detoxification, significantly increased in END group, and similar trend was observed in HIIT. AMP is deaminated to IMP during the resynthesis of ATP, which is catalyzed by AMP deaminase (AMPD). AMPD expression did not alter in both trained groups. Rhbg and Rhcg are the mammalian ammonium transporter family. There were no changes in Rhbg and Rhcg protein level by swimming training. Discussion 6 weeks swimming training, both endurance and high intensity interval, enhanced exercise performance and depressed blood ammonia level. These results suggest that suppression of ammonia during exercise may participate progression of exercise performance. But, ammonia metabolism related factor, except for GS protein, did not alter by swimming training. We could not find the differences between skeletal muscle types. Since critical factor contributing ammonia metabolism could not be identified in this study, further researches are needed to clarify the mechanism of ammonia metabolism during physical exercise. Contact takemasa@taiiku.tsukuba.ac.jp

OXIDATIVE STRESS AND AGING: THE RELATIVE ROLE OF REGULAR EXERCISE

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The oxidative stress theory of aging states that an imbalance between oxidants, antioxidant and repair cell mechanisms, in favor of the primer one, should promote degenerative processes accelerating aging. However, several behaviors that improve health and possibly decrease the rate of aging also favor oxidative stress. Exercise is one of these factors but in what concerns to human studies, there are some inconsistencies in oxidative stress results, though functionality and health parameters usually improve. These inconsistencies might result from methodological constrains related with the blood sample collection, which may have occurred inside the acute physiological response to exercise period. Having this in mind, the main aim of this study was to verify the effects of an exercise program on oxidative stress parameters in human lymphocyte and plasma. Methods Forty five males and fifty two women over 40 years of age (from 40 to 82 yrs) engaged in an exercise program that lasted for 16 weeks (3 sessions of 60-90 min per week on non-consecutive days of aerobic and resistance training). DNA damage was quantified by comet assay with FPG enzyme. Lipid peroxidation was addressed through TBARs and total antioxidant capacity was measured by ABTS method. Blood sample collection occurred in fasting condition, being the subjects advised not to perform any intense activity in the previous 72 hours. An ANOVA with repeated measures was used to analyze differences between groups, and the effect of exercise. Significant level was set at $p<0.05$. Results Our results revealed that exercise program induced significant lower DNA damage in both men and women, and a tendency to decrease TBARs concentration. Total antioxidant capacity increased significantly in women but not in men. All the subjects increased their functional capacity with the exercise program. Discussion Our results pointed to the importance of exercise in oxidative damage regulation, decreasing damage parameters and increasing preventive mechanisms of antioxidant capacity. This study was supported by Foundation of Science and Technology, project PTDC/DES/121575/2010.

WNT INDUCES SATELLITE CELL ACTIVATION IN ADULT AND AGED MICE AFTER VOLUNTARY WHEEL RUNNING

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Introduction Muscle represents an abundant, accessible, and replenishable source of adult stem cells. Skeletal muscle-derived stem cells, called satellite cells, play essential roles in regeneration after muscle injury in adult skeletal muscle (Fujimaki et al., 2013). Although the molecular mechanism of muscle regeneration process after an injury has been extensively investigated (Charge and Rudnicki, 2004), the regulation of satellite cells under the steady state during the adult stage, including the reaction to exercise stimuli, is relatively unknown. Here, we investigated the effects of exercise in adult satellite cell conversion focusing on Wnt signaling, which plays important roles in lineage control during embryonic myogenesis and postnatal development. Methods Male C57BL/6J mice ages 8–12 weeks (adult) and 24 months (aged) were used and divided into control group and runner group in this study. Runner group mice were housed individually in cages equipped with a running wheel and performed voluntary wheel running for 4 weeks. Control group mice were housed in cages without a running wheel. After 4 weeks of exercise, mice were sacrificed and the gastrocnemius muscles were dissected out quickly from each mouse for subsequent analyses. Results & Discussion We demonstrated that voluntary wheel running exercise, which was a low-stress exercise, converted satellite cells to activated state due to accelerated Wnt signaling. Our analyses showed that upregulated canonical Wnt/β-catenin signaling directly modulated chromatin structures of both MyoD and Myf5 genes, resulting in increases in the mRNA expression of Myf5 and MyoD and the number of proliferative Pax7(+)Myf5(+) and Pax7(+)MyoD(+) cells in skeletal muscle. The effect of Wnt signaling on the activation of satellite cells, rather than Wnt-mediated fibrosis, was observed in both adult and aged mice. The association of β-catenin, TCF, and LEF transcription factors of multiple TCF/LEF regulatory elements, conserved in mouse, rat, and human species, with the promoters of both the Myf5 and MyoD genes drives the de novo myogenesis in satellite cells even in aged muscle. These results indicate that exercise-stimulated extracellular Wnts play a critical role in the regulation of satellite cells in adult and aged skeletal muscle. References Charge, S. B., and Rudnicki, M. A. (2004). Physiological reviews, 84, 209-238. Fujimaki, S., Machida, M., Hidaka, R., Asashima, M., Takemasa, T., and Kuwabara, T. (2013). Stem cells int, 2013, 420164. Contact Shin Fujimaki (pointguard0526.3s@gmail.com)

MOLECULAR ADAPTATIONS IN MOUSE SKELETAL MUSCLE FOLLOWING ECCENTRICALLY VERSUS CONCENTRICALLY BIASED TRAINING

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Introduction The molecular adaptations specifically induced by different muscle contraction types have only been partially elucidated. We previously demonstrated that eccentric contractions in human quadriceps elicited proteome modifications that suggest a muscle fiber typology adaptation (Hody et al. 2011). We address this question in a more systematic way by examining the effects of different running modes on the mouse muscle proteome and the muscle fiber typology on the whole quadriceps. Methods Male adult mice (C57BL6) were randomly divided into downhill running (DHR, quadricipital eccentrically biased contractions), uphill running (UHR, quadricipital concentrically biased contractions) and untrained control (CONT) groups. Running groups performed five training sessions on an inclined treadmill for 75 to 135 min/day and the quadriceps muscles were dissected 96 hours after the last session. Muscle protein extracts of DHR and UHR groups (n=4/group) were subjected to a 2D-DIGE analysis coupled with mass spectrometry. The assessment of fiber type, size and number was performed on the rectus femoris of the three groups (n=6/group) using myosin heavy chain (MHC) immunofluorescence.