

ORAL PRESENTATION

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# Screening MRI-based prediction model for therapeutic response of MR-HIFU ablation of uterine fibroids

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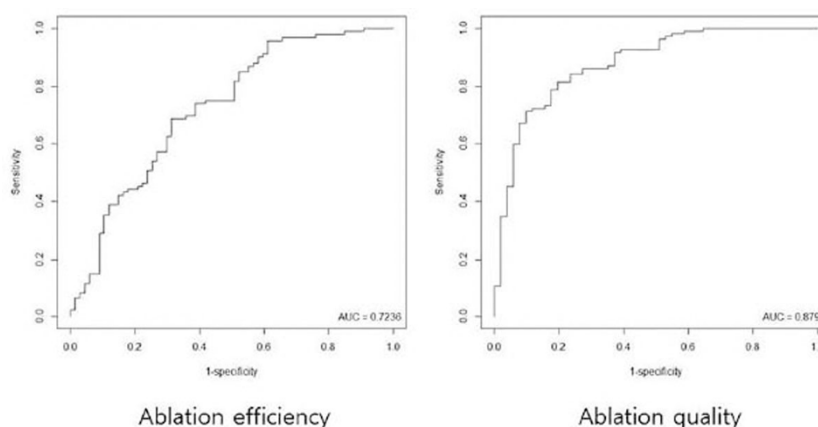
## Background/introduction

With regards to MR-HIFU ablation of uterine fibroids, there have been no screening MR criteria that comprehensively consider multiple influencing factors. The aims of this study was to generate screening MRI-based prediction model for therapeutic responses of MR-guided high-intensity focused ultrasound (MR-HIFU) ablation of uterine fibroids comprehensively considering multiple influencing factors.

## Methods

A total of 160 symptomatic uterine fibroids (diameter 8.3cm, range 3.1-15.0cm) in 112 women (age 43.3, range 25-55) who were treated with MR-HIFU ablation were retrospectively analyzed. The following three parameters

of screening MRI were evaluated. 1) Subcutaneous fat was measured as a thickness of the most compressed point (mm) on prone position. 2) Relative peak enhancement (%) was calculated based on time-signal intensity curve analysis of fibroid in perfusion MRI (100 dynamics, 3s time resolution), in which 0% refers the same signal intensity as in precontrast image. 3) Signal intensity was assessed as a ratio of T2 signal intensity of uterine fibroids to that of skeletal muscle. Those parameters were used to generate prediction models with regards to ablation efficiency (i.e., non-perfused volume/treatment cell volume) and ablation quality (grade 1~5, from poor to excellent), respectively, using generalized estimating equation (GEE) analysis. Then, cut-off values for successful treatment (ablation efficiency >1.0; ablation



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quality grade 4 or 5) were determined based on receiver operating characteristic (ROC) curve analyses.

## Results and conclusions

GEE analyses produced the models of “ $y_1 = 2.2637 - 0.0415x_1 - 0.0011x_2 - 0.0772x_3$ ” and “ $y_2 = 6.8148 - 0.1070x_1 - 0.0050x_2 - 0.2163x_3$ ”, where  $y_1$ =ablation efficiency,  $y_2$ =ablation quality,  $x_1$ =subcutaneous fat thickness,  $x_2$ =relative peak enhancement, and  $x_3$ =T2 signal intensity ratio (p-values for  $x_1$ , 0.0068 and <0.0001; for  $x_2$ , 0.1952 and 0.0001; for  $x_3$ , <0.0001 and <0.0001, respectively). Cut-off values for successful treatments based on ROC curve analyses turned out to be 1.312 for of ablation efficiency (AUC, .7236; sensitivity, .6882; specificity, .6866) and 4.019 for ablation quality (AUC, .8794; sensitivity, .7156; specificity, .9020).

Conclusion: Simple equation models to predict therapeutic responses of MR-HIFU ablation of uterine fibroids in terms of ablation efficiency and quality were generated, which are easily applicable to screening MRI.

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