The Exercise Echocardiographic Profile of Healthy Post Menopausal Women

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The dynamic cardiac response to upright exercise has not been well characterized in healthy post-menopausal women. Accordingly, 20 such volunteers, aged 46 ± 6 yrs, underwent serial echocardiographic study of LV volumes by modified Simpson's rule at rest and during each stage of upright bicycle exercise. Work rate was increased by 15 W every 3 min until exhaustion. Peak work rate ranged from 45 to 105 W. As expected, progressive increases in cardiac output (CO) occurred with exercise. Seventy-six % of this increase was attributed to increases in heart rate and 24% to increases in stroke volume (SV). p < 0.05, rest vs. 30 W and 30 vs. 90 W). Augmentation in SV was associated with significant progressive increases in end-diastolic volume (p < 0.05, rest vs. 45 W and 45 vs. 90 W) as end-systolic volume was unchanged. LV ejection fraction rose slightly from group mean of 67% at rest to 75% at 105 W (p < 0.01).

Conclusions: The cardiac response to upright exercise in healthy post-menopausal women may be characterized by progressive increases in end-diastolic volume, heart rate, SV, CO, and ejection fraction. These data may be clinically useful to identify an abnormal cardiac exercise response in post-menopausal pts with heart disease.

Exercise Testing for the Evaluation of Lipid-Lowering Therapy. Functional Assessment Versus Quantitative Coronary Angiography in the Low-Density-Lipoprotein Atherosclerosis Regression Study

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In patients with coronary artery disease (CAD) exercise testing is used for evaluation of PTCA, CABG and anti-anginal drug therapy. Little information is available about the potential of exercise testing for the evaluation of lipid-lowering therapy.

Method: We studied 42 patients with familial hypercholesterolemia and extensive CAD who were randomized to diet and simvastatin with or without biweekly LDL-apheresis. LDL-apheresis was performed over dextran sulphate columns. Bicycle exercise testing was performed under standardized conditions at baseline (base), after 1 and 2 years of therapy. The final exercise test was performed 1 month after the last LDL-apheresis to avoid possible short-term effects on blood rheology. Mean segment diameter (MSD) and minimal obstruction diameter (MOD) were assessed by QCA.

Results: LDL-cholesterol decreased from 7.72 ± 1.56 mmol/l to a time-averaged level of 2.95 ± 1.13 (-63%) in the LDL-apheresis (L) group and from 7.85 ± 2.34 mmol/l to 4.13 ± 1.58 mmol/l (-43%) in the medication (M) group, difference in response p < 0.01.

Exercise testing LDL-apheresis Medication base 1 year 2 years base 1 year 2 years
ST-time (s) 485 ± 47 548 ± 51 641 ± 50* 485 ± 81 464 ± 54 442 ± 60
ST-max (mm) 1.4 ± 0.2 0.8 ± 0.2 0.7 ± 0.2* 1.4 ± 0.3 1.3 ± 0.4 1.4 ± 0.4

ST-time, time to 1 mm (< 0.1 mV) ST-depression; ST-max, maximal ST depression; *difference between L and M group p < 0.01. QCA revealed no difference in coronary anatomy.

Conclusions: Exercise parameters improved only in the LDL-apheresis group along with a pronounced reduction in LDL-cholesterol but without change in coronary anatomy. Exercise testing, a functional test of the coronary circulation, has to be considered as a valuable inexpensive tool for the evaluation of lipid-lowering therapy in patients with myocardial ischemia.

Elevated Intramuscular Diprotonated Pi (H2PO4) During Exercise in Patients With Chronic Heart Failure


We have shown that metabolic downregulation may depress muscle function in chronic heart failure (HF). This study examined muscle energetics in 10 HF pts (age: 58 ± 5 yrs, EF < 40% ± 10, NYHA II—III) and 10 controls (CON) (age: 52 ± 4 yrs) during low (LO; 25% MVC) and high (HI; 85% MVC) intensity cycle exercise (1 contract/4 s). From an RF coil positioned over the medial gastrocnemius muscle, continuous spectra were obtained (32 s time resolution). LO was terminated at 10 min and resulted in a decrease in [PCr] (HF: 38.75 ± 0.76 to 20.46 ± 1.95 mM, CON: 38.01 ± 0.73 to 27.75 ± 2.74 mM) and pH (HF: 7.09 ± 0.04 to 6.91 ± 0.05, CON: 7.05 ± 0.05 to 7.04 ± 0.08), and an increase in [Pi] (HF: 5.51 ± 0.57 to 16.12 ± 1.47 mM, CON: 5.15 ± 0.48 to 13.41 ± 1.67 mM). HI was terminated at exhaustion (HF: 4:30, CON: 4:25) resulting in greater changes in [PCr] (HF: 47.78 ± 1.04 to 12.79 ± 2.64 mM, CON: 38.43 ± 0.78 to 12.89 ± 1.68 mM) and pH (HF: 7.11 ± 0.10 to 6.65 ± 0.19, CON:7.09 ± 0.02 to 6.90 ± 0.08), and an increase in [Pi] (HF: 4.98 ± 0.41 to 20.42 ± 1.95 mM, CON: 4.99 ± 0.62 to 19.61 ± 1.06 mM) compared to LO. ATP remained unchanged during both conditions. Exercise was associated with a greater decline in pH (LO:HI) and increase in [Pi] (LO) in HF. This resulted in more H2PO4 in HF (LO:HF: 275% ± 51, CON: 101% ± 20; HI:HF: 740% ± 192, CON: 441% ± 43 (p < 0.05). This increase in H2PO4 may be associated with reduced contractile function by altering cross-bridge kinetics and may contribute to the marked exercise limitations in HF.