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Effects of Various Pressures of Enhanced External Counterpulsation on Endothelial Function in Patients with Coronary Artery Diseases

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Objectives: It has been proved that enhanced external counterpulsation (EECP) can be used as a noninvasive treatment of coronary artery disease (CAD). By applying external pressure on the lower trunk, EECP augmenting diastolic pressure and increasing blood perfusion to the coronary system and promoting collateral circulation. More importantly, by speeding blood flow, enhancing shear stress, that protect and improve endothelium function so as to repress the development of atherosclerosis in the arteries. The current study was designed to investigate the effects on endothelial function in patients with CAD with various pressures apply to the patient’s body during EECP.

Methods: Shear stress in brachial arteries were calculated on different EECP cuff pressures by high frequency ultrasound in 21 patients. CAD patients were randomly assigned to non-EECP control group (n=48) and 3 groups of EECP with different cuff pressures: P0.025 group (P=0.025 Mpa/cm², n=28), P0.030 group (P=0.030 Mpa/cm², n=30), P0.035 group (P=0.035 Mpa/cm², n=29). Flow-mediated vasodilatation (FMD) and nitroglycerin mediated dilatation (NMD) of brachial artery before and after the 36-hour EECP treatment were measured by high frequency ultrasound. At the same time points, blood ET-1 and hCRP levels were also detected.

Results: No significant systolic shear stress (T_s) changes among the EECP cuff pressure groups (cuff pressure from 0.025 mmHg to 0.040 mmHg, P<0.05). The endothelial shear stress (T_e) and mean shear stress (T_m) were increased correlated positively with different EECP cuff pressures (P<0.01). Compared with the pre-EECP state, FMD decreased significantly in the three EECP groups (P<0.01). hCRP decreased significantly in P0.030 group (P<0.05) only, ET-1 decreased in P0.025 group and P0.035 group (P<0.01) after the 36-hour EECP treatment. However, no changes of NMD were found in all three EECP groups (P>0.05) after 36-hour EECP treatment. When the extents of changes were compared among the EECP groups, the higher the pressure was applied, the more significant the changes observed. FMD increased, hCRP decreased and ET-1 decreased considerably in P0.035 group compared to P0.025 group (P<0.01). It was also found that the change of ET-1 was more significant in P0.030 group than P0.025 group (P<0.05).

Conclusions: Increased EECP cuff pressure can accordingly raise the shear stress in brachial artery. EECP can improve endothelial cells function in patients with coronary artery disease. In comparison to lower pressure, higher pressure EECP is more effective to achieve the benefits.

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The influence of combined exercise training on the blood lactate level of type 2 diabetes

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Objectives: The present study is to investigate the clinical significance of blood lactate level in type 2 diabetes and the effectiveness of aerobic training combined with resistance training therapy for type 2 diabetes.

Methods: 80 type 2 diabetes outpatients with no complications and another 20 normal healthy people were recruited to observe the relationship between blood lactate level and type 2 diabetes. Then 38 of these 80 type 2 diabetes outpatients with no complications were randomly assigned to non-EECP control group (n=48) and 3 groups of EECP with different pressures apply to the patient’s body during EECP.

Methods: Aerobic training at an intensity of 60%–80% HRR (Heart Rate Reserve) lasting for 30-45 minutes (6 times/week during the first 4 weeks and 3 times/week during the last 4 weeks), and the following resistance training at the intensity of 50%–55% IRM (one Repeated Maximum) for 15-30 minutes (3 times/week, 8 weeks). All the groups were asked to take the rests of fasting blood glucose (FBG) level, 2-hour postprandial blood glucose (PPBG) level, fasting insulin (FIN) level, postprandial plasma Insulin (PIN) level, total cholesterol (TC) level, high density lipoprotein (HDL) level, glycated hemoglobin (HbA1c) level, insulin resistance index (IRI) level and blood lactate (Lac) level before and alter the intervention.

Results: (1) The Lac level of diabetic group was significantly higher than normal control group (P<0.01). (2) After the 8-week treatment, the FBG , PBG, PIN, HbA1c, Lac and IRI levels of both conventional therapy group and advanced exercise therapy group were significantly decreased (P<0.01). The FIN level of the advanced exercise group was significantly decreased if compared with the conventional exercise intervention, but no change in the conventional therapy group. (3) Furthermore, compared with the conventional therapy group, the declines of PBG, PIN, HbA1c, Lac and IRI levels were even bigger in the advanced group(P<0.01 or P<0.001).

Conclusions: (1) Blood lactate level could be used as a new clinical indicator for the type 2 diabetes. (2) The combined exercise training (aerobic training combined with resistance training) is recommended for type 2 diabetes.

Research on the Effects of Exhaustive Swimming Mice’ cardio-pulmonary function after united Supplements of HMB and Glutamine

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Objectives: The main effect of HMB is to increase lean body mass and muscle strength, the main function of glutamine is to resist fatigue. In order to explore the effects of HMB, glutamine and their combination on cardio-pulmonary function with united supplemented HMB and Glu or only HMB and Glu. Then explore whether united supplement have collaborative effects, and provide theory of reference on nutrition supplements.

Methods: We choose 40 clean and healthy Kunming mice, and divide them 10 a group. After 2 weeks’adapting feed, the mice are randomly divided into control group (n=20, only normal diet), sport + HMB group (0.45 g/kg body weight HMB lavage daily), sport + glutamine group (2.7 g/kg body weight glutamine lavage daily), sport + HMB + glutamine group (0.45 g/kg body weight HMB lavage daily, 2.7 g/kg body weight glutamine lavage daily). All the mice weighed once a week to determine growth, then we study the mouse swimming ability. After adaptability feed, all the mice swim 40min without weight loading two days a time(water temperature is 19°C, water depth is 15 cm, the pool diameter is 40 cm), in the second week swim 70min two days a time, in the third week swim 100 min and swim 110 min in the fourth week. Then we take the test which include total swimming distance, swimming time, after swimming, the mice are used to test routine blood and BUN level. Put 10 mice which are taken on the blood on the stage to take the double leg calf muscle, liver, and the determination of the muscle of mice malondialdehyde (MDA), superoxide dismutase (SOD), liver glycogen, and succinate dehydrogenase (SDH), blood BUN and other biochemical indicators. Use the single factor analysis of variance to compare HMB and glutamine supplement and single irrigation suits HMB, glutamine differences in ability of aerobic exercise.

Results: After supplying four weeks, the results indicate that the mixed group’s weight, the swimming time of exhaustion, MDA, SOD, SDH, hepatic glycogen and BUN all have significant differences when comparing with the other groups (P<0.01). Meanwhile, the mixed group’s content of MDA in gastrocnemius and BUN in blood are the lest, and the content of SOD, SDH and hepatic glycogen are the most.

Conclusions: (1) Supplementary feeding glutamine alone, HMB and glutamine are combined supplementary feeding can all significantly increase the weight of mice, while HMB group’ weight was less than the control group, which may indicate that the effect of increasing weight is not obvious. (2) HMB have the best effect of prolonging the swimming time ,which may explain the relatively light weight, aerobic capacity is relatively strong. (3) HMB, Glu supplementary feeding mice either alone or combined, which can significantly increase the glycogen content in mice. Meanwhile, the mixed group and HMB alone and HMB, glutamine jointly feeding are quite similar. (5) HMB, Glu supplementary feeding mice either alone or combined, which can significantly increase the content of SDH. Meanwhile, the joint feeding have the more obvious effect.