Cardiac rehabilitation of a 77-year-old male runner: consideration of the athlete, not the age

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A 77-year-old geologist with coronary artery disease enrolled in our cardiac rehabilitation program after successful placement of a drug-eluting stent. Unlike the typical sedentary cardiac patient in his age group, he loved to run. He expressed a strong desire to return to his sport, and completion of a self-assessment scale confirmed his high level of athletic identity. Despite the patient's advanced age and long history of unstable blood pressure, we were able to design a special exercise program that enabled him to train safely and thereby reach his goal. When developing a cardiac rehabilitation plan, health care professionals should consider the patient's athletic identity, not just his or her chronological age.

In October 2006, a 77-year-old professional geologist was referred to cardiac rehabilitation (CR) at our institution after a right coronary artery atherectomy and placement of a drug-eluting stent. One month before referral, he had unstable angina. Angiography displayed the following coronary obstructions in diameter narrowings: 99%, right; 70%, obtuse marginal; and 70%, left anterior descending. Although coronary bypass grafting was recommended, he chose stent placement in the right coronary artery instead and continued medical treatment.

The patient had a history of prominent ST-segment depression on periodic stress test cardiograms dating back 30 years. While stress thallium studies consistently described results as "normal with no symptoms of myocardial ischemia," they nevertheless displayed the persistently observed depressed ST segments, leading the treating physicians to assume that the patient had underlying coronary disease. Unstable blood pressure, also noted in the patient's medical history, increased significantly after the arterial intervention, rising to a high of 220 mm Hg systolic. At age 67, pravastatin was begun for a total cholesterol level that had reached 259 mg/dL. Subsequently, ezetimibe, lisinopril, hydrochlorothiazide, and aspirin were added. Clopidogrel was added after the intervention. Continuing treatment with risedronate had been instituted at age 71 after a clinical diagnosis of osteopenia and osteoporosis, and the patient's bone density was now normal. He had been physically active throughout his life; he maintained a normal weight and blood lipid profile and was not diabetic.

At age 47 (30 years prior to presentation), the patient began running as part of a program designed to control atherosclerotic risk factors. Over the years, running became an increasingly important part of his life, not only to help reduce atherosclerotic risk factors and increase general fitness but also to increase quality of life and self-esteem.

At age 71, the patient experienced severe pain associated with a herniated lumbar disk. The subsequent peroneal nerve damage resulted in a partial loss of control in the right foot that made it impossible for him to run. Although the condition was successfully reversed with physical therapy, the patient's health care providers recommended that he not return to running. He reluctantly agreed.

On entering CR at age 77 and after cardiac intervention, the patient wanted to explore the possibility of returning to running, an activity he still greatly missed after 6 years. He expressed these feelings and his willingness to do whatever was necessary to accomplish his goal. His score of 1560 on the Athletic Identity Measurement Scale–Plus left no doubt about the importance of running in his life (high athletic identifiers score 1467 to 2200) (1, 2). The CR staff believed that his goal of running again was achievable and designed a safe training regimen that enabled him to work methodically towards a successful outcome.

CARDIAC REHABILITATION TRAINING

The core of the training program consisted of work on a treadmill and resistance machines. Training began midway through phase II of CR and continued into phase III. Treadmill time intervals were prescribed using incrementally increasing speeds. Total jogging and running times were kept constant at 40 minutes per session. The initial 10-minute interval was performed at 3.5 miles per hour and a 3.0% grade; all remaining running speeds were performed with no incline. The representative training goal was set at 5.0 miles per hour (a recognized running speed). Decisions to increase treadmill speeds were based on changes in blood pressure and heart rate, along with

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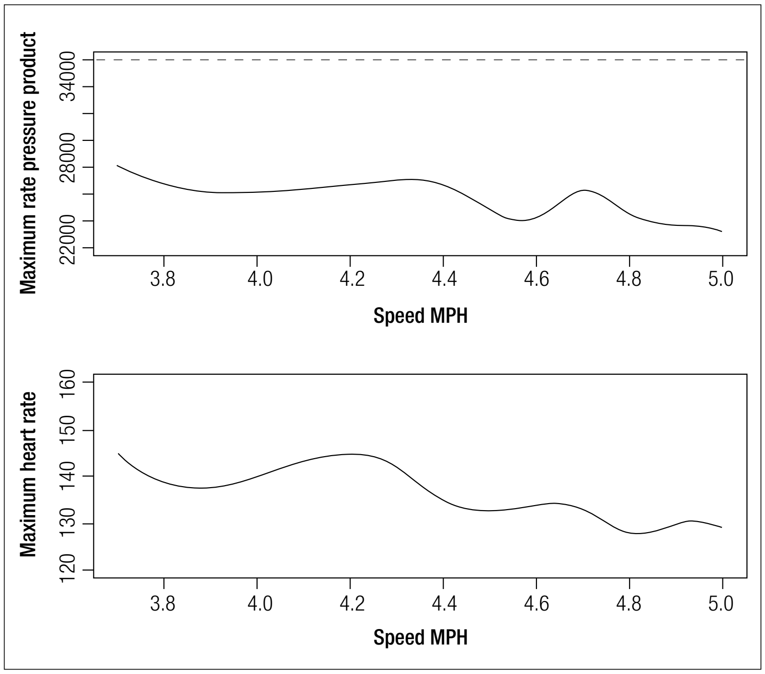

Figure. Curves for maximum rate pressure product (top) and heart rate (bottom) measure during the patient's treadmill training program. The dashed line (top) indicates the safe upper limit of 36,000.

the patient's feedback about the difficulty of the exercise. He was keenly aware of appropriate times for safely increasing exercise loads.

We measured his blood pressure prior to exercise, at maximum exertion, and during recovery. Systolic pressures displayed significant variability at rest (122–152 mm Hg) and during exercise (148–210 mm Hg). Variable systolic pressures had been noted in the patient's past medical history, but the cause was not determined. His blood pressure at maximum exertion during his 25 years of running is unknown.

The patient wore a heart rate monitor continuously during exercise. The *Figure* illustrates that these rates were within the expected range for exercise load levels and displayed a distinct training effect over time. We recorded peak and average blood pressure, heart rate, and rate pressure product at all exercise levels, as shown in the *Table*. All values were well within safe exercise protocols throughout the training program.

DISCUSSION

As the American population ages, the number of older adults eligible for secondary prevention of cardiac events continues to increase dramatically, and older patients now make up the majority of patients in CR programs. The terms "elderly" and "early elderly" refer to adults 65 to 74 years of age, while "older elderly" refers to those 75 or older (3).

There are some older elderly patients who have participated in athletics throughout their lives and steadfastly continued exercise training over the years. High levels of athletic identity are not limited to college lettermen, professional athletes, or elite competitors. Individuals of any age who enjoy training, exercise, or participation in sports may have a high level of athletic identity, as exemplified by the patient in this report. Since many athletes derive a sense of self-worth and well-being from participation in their sport, it is not unexpected that some of them might experience psychological problems (depression, anxiety, or diminished self-worth) when forced to end their athletic careers. Some studies have suggested that this transition out of sport for athletes may have negative repercussions such as emotional difficulty, identity crisis, and decreased self-confidence (4). The older elderly patient with a high level of athletic identity who is forced to stop his or her athletic participation due to a cardiac event may experience psychological problems, just as a college or professional athlete may feel when forced to leave a sport due to injury or retirement. For these older elderly patients, the return to athletic activity may well be the most important and useful benefit that CR can provide.

In a typical CR setting, the patient we describe almost certainly would have been viewed simply as an older elderly gentleman who had survived a cardiac event. He would have been given a standard exercise prescription of walking on the treadmill, lifting hand weights, and riding a stationary bike. After thorough discussions with him, however, it became obvious to us that he thought of himself not as an older elderly person, but rather as an athlete, specifically a runner. He had run in most of the major cities in the United States and Canada and in more than 16 countries around the world. During his lifetime he had logged over 27,000 miles (the earth's circumference at the equator is 25,000 miles). His athletic identity as a runner remained a part of him regardless of his chronological age. He was clearly a runner at heart who wanted to return to his sport.

Table. Descriptive statistics for heart rate, systolic and diastolic blood pressure, and rate pressure product during treadmill exercise

Speed	Heart rate (bpm)		Systolic BP (mm Hg)		Diastolic BP (mm Hg)		Rate pressure product	
(mph)	Mean ± SD	Max	Mean ± SD	Max	Mean ± SD	Max	Mean ± SD	Max
3.7	137 ± 7	145	180 ± 14	210	73 ± 8	88	24,569 ± 2438	28,028
4.0	133 ± 5	140	174 ± 11	190	64 ± 6	74	23,112 ± 1797	26,132
4.3	131 ± 6	142	185 ± 9	206	61 ± 6	72	24,156 ± 1340	26,980
4.4	126 ± 5	135	180 ± 13	204	65 ± 5	76	22,680 ± 2318	26,724
4.6	131 ± 3	134	183 ± 6	188	64 ± 4	68	23,857 ± 350	24,252
4.7	127 ± 4	133	185 ± 9	199	68 ± 10	102	23,495 ± 1590	26,268
4.8	124 ± 2	128	184 ± 11	200	64 ± 4	70	22,851 ± 1279	24,500
4.9	124 ± 4	130	175 ± 9	190	62 ± 9	88	21,641 ± 1183	23,750
5.0	124 ± 3	129	174 ± 14	184	63 ± 5	70	21,537 ± 1377	23,184

BP indicates blood pressure; bpm, beats per minute; max, maximum.

The patient attended CR sessions 2 days per week for over a year; during those sessions he focused on his goal of returning to the sport of running. As he began the exercise training program, initial treadmill speed was set at 3.7 miles per hour. Over time, he was able to increase his speed to 5.0 miles per hour, at which point he was successfully and safely running on the treadmill. His history of unstable and erratic systolic blood pressure presented an ongoing challenge to those of us on the CR staff. As a result, we carefully monitored peak blood pressure and heart rate readings to ensure safety during exercise training. Throughout the exercise program, no negative symptoms occurred that would have alerted us to discontinue his training plan. A previous study has described the rate pressure product (heart rate multiplied by systolic blood pressure) as a way to provide clinicians with a safety indicator of peak myocardial work during a CR training session (5). The patient maintained his rate pressure product below the recommended safe upper limit of 36,000 at all times (see the Figure). Additionally, he demonstrated clear evidence of a physical training effect, as he was able to increase his treadmill running speed and still remain clinically safe in terms of peak heart rate, blood pressure, and rate pressure product.

In conclusion, the older elderly are a unique subset of patients who should be given the opportunity to set goals in CR with respect to their athletic identity, not their chronological age.

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