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MR Assessment of Cardiac Function and Metabolism in Rat Models: A Feasibility Study

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목적 :

We evaluated the feasibility of MRI for the evaluation of cardiac function and metabolism in rat model.

대상 및 방법 :

Twenty Fisher rats underwent ECG-gated 1.5 T MRI for the evaluation of systolicand diastolic cardiac function at the age of 2 and 5 month. We measured the parameter of systolic cardiac function (EF, LVEDV, LVESV) from cine MRI. Diastolic function was also evaluated using VENC-MRI, and E/A ratio was obtained. Postmortem examination was done for measurement of left ventricular weight, and it was compared with MRI data. Cardiac MR spectroscopy was performed for the evaluation of metabolism using 4.7T MRI.

결과 :

For the evaluation of systolic function, there was no significant difference in ejection fraction [71.4 ± 9.4 vs 71.8 ± 6.3 %], LVEDV [0.205 ± 0.04 vs 0.238 ± 0.02ml], LVESV [0.056 ± 0.02 vs 0.067 ±0.01ml] between 2 month and 5 month age. Heart rate was significantly reduced [378.0 ± 38.5 vs 348.2 ± 33.5ml] in the 2 month age. The ratio of E/Awave was significantly greater in the 6 month age. VENC-MRI showed increased diastolic peak E velocity [60.9 ± 25.2 vs 69.1 ± 29.9 cm/sec], $P < 0.05$] in 5 month age, and no significant difference of peak A velocity [56.0 ± 24.7 vs 56.6 ± 18.6 cm/sec]. This resulted in a significantly increased E/A ratio [1.16 ± 0.37 vs 1.30 ± 0.66, $P < 0.05$] in 5 month age. There was no significant difference of LV mass between MRI and postmortem exam [615.2 ± 46.5 vs 647.6 ± 48.9 cm/sec].

결론 :

MRI is feasible for the evaluation of cardiac function and metabolism in rat model.