorrhage may cause hypointensity of cystic lesions such as endometrial cysts. Other uncommon or rare ovarian pathologies which may show hypointensity are presented with pathologic correlation in this study.

[Materials and methods]
Surgically proven ovarian pathologies: seven solid masses or solid components of solid and cystic masses (one sclerosing stromal tumor, two cystadenofibromas, one Krukenberg's tumor, one mucinous cystadenocarcinoma, one clear cell carcinoma and one choriocarcinoma) and cystic component of a mature cystic teratoma, which showed very hypointensity (equal to skeletal muscle) or relative hypointensity (equal to myometrium of the uterus) on T2-WI of the presurgical MRI were reviewed. MR images were obtained with 0.5-1.5 Tesla superconducting systems. The spin echo and/or fast spin echo technique were used for T1-WI and T2-WI. T1-WI were obtained before and after administration of Gd-DTPA. Sagittal and axial images were obtained on all sequences.

[Results]
The solid components of cystadenofibromas showed very low intensity on T2-WI and very high intensity small areas were scattered within them. After the administration of Gd-DTPA, solid components were enhanced and small unenhanced areas were better displayed. These findings just like a black sponge reflected dense collagenous stromal proliferations with scattered small glandular to cystic areas and were considered to be the characteristics of the tumor (Fig. 1).

T2 shortening due to dense collagenous tissue was observed in the Krukenberg's tumor with reactive stromal proliferation stimulated by the signet ring tumor cells, and in the sclerosing stromal tumor with primary neoplastic stromal proliferation. Mucinous materials in the Krukenberg's tumor and edematous change and cyst formation in the both tumors made the signal intensity of the tumors inhomogeneous and complicated.

Mucinous contents within the meshes of the papillary growing tumor cells in the mucinous cystadenocarcinoma (Fig. 2), coagulated necrotic tissues within the small cystic spaces formed by the delicate fibrous trabeculae supporting the tumor cells in the clear cell carcinoma (Fig. 3), and coagulated necrotic and hemorrhagic background in which syncytiotumor cells are scattered cause the hypointensity of the solid tumoral components.

Preoperative differential diagnosis from stromal tumors was difficult in these rare cases on MRI, elevation of tumor markers and other clinical symptoms were helpful to suggest the possibility of malignances.

The content of the mature cystic teratoma which showed very low intensity on T2-WI was brown, muddy liquid which is similar to the contents of the endometrial cysts. Histopathologic examination revealed endometrial component within the cyst and the cause of hypointensity is considered to be the same mechanism of shading observed in the endometrial cysts. Detection of small amount of fat within the cyst was the clue for the preoperative diagnosis in this case.

[Conclusion]
A black sponge like appearance of the solid component of the cystadenofibroma on T2-WI is considered as the characteristic findings of this tumor. Dense fibrous stromal proliferation in the Krukenberg's tumor and the sclerosing stromal tumor, mucinous material in the cystadenocarcinoma, and coagulated necrosis within viable neoplastic tissue in the clear cell carcinoma and the choriocarcinoma, may cause hypointensity on T2-WI.