

## 식의약품의 효능평가 및 기능성소재개발센터(RIC)

### 제 2011-1 차 세미나 개최

【주제】 Control of theta activity by operant conditioning in rats

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#### 【초록】

Neurofeedback is a technique that helps individual control their brain activity through electroencephalographic (EEG) operant conditioning. Although its effects on the subjective state and on several neuropsychiatric disorders have been reported, it is yet to be uncovered whether control of a specific EEG is possible during conditioning. Therefore, we examined changes of theta activity by this technique in rats.

Sixteen Sprague-Dawley male rats (300-350 g body weight at the surgery) were used. The parietal EEG was monitored before (Pre), during (Train) and after (Post) operant conditioning training, which was conducted over ten consecutive days. Pairs of rats were assigned to either a control or experimental group. The experimental group received electrical stimulation of the medial forebrain bundle (MFB) when the theta r.m.s. (4-8 Hz) of 250-ms signals decreased below 50% of its Pre value while the control group received MFB stimulation yoked to the experimental group. The MFB stimulation increased the theta activity, which was weaker in the experimental than the control group. The number of MFB stimuli increased within sessions and across sessions. The theta r.m.s. of 5-min bin signals gradually decreased within sessions in the experimental group, however no changes were observed across sessions. No changes were observed in the control group. There were significant differences between two groups from the second to the tenth session. In contrast, the alpha r.m.s. of 5-min bin signals increased within sessions in the experimental group, with no changes across sessions in either group. The amplitude of the EEG spectral peak changed similarly to that of the theta r.m.s. However, its frequency increased during training in both groups at the first session but only in the experimental group at the tenth session.

These results showed that rats could learn to control their EEG theta activity by shifting the spectral peak to the higher frequency.

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