



# Heart failure and exercise cardiac rehabilitation in the 21<sup>st</sup> Century

Steven J. Keteyian<sup>1</sup> · Ileana L. Piña<sup>2</sup>

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The first randomized trial to study the effects of exercise training in patients with heart failure was published in 1990 by Coats et al. [1], which served as a stepping off point for numerous single site trials that investigated exercise training responses in these patients [2–6]. Subsequently, many of these trials then provided the underlying rationale for the landmark HF-ACTION trial, which was a multisite (n=2,331) study that showed that exercise was safe and, after adjustment for pre-specified covariates, resulted in mild to moderate improvement in important clinical endpoints in patients with stable heart failure with a reduced ejection fraction (HFrEF) [7]. Results from HF-ACTION and subsequent consensus Society guidelines helped result in a policy change in the United States, such that cardiac rehabilitation is now a covered service for Medicare beneficiaries with HFrEF. Around the same time, *Heart Failure Reviews* published a special issue that focused on exercise training principles and responses in patients with heart failure.

Despite the evidence in support of exercise as a beneficial therapy for patients with HFrEF, the percentage of eligible patients that participate in cardiac rehabilitation is very low [8]. Specifically, recent data suggest that less than 10% of all eligible patients with heart failure participate in cardiac rehabilitation. Although current professional society and other organizational efforts are in support of improving the referral and enrollment of patients with heart failure into cardiac rehabilitation, much work remains. Additionally, more knowledge is needed relative to the effects of exercise cardiac rehab on clinical end-points in HF patients with preserved ejection fraction (HFpEF), an understudied cohort that is often the most impaired [9].

Given the above reality, we believe now is an appropriate time to update the science surrounding the exercise

testing and training of patients with heart failure. To that end, *Heart Failure Reviews* dedicates two special issues to the topic. In this issue, Nelson and colleagues summarize the barriers, physiologic adaptations and clinical outcomes associated with exercise cardiac rehabilitation. Dr. Squires reviews the effects of exercise training in patients with cardiac transplant. Hwang and colleagues describe the role of non-traditional, home-based models (e.g., telehealth) for delivering exercise cardiac rehabilitation. Taylor, et al detail the unique elements of prescribing exercise in patients with heart failure. Wills and colleagues address the special concerns associated with women with heart failure in the setting of cardiac rehabilitation and Brawner and Lazar provide an excellent summary of the physiologic and prognostic information derived from a cardiopulmonary exercise test.

So it is with great pleasure that we share with you what we believe is a definitive and stimulating blend of the art and science of exercise cardiac rehabilitation in patients with chronic heart failure. We hope that our enthusiasm for the benefits of cardiac rehabilitation translates to an enhanced pledge by providers to grow referrals and support patients to start and maintain their rehabilitation efforts.

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✉ Steven J. Keteyian  
Sketeyi1@hfhs.org

<sup>1</sup> Division of Cardiovascular Medicine, Henry Ford Hospital and Medical Group, 6525 Second Ave, Detroit, MI 48202, USA

<sup>2</sup> Thomas Jefferson University Hospital, 111 South 11th Street, Philadelphia, PA 19107, USA

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