1-P-20 Effects of Endurance Exercise on Capillary Network in Non-Insulin-Dependent Diabetic muscle

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Purpose: The main point of treating non-insulin dependent (type 2) diabetes is to prevent the microvascular, macrovascular, and neurologic complications associated with this disease. However, the genesis of the increased microvascular risk in diabetes is still relatively obscure. On the other hand, endurance exercise training has been shown to improve whole-body glucose tolerance and/or insulin sensitivity in type 2 diabetes. Endurance exercise may well play a role in diabetic microangiopathy. Therefore, the present study examined the relationship between three dimensional capillarization and endurance exercise. Additionally, the angiogenic factors in soleus muscle were quantified. Methods: Male Goto-Kakizaki (GK) spontaneously diabetic rats (6 weeks old) and age-matched seven wild-type Wistar rats were divided into three groups: diabetes (GK), diabetes plus endurance exercise training (Ex+GK), and sedentary control (Con). The endurance training consisted of exercise at low-aerobic intensity (plasma lactate <~2mmol/l) and included five 60 min sessions per week for 3 weeks. The capillary network of soleus muscle was visualized using a confocal laser microscopy, and the capillary volume was measured. The mRNA levels of angiogenic factors (VEGF, KDR, Flt-1, Ang-1, Ang-2, Tie-2, and HIF-1 α) were determined by TaqMan probe-based real-time PCR. Results: The level of plasma glucose was higher in diabetic GK rats as compared to sedentary controls. Although the capillary volume in diabetic muscle was lower than that in Con, the exercised muscle capillarity was attenuated toward to the level of Con. Thus, exercise had effect on capillary volume in diabetic muscle. The expressions of angiogenic factors were lower in GK muscle than in Con muscle. However, those were attenuated toward to the levels of those in GK+Ex muscle. Conclusion: These data suggest that endurance exercise most likely plays a role in improvement and attenuation of the muscle circulatory complications associated with type 2 diabetes.

Key words: Diabetes, capillary, exercise

1-P-21 Effects of resistance training on finger arterial myogenic response to gravitational potential energy change

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Purpose: This study was to clarify whether peripheral vascular myogenic response is changed by resistance training.

Method: The subjects were twelve healthy men (19-24 years) were assigned to the control group (n=6) and the training group (n=6). Training group performed resistance training 3 times a week for 8 weeks. Gravitational potential energy change (GPEC) induced by raising and lowering the upper extremities 20 and 40 cm from heart level, elicited a myogenic response in the arterioles of the fingers. Arterial compliance index, differential digital photoplethysmogram (Δ DPG), arterial blood pressure (BP), arterial pulse pressure (PP), pulse rate (PR) were measured.

Results and Discussion: Following 8 weeks of resistance training, changes in $\triangle DPG$ -P wave from heart level in the training group increased significantly (mean±SD, 751.2 ± 191.5 to 935.6 ± 154.3 mV/V/sec at the 40 cm elevated position, P<0.05). Compliance index, which was calculated from \triangle DPG-P wave amplitude and PP, also significantly changed in the training group over the 8 weeks (17.6±6.5 to 22.7±9.5 mV/V/sec/mmHg at the 40 cm elevated position, 3.2 ± 1.2 to 4.6 ± 1.0 mV/V/sec at the 40 cm lowered position, P<0.05). One repetition maximum (1RM) was significantly increased in the training group (P < 0.01). On the other hand, the control group showed no significant changes in all parameters for 8 weeks. These results suggest that resistance training induces an increase in peripheral vascular myogenic response to alteration of transmural pressure in the human finger.

Key Words: gravitational potential energy change (GPEC); myogenic response; differential digital photoplethysmogram; arterial compliance index; resistance training