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**Cardiac Rehabilitation and Prevention of Cardiovascular Disease: A Role for
Autonomic Cardiovascular Regulation**

Ferdinando Iellamo, Massimo Pagani, and Maurizio Volterrani

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Cardiac Rehabilitation and Prevention of Cardiovascular Disease

A Role for Autonomic Cardiovascular Regulation

It is with interest that we read the state-of-the-art paper on cardiac rehabilitation by Dr. Wenger (1). The article focuses on several important issues related to exercise training and quoted a number of factors that can contribute to the benefits of exercise training in ameliorating cardiovascular risk level, ranging from improvement in lipid profile and endothelial function to a more favorable fibrinolytic balance and anti-inflammatory action. We believe that it also is important to mention the potential benefits of exercise training on autonomic cardiovascular regulation. Patients with heart disease are at risk for life-threatening arrhythmias and sudden death, and it is well documented that alterations in the neural control of the heart characterized by decreased vagal activity and concurrent sympathetic predominance may have a critical role in the occurrence of arrhythmic events (2). A reduced baroreflex sensitivity (BRS), a measure of baroreceptor reflex vagal control of heart rate, has an independent prognostic value for cardiac mortality and cardiac events after myocardial infarction (3). The negative prognostic role of a depressed BRS and of an impaired autonomic control of the heart extends to patients with heart failure (4).

Several studies have indicated that exercise training improves BRS and heart rate variability parameters in different populations of cardiac patients, from post-myocardial infarction to coronary artery bypass graft surgery and heart failure (5-9), for whom, in all, exercise training is highly recommended (1). Notably, improvement in BRS by exercise training was related to a greater 10-year survival rate after myocardial infarction (10). These findings could by now be considered consolidated experimental evidences. Cardiac rehabilitation also improves depression and stress, with additional potential benefits on autonomic risk profile.

We believe that physicians should be informed on studies demonstrating the beneficial effects of exercise training on autonomic cardiovascular regulation, particularly those who are not familiar with this topic. Stressing the beneficial effects of exercise training on autonomic cardiovascular risk profile would contribute to boost further referral for cardiac rehabilitation by health care professionals.

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Reply

Dr. Iellamo and colleagues have provided an excellent summary of the beneficial effects of exercise training on autonomic cardiovascular regulation in response to my article (1). It is well accepted that reduced baroreflex sensitivity and impaired heart rate autonomic control negatively impact the prognosis of coronary heart disease and other cardiovascular illnesses. However, the improvement in baroreflex sensitivity and in parameters of heart rate variability in association with exercise training and their relationship to improved cardiovascular prognosis cannot be attributed solely to the exercise training component of cardiac rehabilitation, although they are likely substantially mediated by exercise training.

Cardiac rehabilitation is a multifactorial intervention that involves, in addition to prescribed exercise, cardiac risk factor modification and multiple components of education and counseling; these concomitant processes are designed to limit the adverse physiological and psychological effects of cardiac illness, reduce the risk of sudden death or reinfarction, control cardiac symptoms, stabilize or reverse progression of the atherosclerotic process, and enhance the psychosocial and vocational status of selected patients (2). Because this panoply of interventions, including the medical

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