

Poster PE-4

Observation of Fast Response of MR Signal to Neuronal Activity: A Snail Ganglia Study

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목적 :

We observe the response of magnetic resonance signal to neuronal activity in the dissected snail ganglia to investigate faster responding components than the BOLD component.

대상 및 방법 :

In this study, we used dissected snail ganglia which have nonmagnetic hemocyanin as oxygen carrying protein (Park *et al* 2004). Hemocyanin has copper ions to bind oxygens instead of iron ions in the case of hemoglobin. To investigate the fast responding components, we used a volume selection pulse sequence, rather than an imaging pulse sequence. Targeting the volume of interest to the visceral ganglia region, we observed the MRI signal intensity with and without applying the electrical stimulation.

결과 :

The average MRI signal decrease due to the electrical stimulation is about 2.97 ± 1.10 % over the whole period. For further confirmation of the MRI signal dependence on the neuronal activity, we added 1 cc of 2 M $MgCl_2$ solution to the dish containing the snail ganglia. We observed that the neuronal activity was completely blocked by the Mg^{++} ions. When we blocked the neuronal activity, the volume selection MRI signal increased about 5.53 ± 4.84 %.

결론 :

With applying electrical stimulation to the dissected snail ganglia, we have observed the dependence of the MRI signal intensity on the neuronal activity. We expect that the snail ganglia model with the electrical stimulation can be used in quantitative studies of direct MRI measurement of neuronal activities with faster response time than the BOLD effect.