

Changes in feeding behavior after high gravity loading in orchidectomized and ovariectomized rats

M. Kimoto¹, Y. Kumei², J.L. Zeredo³, and K. Toda^{1,3}

¹Physiological Laboratory, Japan Women's University, kimoto@fc.jwu.ac.jp, ²Section of Biochemistry, Tokyo Medical and Dental University, ³Section of Integrative Sensory Physiology, Nagasaki University, Japan

We previously reported that feeding behavior is modulated by stressful high gravity loading [1-3]. In these cases, gender difference is observed, suggesting that sex hormones are highly concerned with changes in feeding behavior after gravity stimulation. In the present study, we investigated the role of sex hormones on the changes in feeding behavior under the condition of high gravity loading. Wistar rats received orchidectomy or ovariectomy at the 53rd day after birth. Rats were exposed to 2G on a centrifuge for 10 min everyday during the period from the 63rd through 92nd day. In male rats, body weight gain was suppressed immediately after orchidectomy. The body weight gain was deteriorated by 2G loading in the orchidectomized rats worse than in the non-orchidectomized rats. The deterioration of body weight gain was initiated in the orchidectomized rats on the 14th day, whereas it was initiated in the non-orchidectomized rats on the 18th day following 2G loading. On the 92nd postnatal day when 2G loading was discontinued, the serum corticosterone levels in either orchidectomized or non-orchidectomized rats was significantly higher than the respective non-loading controls. In female rats, body weight gain was significantly potentiated on and after the 14th day following ovariectomy. However, body weight gain was deteriorated on and after the 13th day following 2G loading in ovariectomized rats. The serum corticosterone level was not influenced by gravity loading both in the ovariectomized and non-ovariectomized rats. These results show that 1) sex hormone is involved in body weight control: increasing effects

in male and decreasing effects in female, 2) the resistance against high gravity stress is more potent in female than in male, 3) the female hormone is critical for anti-stress behavior in the body weight control system.

This study was supported by a Grant-in-Aid for Scientific Research from the Japan Society for the Promotion of Science to M.Kimoto (No.18500630, 2006-2007). We thank K.Iwasaki, H. Okubo, A. Sakabe, Y. Sakitani, T. Nakajima, C.Yanagisawa and M. Yamashita for analyzing data. The experimental procedures were in agreement with the Animal Care Standards of Nagasaki University, and had the approval of its Animal Welfare Committee (no.0507050445).

References:

1. Kimoto M., Amano R., Ishikawa R., Ooe Y., Shimura M., Niinuma K., Hirakawa H., Kumei Y., Toda K. (2007) Effects of stress applied at the Late stage of pregnancy on the feeding behavior in the rat. *Cell Stress & Chaperons*, **12**, 440-441.
2. Kimoto M., Takase S., Toda K., Kumei Y. (2007) Chemical sensation modulated by high gravity Stress at different growth stage in rats. *Gravity Space Biol.*, **21**, 34-34.
3. Kimoto M., Takase S., Shomura E., A. Suzuki A., Zeredo J.L., Sasaki-Zeredo K.M., Kumei Y., Toda K. (2005) High gravity modifies feed efficiencies and chemical sensation in rats. *Autonomic Neurosci.*, **110**, 118-118.