# The assessment of tumoral necrosis in rat tumor model using dynamic T1/T2* gradient dual echo sequence with Gd-DTPA and Gadomer-17 as a MR contrast agent

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목적 : To test the feasibility of rBF and rBVin the assessment of R004 sarcomas of the rat and to compare the results obtained by using Gd-DTPA and Gadomer-17 as a MR contrast agent, on the basis of the histological findings of tumor necrosis.

대상 및 방법 : R004 sarcoma cells with higher growth rate were injected in the thigh of twelve Sprague-Dawley rats (n=12). After the tumor size had reached 2 cm, they were subjected to dynamic MR imaging by using two contrast agents, Gd-DTPA (n=7; 0.2 mmol/kg) or Gadomer-17 (n=5; 0.05 mmol/kg). The MRI study protocol consisted of routine sequences and single slice dynamic T1/T2* gradient dual echo sequence (1000 phases, temporal resolution=1.28 sec). The necrosis of tumors was assessed on T2-weighted and fat suppressed postcontrast T1-weighted images, which were confirmed by gross examination and H& E stain using pathological specimen. By using dynamic T1/T2* gradient dual echo sequence, both T2* shortening and T1 shortening effects were simultaneously obtained after a single bolus injection. The correction of R2* was obtained by the separations of T1 and T2* values in PC work station. The corrected R2*-curve was plotted as a function of time using whole tumor ROI method. rBF and rBV were calculated from corrected R2*-curves using gamma variate method. The dependency of rBF and rBV on the tumor necrosis and contrast agent was assessed.

결과 : MR anatomic imaging and pathologic specimen confirmed the solid masses without necrosis (n=3) and with necrosis (n=4) in Gd-DTPA injected group and themasses without necrosis (n=3) and with necrosis (n=2) in Gadomer-17 injected group. Corrected R2*-curves at the first pass of Gd-DTPA and Gadomer-17 in R004 sarcomas showed a good fitting with gamma variate function while it failed to apply gamma variate fitting for the uncorrected R2* curve. T1 shortening effect, produced from physiologic and pathologic contrast leakage, could be eliminated. Compared to solid non-necrotic area, the decrease of rBF and rBV in necrotic area showed 59.2%, 69.2% in the Gd-DTPA group and 78.8%, 86.7% in Gadomer-17 group, respectively.

결론 : The method to correct R2* using simultaneousT1/T2* gradient dual echo sequence could eliminate T1 shortening effect, being produced by physiologic and pathologic contrast leakage. The values of rBF and rBV extracted from corrected R2*-curves may be useful as in vivo marker for monitoring the tumoral necrosis