Exercise in Practice for Cardiac Patients

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Cardiac Rehabilitation is imperative for cardiac patients. It aims at improving cardiovascular and respiratory function;[1,2] returning to premorbid functional status and activity level; developing a safe and effective home ex program and developing a long-term exercise habit; and educating for secondary prevention.[1] There are 4 phases in a comprehensive cardiac rehabilitation,[2,3] i.e. Phase I: In-patient physical training; Phase II: Supervised institutional physical training with education following hospital discharge; and Phase III & Phase IV: Exercise in community without ECG monitoring or under supervision.

Before exercise training starts, physical assessments should be proceeded for exercise prescription.[2] These include current exercise habit; physical status; cardiorespiratory endurance (*exercise testing, 6-minute walk test*[2-4]); body composition (*fat & fat-free tissue, height, weight, Body Mass Index, Waist-Hip Ratio*); muscular strength, endurance and flexibility.[2,3]

Patient's maximum cardiorespiratory endurance (maximum aerobic capacity) is measured in terms of Maximum Oxygen Uptake (VO_2max):-[3]

VO_2max = Maximum cardiac output (L/min) x Arterial-venous O_2 difference (mL O_2/L)

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It reflects the ability of the heart to deliver O_2 to the working muscles and the muscle's ability to generate energy with O_2. The change of VO_2max is related to mode, frequency, duration, intensity and progression of the exercise training.[3]

Each exercise session should include 10 minute warm up, 20-30 minutes endurance training (3-5 days per week), 10-15 repetitions x 1 set x 8-10 exercises for resistance training (2-3 days per week), and 10 minutes cool down.[2-5] The training effect depends on the overloading and specificity principles.[3,6-9] For the intensity of exercise, ACSM recommends 40%/50% to 85% VO_2 Reserve or Heart Rate Reserve. The common method for intensity calculation is the Karvonen Method (Heart Rate Reserve Method):-[3]

Training Heart Rate = {(Maximum Heart Rate - Resting Heart Rate) x 40-85% of Training zone} + Resting Heart Rate

Monitoring during Phase II cardiac exercise training should contain ECG monitoring (for initial session or high risk patient), Blood Pressure, Heart Rate, Rate of Perceived Exertion (RPE), and Oxygen concentration (SaO_2) (if indicated).[3]

The art of exercise prescription is the successful integration of exercise science with behavioral techniques that results in long-term program compliance and attainment of the individual's training goals. Maintaining exercise compliance after Phase II cardiac rehabilitation is challenging. It can be improved by setting individual short- and long-term, realistic and measurable goals; improving confidence level, signing

contract; giving feedback; revising training plan; recording diary; seeking social support system; and regular follow up.[3]

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