Training Clients with Heart Disease

Determine which older clients you should refer out and which can benefit from your personal training services.

They say that 50 is the new 30, but that may not hold true for all your Baby Boomer clients. In fact, more than 50% of Americans 55 or older already have some degree of heart disease, according to the latest calculations from the American Heart Association (2006). Worse still, this percentage is expected to grow significantly in the future as the Baby Boomer generation nears retirement age.

Many of these seemingly healthy older people are your clients. As an exercise professional, you need to set appropriate exercise limits and encourage your clients to adhere to them. You also need to know when to refer a client to another health professional for further evaluation. The trick is determining which clients you can help and which you can better serve with a referral. This article examines the appropriate testing and assessment tools you can use to make that determination.

Stress Test Report

Typically, patients with heart disease undergo exercise stress testing on a routine basis, usually every year. The American College of Sports Medicine (ACSM) recommends that men over 45 years of age and women over 55 who wish to engage in vigorous exercise and who have more than one coronary disease risk factor (e.g., family history, cigarette smoking, high blood pressure, high cholesterol, impaired fasting blood glucose, obesity, sedentary lifestyle) first undergo an exercise stress test (ACSM 2006). (Older clients with one or fewer risk factors do not generally need a stress test but should at least have physician clearance!)

The stress test report gives you important information about the physiologic changes a client goes through during exercise. Unfortunately, not all exercise stress tests are conducted or reported equally well; some offer more information than you need in order to design a proper exercise program, while others offer far less. Because the data is often inadequate or inaccurate, it is vital to establish and maintain communication with your client's physician in order to glean other necessary information.

Evaluating the upper limits of a client's exercise stress test will enable you to recommend safe and effective exercise guidelines. And through close supervision and necessary heart rate and blood pressure monitoring, you can encourage and reinforce the client's adherence to these guidelines.

Maximum MET Level

A person's capacity for exercise is measured in terms of **METs,** a metabolic equivalent unit used to estimate the metabolic cost of physical activity. This measurement is noted on the stress test report as "METs achieved." Remember that 1 MET = 3.5 milliliters of oxygen consumed per kilogram of body weight per minute.

Clients with known cardiac history should exercise at 45%–85% of **VO_2max,** defined as maximal oxygen consumption/uptake, which is measured in milliliters per kilogram of body weight per minute. The formula for target VO_2 = (VO_2 max – VO_2 rest) (exercise intensity) + VO_2 rest.

Be careful to interpret MET level data yourself. In many reports the stated MET levels have been achieved incorrectly, which can lead to overestimation of exercise capacity. Unless the entire stage of the protocol is completed, the MET level achieved by a client is that of the last completed stage.

Exercise levels that exceed 85% VO_2 max require physician clearance because such levels can induce **ischemia,** the term for lack of blood flow to the heart. Ischemia can lead to chest pain, irregular heart rhythms, heart attack and ultimately death.

For more information on METs, please refer to "Using METs in Program Design" in the February 2006 issue of *IDEA Fitness Journal.*

Ischemic Heart Rate

The heart rate at which the heart is no longer receiving ample blood and other vital nutrients is called the **ischemic heart rate.** If ischemia is present, testing during an electrocardiogram (ECG) tracing will show changes in the ST segment; the ST segment lies between the end of the QRS complex and the initial deflection of the T-wave, as shown in Figures 1 and 2. Exercise physiologists recommend that if the stress test report states that the ST segment depression is greater than or equal to 1 millimeter, trainers set the maximum target heart rate 10 beats below the heart rate that correlates to the depression (ACSM 2006; AHA 2006).

Ejection Fraction

Remember that the heart's left ventricle pumps blood *to* the body. When this chamber's ability to function has been compromised by a heart attack, muscles and other tissues are deprived of blood and oxygen. A common measure used to evaluate the heart's ability to pump blood is the **ejection fraction (EF).** The EF is the percentage of blood pumped out of the heart per beat.

Typically, an EF above 50% is considered normal. However, a reported EF that is lower than 40% should raise a flag. Clients with an EF of less than 40% who wish to begin a traditional resistance training program (e.g., lifting weights greater than 50% of their one-repetition maximum, or 1RM) should first get physician clearance to do so.

a cardiac client's case study

Tom Smith, a 62-year-old man who just joined your facility, has requested a one-on-one training session with you to determine his exercise limits. Two months ago, he suffered a heart attack, which was followed by a triple-vessel coronary artery bypass graft (CABG). Tom also has type 2 diabetes, but he has no orthopedic concerns or any other health concerns that exercise might exacerbate. He weighs 212 pounds and has a body mass index of 29. Tom is regularly seeing a registered dietitian and has been successful in losing some weight. Tom does not have an implanted pacemaker or cardiac defibrillator, and he has been cleared by his cardiologist for exercise.

During your first meeting with Tom, you discuss his medical history and review his recent stress test report (completed after his surgery) and list of current medications. According to the stress test results, Tom was able to complete 7 minutes and 11 seconds of the Bruce protocol for treadmill testing, which is an equivalent of 7.0 METS. Tom's maximum heart rate was 135 beats per minute, his maximum blood pressure was 168/76 millimeters of mercury (mm Hg), and the calculated rate-pressure product (RPP) was 22,680 (135 x 168).

Tom seems to be in fair condition, so in keeping with American College of Sports Medicine (ACSM) guidelines to start slowly (ACSM 2006), you decide to let him begin exercise at 40%–60% of the MET level achieved on his stress test; you then allow him to progress to 80% as tolerated.

Next, calculate Tom's target VO_2 based on the max MET level as follows:

At 40%
target VO_2 = (VO_2max – VO_2rest) (exercise intensity) + VO_2rest
target VO_2 = (7.0 – 3.5) (40%) + 3.5
target VO_2 = 3.5 (40%) + 3.5
target VO_2 = 4.9 METS

At 60%
target VO_2 = (7.0 – 3.5) (60%) + 3.5
target VO_2 = 3.5 (60%) + 3.5
target VO_2 = 5.6 METS

At 80%
target VO_2 = (7.0 – 3.5) (80%) + 3.5
target VO_2 = 3.5 (80%) + 3.5
target VO_2 = 6.4 METS

Rate Pressure Product

Another important consideration for clients with suspected or confirmed heart disease history is the **rate-pressure product (RPP).** The RPP is the product of peak heart rate and peak systolic blood pressure, which indicates the oxygen demands on the heart.

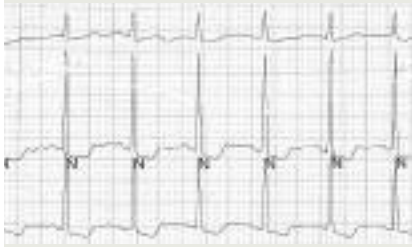
Because it reflects the heart's oxygen demands, a client's RPP can be used to mark if and when ischemia occurs. The RPP associated with the first signs of ischemia (ST segment depression) on the ECG is called the **critical RPP.** Unlike heart rate, ischemia will always occur at the same RPP, regardless of heart rate or systolic blood pressure value. Therefore, it would be wise to use RPP data gathered from the stress test report to design a client's upper limits of exercise intensity ranges.

Keep clients well below the RPP value associated with ischemic changes on their ECGs. To monitor RPP, take regular blood pressure and heart rate measurements during the first several exercise sessions, along with periodic measurements after you have established that measurements do not fluctuate much and are acceptable.

figure 1

Tom's resting ECG shows no ST depression.

figure 2



Tom's peak exercise ECG (leads I, II, and III, respectively) shows 1.5 mm ST depression in lead II. Notice the downward slope of the ST segment.

Pacemakers or Implanted Cardiac Defibrillators

Clients who have devices such as pacemakers or implanted cardiac defibrillators (ICDs) may show blunted exercise heart rates during exercises that limit their upper-body movement. Some of these devices greatly reduce exercise capacity, while others do not. One way to know is to have clients perform lower-body exercise at a moderate intensity on a treadmill or cycle while you measure heart rate.

To determine the correct exercise intensity for clients with these implanted devices, use the rating of perceived exertion (RPE) scale. Encourage clients to perform extended warm-ups and cool-downs to avoid shortness of breath and premature fatigue.

Heart Medications

Cardiac medications are another important consideration when designing an exercise program. Prescription drugs can lower heart rate and blood pressure responses and should be reviewed carefully. (For more information about cardiac medications, see "Cardiovascular Medication and Your Client" in the May 2006 issue of *IDEA Fitness Journal.*) In addition, exercise may be perceived as more difficult by individuals who take medication for type 2 diabetes (e.g., glipizide or glyburide) than by nonusers.

Take Heart

Training clients with heart disease requires close monitoring and supervision

Now you need to determine the appropriate exercise levels that correspond to the MET levels of 4.9, 5.6 and 6.4 shown above. To accomplish this, see "Determining the Correct Exercise Levels for Clients With Cardiac Concerns," below. If you do not have conversion charts available for your client's particular MET levels, you can calculate the levels using ACSM's metabolic equations (ACSM 2006).

As you scour the list of medications that Tom is taking, you find the beta-blocker Toprol-XL® (metoprolol). Initially, you had set Tom's target heart rate zone at 20–30 beats above resting, but now you realize that because Tom is relatively young, he may override the beta-blockade, so you may need to re-evaluate. You can set it at 60%–80% of HRreserve at a later date. Tom is also taking Glucotrol® (glipizide) to help control his blood sugar; this medication can hamper a client's ability to exercise.

The maximum blood pressure achieved on Tom's stress test was 168/76 mm Hg. In relation to the resting blood pressure of 126/72 mm Hg on the day of Tom's stress test, his blood pressure response to exercise appears to be appropriate. Although ACSM recommends that exercise should be stopped in the presence of a hypertensive response (i.e., a systolic blood pressure of >250 mm Hg and/or a diastolic blood pressure of >115 mm Hg), during exercise this client should maintain blood pressure levels similar to the exercise maximum of 168/76 mm Hg.

According to the stress test results, Tom had 1.5 mm of ST depression during the test. Set the maximum exercise heart rate at 125, which is 10 beats below his maximum heart rate achieved during the test. Because Tom's exercise RPP should remain below the calculated critical RPP of 22,680, you should set his RPP limit at 21,000. When asked, Tom admits to having felt chest pressure at peak exercise during the test. The chest pressure will most likely return if he reaches or exceeds an RPP of 22,680. Chest pressure, unusual shortness of breath, and jaw, back or arm pain are all symptoms of ischemia, a lack of blood flow to the heart.

Because Tom's ejection fraction on the test results was 25%, it is acceptable to let him begin a resistance program using light weights (weights no more than 50% of their 1RM). You will need to make an educated estimation here, because it is not safe for cardiac patients to lift weights equal to their 1RM. Before you progress Tom to heavier weights, you must contact his cardiologist to obtain written clearance and to become acquainted with any suggested guidelines the physician may have for your client. It is also common practice to hold back on progressing with resistance exercise until the client's sternal incision fully heals, which usually occurs within 6–8 weeks of CABG surgery.

on your part as a trainer, but it can also sharpen your skills and expand your abilities as an exercise professional. With the burgeoning population of older clients, it can also be a training niche as you yourself age—and an endless revenue stream for the future!

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References

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Determining the Correct Exercise Levels for Clients With Cardiac Concerns

	4.9 METs	5.6 METs	6.4 METs
treadmill	3.7 mph/2%	3.9 mph/3%	4.1 mph/4%
cycle	100 watts	115 watts	130 watts
Airdyne® bike	level 2.0	level 2.5	level 3.0
arm ergometer	60 rpm/ 400 kgm/min	60 rpm/ 600 kgm/min	30 rpm/ 400 kgm/min

kgm/min (a measure of power) = kilograms x meters/minutes; mph = miles per hour