P3PM-1-11

VASOPRESSIN V1A RECEPTOR POLYMORPHISM AND HIGH-INTENSITY INTERVAL WALKING TRAINING EFFECTS IN MIDDLE-AGED AND OLDER PEOPLE

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In this study, we assessed whether C/T(Phe136Phe) polymorphism of vasopressin V1a receptor altered the indices of life-style associated diseases in middle-aged and older men (68 ±6 (SD) yr) and, if so, whether it also altered the effects of high-intensity interval walking training (IWT) on them. CC (n=21), CT (n=62), and TT (n=31) men performed IWT; 5 sets of 3-min fast walking at ≥70% peak aerobic capacity (VO_{2peak}) and 3-min slow walking at 40% VO_{2peak}/day, ≥4 days/wk, for 5 mos. Before IWT, body mass index (BMI) and diastolic blood pressure (DBP) in TT were 25.0±0.4 (SE) kg/m^2 and 85±1 mmHg, higher than 23.4±0.5 kg/m^2 and 79±2 mmHg in CC, respectively ($P<0.05$), whereas the differences disappeared after IWT ($P>0.1$) despite similar training achievement between the groups ($P>0.1$). After IWT, BMI decreased by 1.1±0.2 kg/m^2 and DBP by 7±1 mmHg in TT, more than 0.5±0.1 kg/m^2 and 1±2 mmHg in CC, respectively ($P<0.05$), with greater decreases in blood LDL and total cholesterol in TT than CC ($P<0.05$). Thus, the C/T polymorphism of V1a receptor altered the indices of life-style associated diseases and the effects of IWT on them.

P3PM-1-12

THE CHANGES IN BODY FLUID CONTENT OF JAPANESE ADULT WITH AGING

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Background: Maintenance of physical fitness in elderly is one of the key public health targets in Japan because of its rapid progression to become ageing society. Decrease of muscular power is attributed to decrease of muscle volume. However, the changes in Japanese muscle volume through their lifetime has not been clarified yet. The aim of this study was to examine the changes in body fluid content that reflects muscle mass in Japanese adults. Material and Methods: 1135 Japanese (573 males, aged 15-80 yo; 562 females, aged 15-75 yo) participated in the present study. Body weight (BW), intracellular (ICFV) and extracellular (ECFV) fluid volumes, arm (AFV), trunk (TFV) and leg (LFV) fluid volumes were measured by SMFBI analysis. Results: ECFV/BW in both genders was not significantly changed with aging. Males' ICFV/BW was significantly decreased from about 20 yo whereas the decrease in females was observed from about 50 yo. Almost all of changes observed in AFV/BW, LFV/BW and TFV/BW were consistent to that of ICFV/BW. Discussion: The results showed that trunk and leg muscle volumes in male were decreased from early stage of life whereas those of female decreased from older ages. This phenomenon is probably induced by low level of daily physical activity.

P3PM-1-13

A 'GAIN-OF-FUNCTION' MUTATION IN THE HYPOXIA-INDUCIBLE FACTOR 2α GENE DOES NOT REDUCE EXERCISE CAPACITY IN HUMANS

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The hypoxia-inducible factor (HIF) family of transcription factors regulates the expression of a number of genes relating to metabolism. In the recessive condition of Chuvash Polycythemia (CP), the normal degradation of the HIF family is compromised by mutation in the von Hippel-Lindau gene, resulting in elevated levels of these factors at normal oxygen tensions. We have found a reduced exercise capacity in patients with CP compared with controls. Recently, a few patients have been diagnosed with a heterozygous 'gain-of-function' mutation (G1609→T) in the HIF2α gene. These patients provide an opportunity to understand whether an isolated upregulation of HIF2α limits exercise capacity. We recruited 3 HIF-2α patients in addition to the 5 CP patients and 5 matched controls previously studied. We measured work rate and venous blood lactate during an exercise test. One patient with the HIF-2α mutation was no different from controls. The other two had a limited exercise capacity; both of these patients had a sedentary lifestyle. As at least one patient did not have the marked exercise limitation observed in CP patients, we conclude that isolated upregulation of HIF-2α does not necessarily result in the marked reduction in exercise capacity observed in CP.

P3PM-1-14

CHANGING OF OPERATION MEMBRANE Na,K-ATPase OF FAST AND SLOW RAT SKELETAL MUSCLES AT SIMULATION OF HYPOGRAVITY

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A deep structurally functional reorganization of muscle happens in the conditions of hypogravitation. In the present research we studied influence of hindlimb unloading of the rat by method Morey-Holton, allowing to simulate conditions of hypogravity on mechanisms of maintenance of set level of resting membrane potential (RMP) for fast and slow skeletal fibres. Experiments have shown that prolonged hindlimb unloading of rat led to decrease of RMP of fast and slow muscles. At control experiments presence of ouabain or Na-free solution reduced of RMP of muscle. Under conditions of hindlimb unloading addition solution with ouabain or Na-free solution also was decreased of RMP. However this decrease of RMP has been less expressed, in comparison with depolarization of intact muscles at the same conditions. The carried out experiments allow to make conclusion that hindlimb unloading causes decrease of RMP and transition of its parameters to new stationary level in fibres both "fast", and "slow" muscles of mammals. The basic mechanism of such reduction of transmembrane potential is loss of electrogenic component as result of change in quantitative proportion of counter-flow the main potential-forming ions which are carried out at participation of Na,K-ATPase of muscle membrane.

P3PM-1-15

SLOW-SPEED RUNNING TRAINING MARKEDLY REDUCES SERUM TNF-ALPHA LEVEL IN MIDDLE-AGED AND ELDERLY RUNNERS

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The effects of slow-speed running training on serum adipo-cytokines and C-reactive protein levels were studied. Twenty-six middle-aged and elderly males and females at an age of 46 to 79 years participated as subjects. The subjects ran 1 to 5 times a week for about 1 hour each at slow speed of 7-8 minutes/km for four months. Serum samples were collected on two occasions, one at an introductory stage (July), the other at relatively hard preparatory work stage (November) in the training period preparing for participation to the Honolulu Marathon held in Hawaii. The collected samples were analyzed for leptin, TNF-alpha and C-reactive protein. Anthropometric parameters were also measured. Although the slow speed running training for four months induced no significant change in serum leptin and C-reactive protein concentration, it markedly decreased serum TNF-alpha concentration which was statistically highly significant($p<0.001$). The decrement of serum TNF-alpha level was accompanied by decreases in body mass and abdominal circumference. The marked decrement of serum TNF-alpha level was suggested to be a reflection of the training-induced improvement in insulin sensitivity.

P3PM-1-16

MOVEMENT-STIMULATED HYALURONAN (HA) SECRETION INTO JOINTS IN VIVO IS MEDIATED BY PHOSPHOLIPASE C AND PARALLEL MAP KINASE PATHWAYS

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Interstitial/glycocalyx permeability, joint lubrication and synovial fluid conservation depend on HA. HA injections and exercise ameliorate osteoarthritis. We therefore studied how movement affects synovial HA secretion rate qHA. In anaesthetised rabbits, knee joints were cycled passively at 0-1.5Hz for 0-9min per 15min for 5h. Newly secreted HA was harvested at 5h for HPLC. qHA increased as a nonlinear function of cycle frequency & duration, almost doubling at 0.5Hz-20% duration ($p=0.001$, t test, $n=35$). In static joints similar or larger increases were elicited by Ca^{2+} ionophore ionomycin, PGE2 & phorbol ester (PKC activator). PKC-mediated stimulation was inhibited by PKC inhibitor bisindolylmaleimide and by U0126 and PD98059, inhibitors of the PKC downstream effectors MEK-ERK. These agents only inhibited movement-stimulated secretion (MSHA) when co-injected with an inhibitor of the parallel p38 kinase path (SB203580, ineffective alone). Phospholipase C (PLC) inhibitor U73122 almost fully blocked MSHA ($p=0.001$, $n=10$), leaving static qHA unchanged. ENaC blocker amiloride inhibited MSHA; Gd^{3+}/SKF96365 did not. It is proposed that MSHA may be mediated by PLC activation, leading to parallel activation of PKC-MEK-ERK and p38 kinase pathways in vivo.