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# ACSM's Certified News



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SEPTEMBER 2006

VOLUME 16, ISSUE 3

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## News You Need!

# ACSM's Committee on Certification and Registry Boards, 2005-06 Milestones

Mike Niederpruem

National Director of Certification and Registry Programs

Each year, the ACSM Committee on Certification and Registry Boards (CCRB) provides an annual update on CCRB activity at a public colloquium that takes place during the ACSM Annual Meeting. This year in Denver at the 2006 ACSM Annual Meeting, there was a lot of good news to share. The following milestones were a result of the hard work of our CCRB volunteers over the last year and in the remaining calendar year:

- New Publications:
  - ACSM's *Guidelines for Exercise Testing and Prescription*, 7th edition
  - ACSM's *Resource Manual for Guidelines for Exercise Testing and Prescription*, 5th edition
  - ACSM's *Certification Review Book*, 2nd edition
  - ACSM's *Resources for the Personal Trainer*, 2nd edition
  - ACSM's *Health/Fitness Facility Standards and Guidelines*, 3rd edition (Fall, 2006)
  - ACSM's *Metabolic Calculations Handbook* (Fall, 2006)
- Appointment of Senior Editors for Subsequent Editions:
  - ACSM's *Guidelines for Exercise Testing and Prescription*, 7th edition: Walter R. Thompson, Ph.D.
  - ACSM's *Resource Manual for Guidelines for Exercise Testing and Prescription*, 6th edition: Jonathan K. Ehrman, Ph.D.
  - ACSM's *Certification Review Book*, 3rd edition: Khalid Bibi, Ph.D., and Mike Niederpruem, M.S.
- Launch of ACSM's Online Learning Portal ([www.acsmlearning.org](http://www.acsmlearning.org)) for exam preparation and continuing professional education.

- Successful conversion of all ACSM exams to On-Demand, Computer-Based Testing Format, Available in English Around the World.
- Successful Deployment of ACSM Certified Personal Trainer® and ACSM Health/Fitness Instructor® examinations in Spanish and Chinese (Fall, 2006).
- Established Affinity Program for ACSM Certified Professionals with Pearl Izumi ([www.pearlizumi.com](http://www.pearlizumi.com)), a manufacture of technical wear.
- Successful Launch of the first workshop for the ACSM Registered Clinical Exercise Physiologist®. The inaugural workshop was held in January at Henry Ford Hospital in Detroit. Another successful workshop was held at the University of Louisiana at Monroe in April and the final workshop for the 2006 calendar year is at Henry Ford Hospital October 27-28.
- Successful Launch of a new 1-day CEC Course, "Weight Management for the Fitness Professional." Stay Tuned for Information on another Brand-New, 1-day CEC course for 2007!
- ACSM's Commitment to 3rd-party Accreditation through the National Commission for Certifying Agencies (NCCA):
  - ACSM Certified Personal Trainer® Accredited in May, 2006
  - ACSM Exercise Specialist® and ACSM Health/Fitness Instructor® to be submitted in September, 2006

News You Need... Continued on Page 12

# The Chronic Heart Failure Patient: A Unique Entity in Cardiac Rehabilitation

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## Introduction

Chronic heart failure (CHF) is impairment in the filling and/or pumping capacity of the heart. Five million Americans currently live with CHF and the condition is responsible for 300,000 deaths per year in the United States<sup>1</sup>. Persons with CHF typically complain of excessive fatigue or dyspnea with exertion, a condition termed exercise intolerance. Because of concerns about potential damage to the heart muscle by exercise, activity restriction had been recommended in this population until the 1980s. In the last two decades however, studies have clearly demonstrated that patients with CHF derive considerable physiologic benefits from exercise training, and exercise does not have a deleterious impact on left ventricular function. It is widely accepted today that patients with stable CHF are good candidates for rehabilitation programs<sup>1,3</sup>. In fact, recent meta-analyses have shown that long-term outcomes (survival, cardiac events, hospitalization) are improved among CHF patients participating in rehabilitation programs<sup>4,5</sup>. Interested parties are referred to the American Heart Association Statement on Exercise and Heart Failure<sup>2</sup> for a more detailed account of this evolution in treatment.

The purpose of this article is to provide exercise professionals with: 1) an understanding of the CHF condition; and 2) knowledge and skills required to work with this unique population. To that end, background information regarding the etiology, clinical manifestations and therapy of CHF will be presented, followed by practical applications related to exercise testing, prescription, counseling and supervision of CHF patients.

## Chronic Heart Failure Defined

Impaired pumping ability, or systolic dysfunction, affects the majority of patients diagnosed with CHF. Patients with this type of heart failure often exhibit a dilation of the left ventricle and a resulting reduction in left ventricular ejection fraction (LVEF)<sup>1,3</sup>. LVEF, or the amount of blood ejected by the left ventricle relative to the amount of blood in the ventricle at the end of the filling phase (end diastolic volume or EDV), is typically <40 percent in these patients. In 20 to 40 percent of

CHF patients, impairment in the heart's filling capacity, or diastolic dysfunction, is the underlying cause of their CHF. In the latter condition, the ventricle does not relax normally and the elevated pressure in the ventricle can result in increased pressure and fluid in the blood vessels of the lungs. In many patients, either systolic or diastolic dysfunction predominates; however, it is now recognized that many patients have a combination of both<sup>6</sup>. Figure 1 illustrates typical underlying causes of systolic and diastolic dysfunction.

## Clinical Manifestations of CHF

CHF is a progressive condition that can be highly variable. Both impaired systolic and diastolic function are associated with abnormalities in skeletal muscle metabolism, vascular function, neurohormonal responses, and pulmonary function<sup>6</sup>. CHF typically originates with asymptomatic ventricular dysfunction, progressing to overt symptoms, which often worsen due to excessive fluid retention and symptoms of congestion. When the condition progresses and becomes unstable, typical symptoms at presentation include excessive fatigue, dyspnea, rapid weight gain, increased respiration rate, sinus tachycardia (sometimes atrial fibrillation is present), paroxysmal nocturnal dyspnea, inability to breathe while lying down (orthopnea), jugular venous distention, cold, pale and possibly cyanotic extremities, fluid retention contributing to peripheral and/or pulmonary edema, and exercise intolerance<sup>6</sup>.

Upon diagnosis, the New York Heart Association (NYHA) Functional Classification of Heart Disease<sup>7</sup> is often used to classify the degree of functional impairment (Table 1). This I to IV scale relates symptoms of everyday activities and the patient's quality of life; it assists physicians in classifying patient symptoms and determining best course of therapy. The higher a patient is ranked, the greater their symptoms and degree of heart failure.

Progression of CHF is directly related to remodeling of the myocardium, which involves a gradual enlargement of the ventricular chambers and hypertrophy of the ventric-

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**Chronic Heart Failure... Continued from Page 2**

ular walls. Remodeling results in an increase in ventricular filling volume, which serves to preserve cardiac output in the early stages of the condition. With progressive remodeling, the heart's size may become too large, resulting in impaired cardiac output and symptoms eventually worsening<sup>6</sup>. Such patients typically have 50 percent or greater reductions in peak exercise power output, cardiac output, stroke volume, peak VO<sub>2</sub> and lower maximal heart rates with exercise testing.<sup>3</sup>

Other common but more covert symptoms that often go undiagnosed or undetected in these patients are depression, anxiety, and other mood disorders. Patients with CHF are more likely to be depressed; depression in patients with CHF has been demonstrated to be a significant predictor of two-year mortality<sup>3</sup>. It is therefore imperative that patients are appropriately screened for these disorders and if applicable, assisted in obtaining suitable and timely treatment.

**CHF Therapy**

Because symptoms of heart failure can quickly change, persons with CHF need to be closely monitored by their health care team and highly educated about self-managing their condition. Most patients are adequately stabilized with medication. However, invasive interventions for patients with CHF can include dual chamber pacemaker implantation, biventricular pacemakers, implantable cardiac defibrillator (ICD), coronary artery bypass graft surgery (CABG), a left ventricular assist device (LVAD), surgical restoration of the left ventricle size and shape or, as a last resort, cardiac transplantation<sup>6</sup>. Patients are typically on a regimen of multiple medications, including diuretics, angiotensin converting enzyme (ACE) inhibitors, beta blockers, alpha/beta blockers, aspirin and statins. Thus, it is important that exercise professionals working with these patients understand the effects these medications can have on patients and how they may alter their ability to exercise.

Lifestyle modification is also an important part of the management of CHF. Most patients require extensive counseling regarding

**Table 1 – New York Heart Association (NYHA) Functional Classification of Heart Disease<sup>7</sup>**

CLASSIFICATION	DESCRIPTION
Class I (Mild)	Patients with cardiac disease but without resulting limitations of physical activity. Ordinary physical activity does not cause undue fatigue, palpitations, dyspnea or angina pain.
Class II (Mild)	Patients with cardiac disease that results in a slight limitation of physical activity. Patients are comfortable at rest, but ordinary physical activity results in fatigue, palpitations, dyspnea or angina pain.
Class III (Moderate)	Patients with cardiac disease that results in a marked limitation of physical activity. Patients are comfortable at rest, but less than ordinary physical activity results in fatigue, palpitations, dyspnea or angina pain.
Class IV (Severe)	Patients with cardiac disease that results in an inability to carry on any physical activity without discomfort; fatigue, palpitations, dyspnea or angina pain may be present; if any physical activity is undertaken, symptoms increase.

risk factor modification, reduction/elimination of alcohol intake and dietary strategies to reduce body weight and sodium intake. Patients are encouraged to weigh themselves frequently and to know the signs of edema (i.e. ankle swelling). Weight gain and edema are indications of fluid retention, a hallmark sign of worsening heart failure. As exercise professionals, it is important to ensure these guidelines are reinforced and that patients are counseled regarding symptoms of acute heart failure; those exhibiting instability or signs of decompensation should refrain from exercise and be referred for medical follow-up.

**Cardiac Rehabilitation Programming and the CHF Patient**

CR has been demonstrated to be effective for patients with heart failure<sup>8,9</sup>. A structured education program promoting risk factor modification and understanding of CHF in combination with pharmacological, dietary, and exercise counseling is necessary for optimum improvement and secondary prevention in the CHF population<sup>3</sup>.

Risk stratification for patients with CHF entering cardiac rehabilitation programs should include the patient's NYHA Functional Classification of Heart Disease<sup>7</sup> and Canadian Cardiovascular Society (CCS) Angina Class<sup>3,10</sup> (see Table 2). Prior to beginning cardiac rehabilitation, patients should have a functional capacity above three METs, be adapted to and compliant with their medication regime and have stability of their symptoms<sup>1,9</sup>. Patients also need to be free of absolute contraindications (i.e., obstruction to left ventricular outflow, decompensated CHF or life threatening dysrhythmias)<sup>3</sup>. As CHF patients can have a poor chronotropic response to exercise, a graded exercise test with direct gas analysis and rating of perceived exertion scale (RPE scale) is strongly recommended<sup>9</sup>. Close supervision of these patients during

testing and at the outset of their cardiac rehabilitation program is necessary to monitor symptoms of exercise intolerance and disease progression<sup>3,6</sup>.

Patients should refrain from exercise if they exhibit any of the following: progressive weight gain of two lbs. over a one to three day period, increasing fatigue, worsening dyspnea or onset of paroxysmal nocturnal dyspnea and/or onset or worsening of atrial or ventricular arrhythmias. These symptoms should be promptly reported to the patient's treating physician<sup>1,3</sup>. If, during exercise, the following symptoms are observed, exercise should be terminated: decrease in heart rate >10 bpm or blood pressure >10mm Hg during steady state exercise, increased supraventricular or ventricular ectopy or pallor or confusion<sup>3</sup>.

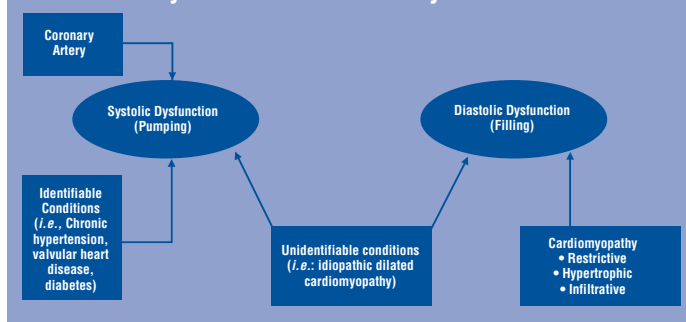
**Exercise Prescription and Training Considerations**

The benefits of regular exercise in this population are broad and numerous. Convincing evidence has demonstrated an increase in exercise tolerance and peak VO<sub>2</sub><sup>2,3,11,12</sup>, various metabolic adaptations in the skeletal muscle, improvements in quality of life as well as reductions in hospital readmission rates and mortality<sup>2,4,5,8,9,13-17</sup>. Readers are referred to the American Heart Association Statement on Exercise and Heart Failure<sup>2</sup> for more detailed information regarding these benefits.

An individualized approach to training is recommended. Late day fatigue is common in these patients, thus scheduling exercise at a time of day when they have more energy is recommended<sup>3</sup>. Patients with CHF tend to do well with any mode of exercise including treadmills, bicycle or arm ergometers, elliptical trainers, walking, rowing or stair climbing. It is important to match the mode of exercise to the patient's skill and preference, as they will be more likely to want to exercise and thus adhere to their prescribed exercise program<sup>9</sup>.

Patients should be counseled to warm up and cool down for a period of 10 to 15 minutes in order to adjust to the exercise intensity; the extension of these two components can reduce the patient's incidence of symptoms during exercise. The acceptable exercise

**Figure 1 - Proposed Etiology of Systolic and Diastolic Dysfunction**



**Chronic Heart Failure... Continued from Page 3**

intensity for CHF patients suggested in the literature ranges from 40 to 80 percent  $\text{VO}_2$  peak<sup>1, 2, 9</sup>. The heart rate reserve (HRR) or Karvonen method is also acceptable for prescribing exercise intensity; an initial intensity of 40 to 60 percent HRR and titrating the intensity upward to 70 percent HRR over a period of 1 to 3 weeks is recommended<sup>3</sup>. The Karvonen method for calculating exercise intensity is as follows<sup>1</sup>:

Target heart rate range =  $(\text{HR}_{\text{max}} - \text{HR}_{\text{rest}}) \times \text{percent intensity} + \text{HR}_{\text{rest}}$

Because many CHF patients are chronotropically incompetent (i.e. have impaired heart rate responses to exercise), the RPE scale can be a useful approach to prescribing exercise intensity in these patients; titrating intensity to 11 to 14 on the 6 to 20 scale is appropriate<sup>2, 3</sup>. Patients should be encouraged to achieve 20 to 40 minutes of continuous exercise during each session<sup>1, 3</sup>. It can be effective to have the Class III or highly deconditioned CHF patients try intermittent work/rest intervals of 3:1 and progress their exercise duration as tolerated until they are able to attain one bout of 30 minutes or more<sup>3</sup>. Current literature recommends patients perform aerobic exercise sessions 3 to 7 times per week<sup>1, 2, 3, 9</sup>.

CHF patients are at increased risk of exertional hypotension, thus blood pressure during exercise should be regularly taken in the first few sessions<sup>3</sup> and patients should be frequently asked to rate their breathlessness and/or RPE while exercising. In conjunction with medical management of these patients, they should be extensively counseled regarding daily fluid intake. Exercising patients should be advised to concentrate some of their daily-allotted fluid intake around the exercise session so as to assist in avoiding exertional hypotension. This small adjustment to their regime frequently alleviates symptoms of low blood pressure during exercise.

Recommendations for ECG monitoring of CHF patients during exercise are mixed<sup>1, 2</sup>. Although not a requirement, a few ECG monitored exercise sessions can assist in ensuring the patient's exercise prescription is safe. If ECG findings are unremarkable, the patient is stable, properly medicated, and has a good understanding of the mechanics of their exercise program, the patient can participate in an unsupervised home exercise program<sup>2</sup>. The exercise professional should maintain close contact with the patient during the first few weeks of the home program to address any concerns, ensure they are tolerating exercise and adhering to the prescribed exercise program.

**Resistance Training and CHF**

Resistance training, when done properly, is

**Table 2 – Canadian Cardiovascular Society (CCS) Angina Class10**

CLASS	CRITERIA
CCS 0	Asymptomatic
CCS I	Ordinary physical activity such as walking or climbing stairs does not cause angina. Angina with strenuous, rapid or prolonged exertion at work or recreation.
CCS II	Slight limitation of ordinary activity. Walking or climbing stairs rapidly, walking uphill, walking or stair climbing after meals, or in cold, or in wind, or under emotional stress, or during the few hours after awakening. Walking more than 2 blocks on the level and climbing more than one flight of stairs at a normal pace and in normal conditions.
CCS III	Marked limitation of ordinary physical activity. Walking one or two blocks on the level or climbing one flight of stairs in normal conditions and at a normal pace.
CCS IV-A-D*	Inability to carry out any physical activity without discomfort—anginal syndrome may be present at rest.

\* Symptoms in this class may deteriorate from requiring uncomplicated hospitalization to intravenous therapy, hemodynamic instability or defibrillation.

a safe and effective addition to an aerobic exercise program for CHF patients. The focus should be on educating patients on proper technique, with less emphasis on weight lifted. Isometric exercise and the Valsalva maneuver should be avoided<sup>2, 3</sup>. For patients who have little or no experience with weight lifting, machines or resistance tubing/bands can be a less threatening and safe way to begin; programs of this nature should include 8-10 exercises for the major muscle groups of the upper and lower body.

Weight lifting programs in the CHF population should consist of one set of 10 to 12 repetitions of exercises for the major muscle groups one to two times per week<sup>9</sup>. Acceptable resistance ranges from 50 to 60 percent of 1RM. Intensity can be titrated up to 15 repetitions before increasing weight by 5 to 10 percent<sup>1, 9</sup>.

**Conclusion**

CHF is a complex and progressive heart condition. Exercise as a therapy in CHF can have far reaching benefits, most importantly reducing the incidence of symptoms and improving quality of life. To best serve this population, exercise professionals must have a thorough understanding of the etiology and standard medical therapies common to this condition and be qualified to recognize symptoms of disease progression. Personnel are strongly advised to obtain either the ACSM Exercise Specialist®, and/or the ACSM Registered Clinical Exercise Physiologist®, certification, as these certifications prepare candidates in this regard. Personnel are also referred to ACSM's *Guidelines for Exercise Testing and Prescription*, 7th Edition, ACSM's *Resource Manual for Guidelines for Exercise Testing and Prescription*, 5th Edition, ACSM's *Exercise Management for Persons with Chronic Diseases and Disabilities*, 2nd Edition and the *Canadian Guidelines for Cardiac Rehabilitation Disease Prevention: Enhancing the Science, Refining the Art*, 2nd Edition. These references are valuable for guidance with all aspects of exercise programming in this and other clinical populations.

**About the Author**

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For a complete list of references, please e-mail certification@acsm.org.

Coaching News



# Are You Really Coaching?

This is the twelfth edition of the Coaching News column, sponsored by Wellcoaches Corporation in alliance with ACSM, and it appears regularly in ACSM's *Certified News*.

Recent conversations with colleagues about coaching have reminded me of the early days of personal training. In the late 1980s and early 1990s it wouldn't have been unusual to hear, "Oh, I personally train people all the time. We have staff on the floor who answer member questions and show them what they need to do. We call them fitness consultants/experts. Same thing." Or, "You're charging how much, for what? Why would anyone want to pay for that?" It took awhile for the public to come around to the idea of paying for someone to train them personally, but when they started seeing results, people took notice, and the industry grew.

Similar conversations are taking place about coaching, where many misconceptions abound. In spite of those misconceptions, great things are happening. Our industry is growing and changing to utilize these new coaching skills that will finally help our clients make lasting change.

As we start incorporating coaching into our repertoire, we need to be clear about what coaching is and is not, as well as creating standards for professionalism.

Not long ago, a director of a wellness center said to me that their staff did "coaching all day, all the time." Of course, this sounded like the statements I'd heard about personal training years ago. In this case, none of the staff had any training, they were just "coaching" using the generic meaning most people associate with the term. What they really meant, was that they were encouraging their participants, cheering them on, and giving supportive information; not using professional coaching skills as we've come to develop through formal coach training or certification.

Coaching is much more than encouraging talk. It's a toolbox of skills and knowledge that are grounded in evidence-based coaching psychology, and take months and years of practice and training for mastery. Coaching allows us to affect every waking minute of our client's lives; not just that one hour in 24 where we see them! Each of us has probably thought at one time or another, "I wonder

what keeps getting in the way for that client? They're never going to lose weight. If I could just follow them around for a day/week... I know I could make a difference." I was first drawn to coaching because it pulled together all the theory and information I'd learned over the years and wanted to use to help clients make lifestyle changes. Coach training helped me apply the theory without telling my clients what to do!

Our solution, since we don't have a lot of time, has been to give endless amounts of information. A "trade show" analogy I like to use, describes how we as health and fitness professionals, dietitians, physicians, and others, have often worked with our clients to help them make changes. We fill our client's bags to the brim with knowledge, passion, programs and information, spin them around, then point them to the door. They are often dizzy with the amount of information, that instead of taking action, they give up and do nothing. Remember the last time you went to a trade show, home show, or other similar event with informational resources? How often have you taken the bag out again and read the materials? The truth is we rarely take action on that "bag" because life gets in the way. We do the same with our clients, filling the bag with pride and passion filled information. We've spent years learning and we want to pass it on!

The coach approach is not about throwing away those years of expertise. It's instead, providing "just in time learning" when the client is needing or wanting it! In fact the strength of health and fitness professionals being trained as coaches is their foundation of professional expertise. However, one of the greatest challenges for new coaches is finding the balance between expert and coach which enables clients to build confidence and master well-being and change.

In my 25 years of working in the health and fitness industry, coaching is far and away the most effective tool I've ever used. When people take ownership of their health and make lifestyle changes, there's no greater reward. I have taught them to fish and engaged them within the framework of their lives to make lifestyle changes once and for all.

As a recent breast cancer survivor, I came face to face with a new world. I experienced what it felt to be overwhelmed with information. I longed for someone to help me sort out the many decisions I was making, and coach me through it. There was no part of my life that was untouched, so the information stream was endless. Because of my experience in trying to get my life back after cancer, I am now coaching survivors to live their healthiest lives, one small step at a time. Coaching has been a gift for me that I can use to help others

in a powerful way.

If you've been putting off training/certification, I'd encourage you to not wait, and experience what coaching can do for you and what you can do for others. Before using the title of coach, just as in any profession, make sure you have the skills and training to support the title!

**About the Author**

*Pam Schmid owns Priorities Simplified which provides wellness services as a coach, speaker, educator, and consultant. She is a licensed executive wellcoach and is ACSM HFI certified. She is on the teaching faculty of Wellcoaches, is a practical examiner, and mentor coach as well as co-chair for ACSM's Health, Fitness, and Wellness Coaching interest group. Pam has built several Web sites to support her business and passions. www.PrioritiesSimplified.com*

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**SELF-TEST ANSWER KEY FOR PAGE 11**

	QUESTION				
	1	2	3	4	5
TEST #1:	B	C	F	A	F
TEST #2:	T	C	D	F	A
TEST #3:	D	A	B	A	C

# Cardiac Rehabilitation and Resistance Training

Kelli Christensen, MS, ACSM Exercise Specialist®  
 Exercise Physiologist  
 Wellness Institute at Northwestern Memorial Hospital  
 Chicago, IL



## Introduction

Cardiac rehabilitation (CR) is defined by the American Heart Association as a “medically supervised program to help heart patients recover quickly and improve their overall physical and mental functioning”<sup>1</sup>. CR programs focus on helping patients with cardiovascular disease (CVD) modify cardiovascular risk factors, including weight loss, lowering cholesterol, improving blood glucose levels, controlling blood pressure, and if necessary, smoking cessation. The program traditionally consists of three phases, beginning with inpatient education and mobility and progressing to a structured exercise and secondary prevention program in the outpatient setting. Most patients referred to CR are post-myocardial infarction (MI), have undergone bypass surgery (CABG), PCI/stent

implantation, heart valve or transplant surgery or have stable angina pectoris.

The form of exercise most frequently studied and therefore, most frequently utilized in CR is aerobic in nature. The ability of aerobic exercise to improve cardiovascular functioning (work capacity, risk factors, ventricular function) in CVD patients along with its role in weight loss, improving insulin sensitivity, increasing HDLs and lowering total cholesterol make this form of exercise a logical choice. However, recent studies have documented the safety and value of resistance training in CR.

## Resistance Training and Cardiac Rehabilitation

One of the biggest concerns regarding recommending resistance training (RT) to CVD patients centers on myocardial strain, or work of the heart. In the

past, many physicians had warned patients not to lift anything post-cardiac event, due to a perceived increased risk of stroke, aneurysm or arterial dissection<sup>2</sup>. Research published in 1998 examined rate pressure product (RPP), a product of heart rate (HR) and systolic blood pressure (SBP) and one of the measures used to determine myocardial strain, found that RPP was actually lower during circuit based-RT than during an 85 percent effort on a treadmill test<sup>3</sup>. Another study determined that even among high risk CVD patients performing various RT exercises, peak RPP achieved was 22,780, well below the upper end of the acceptable range typically utilized in CR programs (HR – 110-150 beats per minute, SBP – 120-240 mm Hg)<sup>4</sup>.

Both the AACVPR and ACSM recommend



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RT be introduced during CR in low to moderate risk CVD patients, but only after a period of regular aerobic training, usually a minimum of four weeks after an acute MI or surgery and two weeks following a PCI or stent implantation<sup>6</sup>. The guidelines suggest 50 to 60 percent of 1RM for lower body exercise and 30 to 40 percent of 1RM for upper body exercise. Moderate repetitions (12-15) and one to three sets per exercise are recommended<sup>5,6</sup>. Intensity of exercise should be “light” to “somewhat hard,” corresponding to 11 to 13 on the Borg rating of perceived exertion (RPE) scale<sup>6</sup>.

Patients who should not perform RT include those with unstable congestive heart failure (CHF), uncontrolled dysrhythmias, severe valvular disease, uncontrolled hypertension and other, unstable symptoms<sup>6</sup>.

A challenge with these recommendations is that many patients do not undergo exercise testing prior to starting CR, let alone undergo testing for 1RM, which makes specific and individualized programming recommenda-

**Cardiac Rehabilitation... Continued from Page 6**

tions difficult to define and implement. Moreover, RT should be incorporated either in a circuit training format, or in addition to the regular aerobic activity, which can be challenging due to the time and staffing constraints of some CR programs.

**Benefits of Resistance Training**

RT is an important component of a well-rounded exercise program, helping an individual maintain the muscle strength and function necessary to carry out day-to-day activities. Some of the adaptations to RT include increased muscular strength and endurance, improved body composition through an increase in lean body mass and improvements in aerobic capacity along with increased skeletal muscle enzyme activity (creatine phosphokinase and myokinase), improved metabolic energy stores and increases in circulating anabolic hormones<sup>7</sup>.

A review of recent research regarding CVD patients and RT, published in the *Strength and Conditioning Journal* in April 2006, reported that adaptations to RT in patients with CVD were similar to those observed in healthy individuals<sup>2</sup>. Importantly, some of the studies reviewed actually found greater improvements in peak VO<sub>2</sub> values when aerobic exercise was combined with RT over aerobic exercise alone<sup>2</sup>. The studies reviewed included a variety of protocols including RT in addition to aerobic exercise, circuit training, fixed set and repetition programs, and RT versus non-RT controls. It was concluded that patients with CVD can safely perform weight training using “a variety of free weights, dumbbells, resistance tubing and machines,” and follow multi-set protocols with slightly longer rest periods in between sets of 15 seconds to three minutes<sup>2</sup>.

Another study, published earlier this year in the *American Journal of Cardiology*, attempts to further clarify recommendations for RT beyond weight selection parameters (percentages of 1RM) and timing (several weeks after beginning cardiac rehab) by evaluating different types of RT exercises<sup>4</sup>. The authors suggest that the two major concerns, injury to the surgical site and strain on the heart, can be addressed by examining the weight training exercises themselves.

Regarding injury to surgical site, the researchers evaluated some of the more traditional RT exercises for both safety and efficacy and created a rating system. Safety ratings were based on four factors including “complexity of movement, training requirements to perform the exercise correctly, the ease of use in different training environments and the likelihood of blunt trauma to surgical site,” while efficacy ratings were established to

**Figure 1 - Safety and Efficacy of Resistance Exercise Tool**

Exercise	Population	Safety Score	Efficacy Score	Total Score	Time Under Restriction
 Leg Extension	MI	3	3	6	0
	Pacemaker/ICD	3	3	6	0
	CABG	3	3	6	0
 Leg Curl	MI	3	3	6	0
	Pacemaker/ICD	2	3	5	0
	CABG	1	2	3	6 weeks
 Standing Calf Raise	MI	3	3	6	0
	Pacemaker/ICD	3	3	6	0
	CABG	3	3	6	0
 Dumbbell Bent Row	MI	3	3	6	0
	Pacemaker/ICD	2	2	4	0
	CABG	2	2	4	0
 Lat Pulldown	MI	3	3	6	0
	Pacemaker/ICD	2	1	3	4 weeks
	CABG	2	1	3	6 weeks
 Dumbbell Bench Press	MI	3	3	6	0
	Pacemaker/ICD	2	1	3	4 weeks
	CABG	2	1	3	6 weeks
 Dumbbell Flye	MI	3	3	6	0
	Pacemaker/ICD	1	1	2	4 weeks
	CABG	1	1	2	6 weeks
 Lateral Raise	MI	3	3	6	0
	Pacemaker/ICD	3	2	5	0
	CABG	3	2	5	0
 Shoulder Press	MI	3	3	6	0
	Pacemaker/ICD	2	1	3	4 weeks
	CABG	2	2	4	0
 Frontal Raise	MI	3	3	6	0
	Pacemaker/ICD	2	1	3	4 weeks
	CABG	2	1	3	6 weeks
 Dumbbell Curl	MI	3	3	6	0
	Pacemaker/ICD	3	3	6	0
	CABG	3	3	6	0
 Tricep Kickback	MI	3	3	6	0
	Pacemaker/ICD	3	3	6	0
	CABG	3	3	6	0
 Tricep Pushdown	MI	3	3	6	0
	Pacemaker/ICD	3	2	5	0
	CABG	3	3	6	0

Safety score: 3 - no risk, 2 - low risk, 1 - high risk.

Efficacy score: 3 - optimal benefit, 2 - some benefit, 1 - no benefit or potential harm.

Total score: safety score + efficacy score:

6 - no risk (no danger to the surgical site), 4 to 5 - low risk (can be safely performed given some movement modification and incisional healing), 2 to 3 - high risk (high likelihood of injury or trauma to the surgical site and/or ICD).

Reprinted from *American Journal of Cardiology*, volume 97, Adams, J. et. al., “A New Paradigm for Post-Cardiac Event Resistance Exercise Guidelines”, page 283, with permission from Excerpta Medica, Inc.



### Cardiac Rehabilitation... Continued from Page 7

“determine the ability of the exercise to produce a positive effect for a given diagnosis such as pain, target muscle use, movement synergy, movement stabilization, dynamic stabilization and antagonist stabilization for surgical site”<sup>4</sup>.

Regarding strain on the heart, parameters were established using RPP to assess whether or not patients were exceeding safe levels of myocardial work during weight training. The acceptable range for RPP was found to be 13,200 to 36,000, determined by the heart rate and blood pressure parameters typically used during CR<sup>4</sup>.

See Figure 1 for a complete list of all the exercises tested and their corresponding safety ratings. As mentioned previously, these exercises are for low to moderate-risk CVD patients who exhibit no contraindications to exercise, as recommended by AACVPR and ACSM. RT is not currently recommended for high risk CVD patients<sup>6</sup>.

### Summary

When performed within the recommended guidelines, it has been found that CVD patients can achieve the same physiological benefits of RT as their otherwise healthy counterparts. RT not only improves cardiovascular function, but also helps to build or maintain muscle strength and endurance, which assists patients to return to their normal daily activities.

Individualized plans should be developed based on the patient's age, gender, previous fitness levels and degree of healing. As with anyone beginning weight training, instruction of proper form and breathing techniques is the key to safe and effective programming. Avoidance of excessive strain (either in lifting or gripping) and the Vasalva maneuver is especially important when working with CVD patients<sup>5</sup>.

### About the Author

*Kelli Christensen M.S. is a graduate of the University of Illinois at Chicago. Her area of study was clinical exercise physiology and she works as an Exercise Physiologist with the Wellness Institute at Northwestern Memorial Hospital in Chicago. Kelli is ACSM Exercise Specialist® certified.*

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**SELF-TEST #1 (2 CECs):** The following questions were taken from "The Chronic Heart Failure Patient: A Unique Entity in Cardiac Rehabilitation" published in this issue of *ACSM's Certified News*, pages 2-4.

- Which of the following is not a proposed cause of systolic dysfunction?
  - Chronic hypertension
  - Hypertrophic cardiomyopathy
  - Coronary artery disease
  - Idiopathic dilated cardiomyopathy
- A patient reports excessive fatigue and dyspnea during housework and light gardening. How would she be classified in the NYHA Functional Classification?
  - Class I
  - Class II
  - Class III
  - Class IV
- CHF patients are not routinely put on a diuretic.
  - True
  - False
- After three weeks of aerobic exercise training, the recommended exercise intensity for a CHF patient according to the heart rate reserve method is:
  - 70%
  - 40 to 85%
  - 60%
  - 40 to 60%
- Impaired chronotropic incompetence is common among CHF patients, thus the RPE scale can be a useful adjunct to heart rate in prescribing exercise intensity.
  - True
  - False

**SELF-TEST #2 (1 CEC):** The following questions were taken from "Cardiac Rehabilitation and Resistance Training" published in this issue of *ACSM's Certified News*, pages 6-8.

- Resistance training should only be used with low to moderate risk CAD patients.
  - True
  - False
- Resistance training guidelines suggest lower body exercises use which of the following 1-RM percentages?
  - 30%-40%
  - 45%
  - 50%-60%
  - 65%
- The time under restriction for chest exercises (e.g., dumbbell bench press) in post-CABG patients is:
  - 0 weeks
  - 2 weeks
  - 4 weeks
  - 6 weeks
- Cardiovascular exercise alone is the best way to improve peak  $\text{VO}_2$  values in CAD patients.
  - True
  - False
- When planning exercise for CAD patients, all of the following should be taken into consideration EXCEPT:
  - patient's exercise knowledge
  - age
  - gender
  - previous fitness levels

**SELF-TEST #3 (1 CEC):** The following questions were taken from "Lipoprotein Subfraction Changes after Continuous or Intermittent Exercise Training," published in *Medicine & Science in Sports & Exercise*, Volume 38; No. 2, pages 367-372.

- Accumulating multiple \_\_\_\_ minute exercise bouts, totaling at least \_\_\_\_ minutes in moderate-intensity lifestyle activity or intermittent exercise was speculated to benefit people with busy lifestyles or low fitness.
  - 5 / 20
  - 10 / 40
  - 5 / 40
  - 10 / 30
- All subjects completed \_\_\_\_ exercise sessions in \_\_\_\_ weeks.
  - 20 / 4
  - 16 / 4
  - 20 / 6
  - 12 / 4
- Both CON-EX and INT-EX totaled \_\_\_\_ minutes at \_\_\_\_ HRmax.
  - 45 / 75%
  - 30 / 75%
  - 30 / 60%
  - 45 / 60%
- Based on the present results, \_\_\_\_\_ in lipoprotein profile improvements.
  - CON-EX and INT-EX were similar
  - CON-EX was superior
  - INT-EX was superior
  - only CON-EX resulted
- The current findings emphasize the importance of \_\_\_\_\_ rather than the exercise method.
  - Exercise intensity
  - Exercise frequency
  - Caloric expenditure
  - All of the above



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