VIA MEDICA

EDITORIAL

Cardiology Journal
2011, Vol. 18, No. 6, pp. 607–609
10.5603/CJ.2011.0023

ISSN 1897–5593

# Cardiac rehabilitation can be effective in all stable patients

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## Introduction

Exercise training and regular daily physical activities are essential for improving a cardiac patient's physical fitness. Research data demonstrates that participation in exercise training improves exercise capacity, peripheral hemodynamics, endothelial and autonomic functions, quality of life, behavioral characteristics (depression, anxiety, somatization and hostility) and leads to modification of cardiovascular risk factors [1–5]. Supervised exercise training for three to six months generally is reported to increase a patient's peak oxygen uptake ($VO_2$ peak) by 11% to 36%, with the greatest improvement in the most deconditioned individuals [2, 5].

In this issue of *Cardiology Journal*, Abdou et al. [6] demonstrated that the cardiac rehabilitation (CR) program conducted at personalized ventilatory threshold significantly improves the aerobic physical capacities of all cardiac patients, and induces similar benefits whatever the age, gender or cardiac pathology.

According to the new ESC and AHA, ACC guidelines, exercise training is strongly recommended for all stable cardiac patients [1–4, 7]. However a universal agreement on exercise prescription in cardiac patients does not exist; thus an individualized approach is recommended, with careful clinical evaluation, including behavioral characteristics, personal goals and preferences.

## Selecting an optimal training protocol

Identifying appropriate and adequate levels of training intensity is crucial to obtaining the desired benefits while maintaining reasonable control of the related risk.

Training protocols should include the following variables: intensity, type, method, application, control and setting [1–4]. Abdou et al. [6] perfectly described training modalities. Their ambulatory CR program consisted of exercise on a cycloergometer for three sessions of 45 min per week for eight weeks at heart rates attenuated at ventilatory threshold obtained during a cardiopulmonary exercise test conducted before the training period. The improvement during a CR program depends on the exercise intensity. The training intensity is usually prescribed relative to $VO_2$ peak or at the anaerobic threshold [1–5]. It can be detected noninvasively during cardiopulmonary exercise test by analysis of the ventilator curves [8]. The anaerobic threshold represents the time when there is, in theory, a transition from an aerobic to an anaerobic metabolism during exercise [5, 8]. In a normal subject, the anaerobic threshold occurs at about 50% of $VO_2$ peak [5]. Recommended training intensities are 40–50% at the starting point (high risk patients, heart failure patients) increasing to 70–80% of the percentage $VO_2$ peak [1, 2, 4].

## Cardiac rehabilitation of challenging populations — the elderly and women

Specific attention has been directed to the rehabilitation of elderly coronary patients; they have exercise trainability comparable to younger patients, with elderly women and men showing comparable improvement [1, 2, 5, 7, 9].

It is important to emphasize that there is typically more variety within groups such as the elderly and women, than between these and comparison groups — in this case younger people and men [1,

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5, 7]. Elderly cardiac patients are often excluded from CR programs [1, 5, 10] despite the fact that a beneficial effect of CR has been documented also in older patients, even in those with severe clinical status and multiple co-morbidities [5, 7]. The planning and implementation of CR in older groups requires a high level of individual care and support with a careful clinical evaluation beyond cardiovascular function, including psychosocial assessment and evaluation of co-morbidities. The main goals of CR in aging patients are to preserve mobility, independence and mental function, to prevent anxiety and depression, to improve quality of life, to encourage social adaptation and reintegration, and to enable the patient to return to the same lifestyle as before an acute event [1, 5, 7, 11].

Women benefit from comprehensive CR as much as men do, regardless of age. The planning and implementation of CR in women needs to take into consideration the fact that women who undergo CR are more likely to be older, hypertensive, diabetic, obese, with hypercholesterolemia and heart failure. Their exercise and functional capacity are lower than those of male patients, as was described in the paper mentioned above. Moreover, elderly women are more likely to experience activity limitations due to co-morbidities such as arthritis, osteoporosis and urinary incontinence [1, 5, 12, 13].

Unfortunately, referral to and participation in exercise training are less common in older age, especially among elderly women, suggesting that elderly patients of both genders should be strongly encouraged to participate in CR [5].

## Rehabilitation of different cardiac pathology groups

### Cardiac rehabilitation following acute coronary syndrome and post percutaneous coronary angioplasty

Cardiac rehabilitation after acute coronary syndrome and/or post percutaneous coronary angioplasty depends on patients' clinical status. After an uncomplicated procedure, physical activity counselling can start on the following day. After large and/or complicated myocardial damage, CR should start after clinical stabilization, and physical activity should be increased slowly, in response to symptoms. Cardiac rehabilitation programs ought to include supervised, medically prescribed aerobic exercise training. According to the current recommendations, low risk patients should undergo at least three sessions of 30–60 min/week of aerobic exercise at 55–70% of the maximum work load or heart rate at the onset of symptoms. Moderate to high-risk patients should undergo exercise training similar to the low risk group but starting with less than 50% of maximum work load. Cardiac rehabilitation should also include resistance exercise at least 1 h/week with intensity of 10–15 repetitions per set to moderate fatigue [1, 2, 5, 14].

### Cardiac rehabilitation following cardiac surgery — coronary artery or valve heart surgery

Cardiac rehabilitation programs should be available for all patients undergoing coronary artery surgery and valve surgery. In line with current guidelines, exercise training in these patients can be started in the early in-hospital phase and continued in out-patient settings immediately after discharge for 8–12 weeks. Exercise training should be individually tailored in respect to the clinical condition, baseline exercise capacity, ventricular function and different valve surgery. After valve surgery, exercise tolerance will take a significant time to recover. After mitral valve replacement, exercise tolerance is much lower than that after aortic valve replacement, particularly if there is residual pulmonary hypertension. Low-level activities are usually acceptable 24 to 48 h after surgery. Chest and leg wounds usually require four to six weeks to heal. Upper-body training can begin when the chest is stable, i.e. usually after six weeks, but exercise that causes sternal tension should be avoided for up to three months after surgery. Patients who have undergone minimally invasive coronary artery bypass grafting without sternotomy need less restriction on their activity [1, 2, 5].

Each patient affected by cardiovascular disease independent of age, gender and cardiac pathology can benefit from CR programs. This is why all patients should be supported to adopt strategies appropriate to their condition and current status by addressing the core components of CR [1–5].

## Acknowledgements

The author does not report any conflict of interest regarding this work.

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