

**Promotion of muscle activities as the countermeasure for prevention  
of the deterioration of brain function**

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**【Outline of survey】**

It is generally stated that lack of physical exercise or chronic bedrest causes a detrimental effect on the brain function, although clear scientific evidences are not necessarily available. However, significant inhibition of protein expression in brain was noted after chronic gravitational unloading of hindlimbs in growing rats (Ohira et al., Space Utilization Symposium, Tokyo, 2006). It is suggested that decreased muscle activities, caused by growth inhibition, aging, accident, or disease, may cause detrimental effects on the characteristics of brain. Therefore, the current study was planned to investigate the mechanism responsible for 1) muscle regeneration and 2) deterioration of brain function and/or protein expression caused by decreased physical activity (lack of exercise), and further 3) whether the regeneration of brain function is possible by promotion of muscle activities.

**【Expected results】**

Application of mechanical and/or chemical stimuli may stimulate the regeneration of muscle. And implantation of activated satellite cells and/or stem cells may play a significant role in the regeneration of muscle. Further, promotion of muscle activities may cause a beneficial effect for activation of brain function.

**【References by the principal investigator】**

- Wang, X.D., F. Kawano, Y. Matsuoka, K. Fukunaga, M. Terada, M. Sudoh, A. Ishihara, and Y. Ohira. Mechanical load-dependent regulation of satellite cell and fiber size in rat soleus muscle. *Am. J. Physiol. Cell Physiol.* 290: C981-C989, 2006.
- Kawano, F., Y. Matsuoka, Y. Oke, Y. Higo, M. Terada, X.D. Wang, N. Nakai, H. Fukuda, S.Imajoh-Ohmi, and Y. Ohira. Role(s) of nucleoli, phosphorylation of ribosomal protein S6 and/or HSP27 in the regulation of muscle mass. *Am. J. Physiol. Cell Physiol.*, in press.

**【Term of project】** FY2007—2011

**【Budget allocation】** 21,000,000 yen

(2007 direct cost)

**【Homepage address】**

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