

## Leaders

### Exercise in cardiac rehabilitation

There is a saying that "what goes around comes around", and exercise training as a treatment for patients suffering from coronary heart disease is no exception to the rule. The eighteenth century English physician, William Heberden, recorded the case of a patient suffering from angina "who set himself the task of sawing wood every day and was nearly cured".<sup>1</sup> Almost a century later in 1854, the Irish doctor, William Stokes wrote "the symptoms of debility of the heart are often removable by a regulated course of gymnastics, or by pedestrian exercise".<sup>2</sup> His "pedestrian cure" consisted of comfortable walking initially on level ground, the distance and gradient being increased as tolerance improved—always, however, cautioning against excessive fatigue, breathlessness, or chest pain. Have we progressed that far since then? Over the ensuing years, Stokes' exercise training regime was largely forgotten, obscured by the teaching of the London surgeon John Hilton, who stressed the value of strict bed rest.<sup>3</sup> Unfortunately Hilton's precept was carried to extremes. Prolonged immobilisation in bed became the cornerstone of medical care for close to a century; seldom was it practiced more assiduously than after a myocardial infarction. However, by the 1950s, doctors had begun to question the wisdom of strict bed rest, and when Levine and Lown introduced their innovative and highly successful "armchair treatment", in which they progressed their heart attack patients to sitting up in a chair by the bed a few days after admission, the era of early mobilisation had arrived.<sup>4</sup>

From mobilisation to exercise training is a short step, and when Chapman and Fraser, from the University of Minnesota, catheterised patients recovering from myocardial infarction during treadmill exercise and showed that their cardiovascular responses were normal, they paved the way for the introduction of exercise training regimens.<sup>5</sup> During the 1960s, a handful of doctors began to involve their cardiac patients in aerobic conditioning programmes. A major problem during those early years, however, was the perception of the patient who had suffered myocardial infarction as a chronic invalid. It was partly to offset this situation and also to show the high level of fitness that could be achieved in selected subjects by supervised training that we entered seven coronary patients from the Toronto programme in the 1973 Boston marathon.<sup>6</sup> Their completion of the run without mishap was a medical first. It focused considerable attention on cardiac exercise rehabilitation, and did much to convince patients and public alike that most heart attack survivors who had completed a progressive exercise training regimen could lead not only a full and active life, but could accomplish something that was beyond their physical capacity even before their attack. Today, exercise training remains a cornerstone of cardiac rehabilitation and the secondary prevention of coronary disease. In combination with other strategies, such as smoking cessation and a prudent low fat diet, it has been shown to reduce symptoms, increase cardiopulmonary fitness, improve lipid profile, ameliorate high blood pressure, counter obesity and adult onset diabetes, enhance fibrinolysis, improve endothelial dysfunction, alleviate depression, improve quality of life, and reduce the incidence of sudden death and recurrent fatal myocardial

infarction.<sup>7,8</sup> Certainly, a formidable list! Initially offered to patients recovering from myocardial infarction and coronary artery bypass graft surgery, cardiac rehabilitation exercise programmes are now extended to stable chronic heart failure patients, as well as heart transplantation recipients, angioplasty patients, pacemaker and left ventricular assist device recipients, and those recovering from valve surgery. More recently, exercise training has emerged as having a role to play in strategies to stabilise or reverse the atherosclerotic process. In America, the Ornish Lifestyle Program combined regular daily exercise with a low fat diet and stress reduction techniques to obtain plaque reversal in a small group of coronary patients.<sup>9</sup> Although no attempt was made to determine the impact of the various interventions, and one would suspect that the rigorous low fat diet would emerge as the prime candidate, exercise training would nevertheless appear to be a valuable component. On the other hand, a similar regression trial carried out by Schuler in Heidelberg, Germany, which also obtained stabilisation and reversal in a significant number of treated patients, compared the effectiveness of its American Heart Association Step 2 low fat diet with a vigorous exercise training protocol.<sup>10</sup> Of the two interventions, the exercise training regimen was found to be more closely associated with plaque reversal than diet.

Thus the past five decades of the twentieth century have seen noteworthy advances in the application of exercise training as part of a comprehensive approach for the secondary prevention and rehabilitation of coronary heart disease. As a result, national and international health bodies have stressed the importance of exercise rehabilitation, and have advocated that it be made available to all cardiac patients. Unfortunately, in most countries this goal has not been achieved. Cardiac rehabilitation is grossly undervalued and underused, and it has been estimated that only about 20–30% of potential candidates receive the service. Greater efforts are required on the part of government, health professionals, and the public alike if we are to meet the challenge of providing improved cardiac rehabilitative care for patients into the next century.

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- 1 Heberden W. *Commentaries on the history and cure of diseases*. London: T Payne, 1802.
- 2 Stokes W. *The diseases of the heart and the aorta*. Dublin: Hodges & Smith, 1854.
- 3 Hilton J. *Rest and pain*. London: G Bell & Sons Ltd, 1863.
- 4 Levine SA, Lown B. "Armchair" treatment of acute coronary thrombosis. *JAMA* 1952;148:1365-9.
- 5 Chapman C, Fraser R. Studies on the effect of exercise on cardiovascular function: cardiovascular responses to exercise inpatients with healed myocardial infarction. *Circulation* 1954;9:347-51.
- 6 Kavanagh T, Shephard RJ, Pandit V. Marathon running after myocardial infarction. *JAMA* 1974;229:1602-5.
- 7 National Institutes of Health. *Physical activity and cardiovascular health. A national consensus*. Leon AS, ed. Champaign, IL: Human Kinetics, 1997.
- 8 Kavanagh T. *Take heart*. Toronto: Key Porter Books, Ltd, 1998.
- 9 Ornish D, Brown SE, Scherwitz LW, et al. Can lifestyle changes reverse coronary heart disease? The lifestyle heart trial. *Lancet* 1990;336:129-33.
- 10 Hambrecht R, Niebauer J, Marburger C, et al. Various intensities of leisure time physical activity in patients with coronary artery disease: effects of cardiorespiratory fitness and progression of coronary atherosclerotic lesions. *J Am Coll Cardiol* 1993;22:468-77.