1A-12 Voluntary wheel running prolongs the half-life of circulating IgG in mice through IgG protection in the liver

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Purpose: Production of antibodies appears to be stimulated by exercise. We previously demonstrated that voluntary wheel running exercise prolongs IgG half-life in the circulating blood of mice. However, the mechanisms underlying this prolonged IgG half-life are uncertain. Prolonged IgG half-life is important for up-regulating serum antibody levels in voluntary exercised mice. **Methods:** This experiment was designed to investigate alteration of biodistribution, when exogenously injected ^{125}I labeled mouse IgG by voluntary wheel running exercise in mice. Mice were killed 2 h after intraperitoneal injection of 1.2 mg IgG labeled with ^{125}I (60 kBq). Kidney, liver, spleen, heart, lungs, bone (femur) and bladder were collected and gamma waves counted. The counts of radioactivity (cpm) were converted into percent injected dose (%ID) and expressed as mean±SE. **Results and Discussion:** Significantly large amounts of the ^{125}I-IgG were distributed in the liver of exercised mice at 2 h (EX=6.09± 0.2 %ID vs. Non-EX=2.79±0.4 %ID, $p<0.05$ by *t*-test) and 24 h after injection (EX=2.63±0.1 %ID vs. Non-EX=0.73± 0.04 %ID, $p<0.05$ by *t*-test). This observation indicates the accelerated trapping of exogenous ^{125}I-IgG in the livers of voluntary exercised mice is effective for prolonging the half-life IgGs. This may be because intact IgGs are protected from proteinases in the liver.

Key words: voluntary wheel running exercise, Liver, Antibody half-life, mouse

1A-14 The effect of exercise and psychological stress on bone mass and the participation of ER alpha gene polymorphisms

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Purpose: Bone mass is not only affected by environment factors, it is also influenced by gene polymorphism. In this study, we investigated the participation of ER alpha gene polymorphism and the effects of exercise and stress subjective symptoms on bone mass.

Methods: The subjects were 700 Japanese men and women who were divided into 4 groups : 1. people who exercise who feel stress, 2. People who exercise who don't feel stress, 3. people who don't exercise who feel stress, 4. people who don't exercise who don't feel stress. Bone mass was evaluated using the calcaneus osteo sono assessment index (OSI) and Z score, measured by quantitative ultrasound densitometry. Genomic DNA was extracted from buccal cells. The *XbaI* and *PvuII* ER alpha Polymorphism were analyzed by the PCR-RFLP.

Results: In the two exercise groups, there was no significant difference between the stress, and bone mass. However in the two non-exercise groups, the subjects with stress showed significantly lower bone mass ($P<0.05$). Furthermore, these significant differences were not seen by classification of ER polymorphisms. Therefore, it is suggested that stress is an independent which causes a fall in bone mass factor which is not influenced of ER *PvuII XbaI* polymorphisms.

Conclusions: The subjects with stress whose bone mass tend to fall hereditarily can prevent a loss in bone mass with exercise.

Key words: bone, exercise, stress, polymorphism, ER