

THE EFFECT OF EXERCISE TRAINING ON OXYGEN KINETICS IN PATIENTS WITH CHF

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Background: Oxygen uptake kinetics at a constant workload are prolonged in patients with CHF and have shown to be an independent prognostic indicator. The effect of an exercise-training program is not yet established on oxygen uptake kinetics. We compared the effects of two types of exercise (interval and continuous) on the different components of the oxygen uptake response as well as on the symptom-limited incremental maximal exercise parameters.

Materials and methods: Twenty-one stable CHF patients (60±8 yrs) participated at an exercise rehabilitation program of 36 sessions three times weekly. Patients were randomly assigned to interval training [N=11; (100% VO₂peak for 30s, alternating with rest for 30s)] and continuous training [N=10; (50% VO₂peak)]. Before and after the end of exercise training, patients performed both a maximal cardiopulmonary symptom-limited and a constant workload submaximal exercise test on cycle ergometer. Phase one oxygen kinetics was evaluated by time t (from the onset of exercise until respiratory quotient started to fall) and phase two by time constant tau, (from the end of phase I until appearance of steady-state exercise), measured using a monoexponential curve of best fit.

Results: On the whole cohort peak VO₂ increased significantly from 14.6±3.7 to 15.9±4.3 ml/kg/min (9%, p=0.002), the time constant from 61.2 ± 16.7 to 51.6±15.0 sec (16%, p=0.03), the duration of phase I kinetics (t) from 40.1± 4.9 to 35.8±5.7 sec (11%, p=0.001) and maximum work rate from 82.1 ± 32.0 to 94.5 ±38.1 Watts (p=0,002). With continuous exercise the time constant improved from 63.3±23.6 to 42.5±16.7sec (p=0.03) and t from 40.6 ± 6.6 to 35.4 ± 4.8 sec (p=0.01) . In contrast with interval exercise the t improved from 39.7 ± 3.7 to 36.1 ± 6.9 sec (p=0.05) but the time constant did not improve (60.7 ± 9.4 to 60.0 ± 8.5 sec ;p=ns)

Conclusion.: A three month training program results on an improvement in the oxygen uptake kinetics. Specifically, there is an improvement of cardiodynamic phase (phase I) from both types of exercise. However, only continuous training program ameliorates phase 2 which reflects the oxygen utilization from the muscles.