Magnetic stimulation ameliorates pain-emotion via activation of descending inhibitory system: Similar effect of antidepressant drugs

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Depression-like behaviour is often complicated by chronic pain. A lack of 5-HT and/or BDNF can result in pain-depression. In fact, antidepressants imipramine (IMI) increases 5-HT along with BDNF mRNA. Moreover, magnetic stimulation (MS) can evoke 5-HT release of spinal cord. However, the induction of BDNF with MS has not been established. We aimed to investigate depression with chronic pain modulates BDNF synthesis and to evaluate the effect of MS with induction of BDNF comparing from IMI. A chronic constriction injury (CCI) was constructed in S-D rats. MS was consequently exposed to skin located injury site. In other rats, IMI was administered after CCI. Hyperalgesia was assessed by paw withdrawal latency (PWL) using plantar test. The depression was used forced swim test. Anterior cingulate cortex (ACC) and rostral ventromedial medulla (RVM) samples for 5-HT and BDNF (ELISA) contents and also BDNF mRNA expression (RT-PCR) were removed. CCI rats showed a significant reduction in PWL of the injured leg to thermal stimuli with time. Both MS and IMI-treated rats reduced hyperalgesia and an increased immobility time that were reversed by anti-BDNF antibody and 5, 7-DHT. Analgesia effects of MS were antagonized by naloxone. MS was also reduced decrease in BDNF mRNA. This study clearly shows that a lack of 5-HT coupled with BDNF in the descending inhibitory system leads pain-emotion. MS ameliorates this symptom by activating 5-HTergic neurons by spinal microdialysis associated with induction of BDNF. Moreover, these effects were similar actions to those of antidepressant, IMI, which suggests that MS activates 5-HTergic neurons concurrent with an interaction of BDNF.

Biography
T Furuta has completed his MS at Yamaguchi University and is employed at Major Research Institute. He is an expert of Neurobehavior and protein analysis.

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