Focus on CME at McGill University

HEART DISEASE AND EXERCISE part 2: can patients benefit?

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In view of the known benefits of exercise, many patients with heart disease are candidates for a program of regular physical activity. This includes patients with a history of stable angina, myocardial infarction, coronary angioplasty, heart failure and cardiac surgery. It is important to emphasize that this does not represent a

homogeneous group and that patients may vary in clerical status.

In patients with established cardiac disease, the combination of exercise prescription and risk factor modification can improve functional capacity and reduce cardiac morbidity and mortality. Meta-analyses of randomized trials evaluating cardiac rehabilitation after myocardial infarction demonstrate a 20% reduction in cardiac death after three years of followup.1

WHAT ARE THE BENEFITS OF EXERCISE?

Regular aerobic exercise results in improved oxygen delivery to exercising muscle, as well as more efficient oxygen uptake by muscle cells. There is an increase in both the number and the size of mitochondria in exercised muscle, which contributes to enhanced oxygen utilization by skeletal muscle cells. This, in turn, reduces the blood flow needed by skeletal muscle during exercise and, as a result, the cardiac output required for any gffln effort is lowered.2

Regular exercise training also lowers sympathetic nervous system activity.3 Heart rate and blood pressure, which are important determinants of myocardial oxygen demand, will be lower at rest for any level of submaximal effort. The lower myocardial oxygen demand after training allows cardiac patients to perform at higher levels of activity, before limiting symptoms such as angina develop (figure 1). This enhancement of submaximal exercise capacity can have a profound effect on improving a patient's quality of life.

Some studies suggest that exercise may improve coronary flow.4 Possible mechanisms include the stimulation of collateral vessel development, improved coronary endothelial function and regression of coronary stenoses.

A reduction in the rate of sudden death is reported in patients who exercise regularly after having a myocardial infarction.[5] This may be due, in part, to protection from fatal arrhythmias associated with lower circulating catecholamine levels.

Improved serum lipids, decreased platelet adhesiveness and enhanced fibrinolysis are other benefits of exercise which favor the stabilization of atherosclerotic plaque and a reduced risk of coronary thrombosis.

Prescribing exercise for patients with heart disease follows the same principles as those used for the apparently healthy population. It is important to define the type of activity to be performed, as well as the intensity, duration and frequency of exercise.

Dr. Mark Smilovitch

WHO CAN BENEFIT?

In view of the known benefits of exercise, many patients with heart disease are candidates for a program of regular physical activity. This includes patients with a history of stable angina, myocardial infarction, coronary angioplasty, heart failure and cardiac surgery. It is important to emphasize that this does not represent a homogeneous group and that patients may vary in clinical status. Before beginning an exercise program, cardiac patients require a complete medical history and physical examination. Patients with unstable angina, severe aortic stenosis, poorly controlled arrhythmias and decompensated heart failure are at high risk and should not exercise until these problems are corrected.[4]

THE EXERCISE PRESCRIPTION

Prescribing exercise for patients with heart disease follows the same principles as those used for the apparently healthy population. It is important to define the type of activity to be performed, as well as the intensity, duration and freI quency of exercise.

Types of exercise. The types of exercise that improve aerobic capacity are those involving large muscle groups in repetitive motions, with low resistance (e.g., walking, dancing, cycling, swimming and cross country shing).

Intensity. The recommended intensity of exercise (target heart rate) is 65% to 85% of the maximal heart rate. The maximal heart rate must be determined from a symptom-limited exercise test, usually done on a treadmill or stationary cycle. When there is evidence of ischemia during the exercise test, the maximum heart rate for training should be 10 beats per minute lower than the heart rate observed at the onset of ischemia. Training within the target heart rate will improve the patient's effort tolerance. Training at higher levels offers little further benefit and increases the risk of both cardiac and musculoskeletal complications; therefore, it is extremely important that cardiac patients do not exceed the prescribed intensity of exercise. The radial or carotid pulse can be used to verify the heart rate during or immediately following activity. For patients receiving medications which can lower the heart rate (beta-blockers and some calcium channel blockers), the target heart rate is determined from the exercise test while taking their usual medication. If there is a change in these medications, a repeat exercise test is necessary to re evaluate the target heart rate.

The use of a scale of perceived exertion is helpful in teaching patients how to regulate exercise intensity. During the exercise test, the patient is shown a numerical scale with descriptive markers of perceived effort ranging from very,

very light to very, very hard (Table 1). At every minute of exercise, the patient describes the rate of perceived exertion (RPE). Once the target heart rate is calculated, the RPE corresponding to the target heart rate is noted and can be used to guide exercise intensity during physical activities. This provides a method of continuous feedback and is particularly helpful in sports which make it difficult to monitor the heart rate (e.g., swimming, cycling or winter actvities).

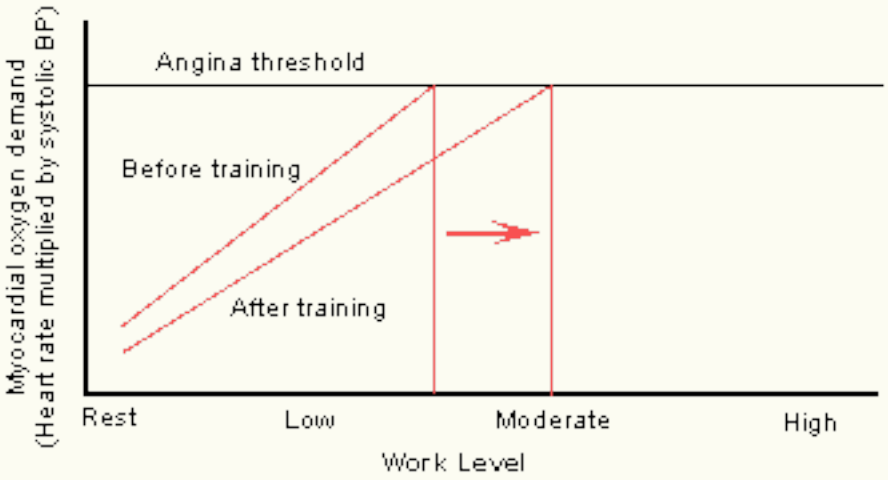

FIGURE 1. Exercise training lowers heart rate and blood pressure (determinants of myocardial oxygen demand) at rest and for any level of submaximal exercise. This allows for an increase in the amount of work that can be done before angina develops.

Duration. The duration of exercise should be between 20 and 40 minutes. In order to limit injury and postexercise hypotension, exercise sessions should be preceded by a warm-up period (of about 10 minutes) and followed by a cool-down period of about 10 minutes.

Frequency. The frequency of exercise should be between three and five sessions per week. For patients with reduced functional capacity, more frequent activity sessions of short duration and low intensity can be advised.

An individualized approach with attention to the patient's interests is important in maintaining compliance with the

exercise program. Walking is an example of a low-intensity activity that is safe and enjoyable, and is more likely to be continued long term than some higher intensity activities.

TABLE 1

BORG SCALE OF RATE OF PERCEIVED EXERTION (RPE)

Using the RPE scale during ecercise testing allows the prescription of
exercise intensity based on the patient's perception of exertion

Perceived exertion	Rating
Very, very light	6 7 8
Very light	9 10
Light	11 12
Somewhat hard	13 14
Hard	15 16
Very hard	17 18
Very, very hard	19 20

SAFETY AND NEED FOR MEDICAL SUPERVISION

The risk of exercise in cardiac patients is small, although it is

greater than that observed in the apparently healthy population. A survey of cardiac rehabilitation programs involving 51,000 patients over a five-year period described 21 cardiac arrests, 18 of which were successfully resuscitated.[6] Most cardiac complications occur when the prescribed exercise intensity is exceeded. A period of monitored exercise sessions supervised by qualified personnel allows paffents to become familiar with the exercise prescription and to learn to self-regulate actvity levels. Six to twelve sessions usually are required to achieve this goal. After this has been accomplished, low-risk patients (exercise capacity greater than six metabolic equivalents of oxygen consumption, without ischemia, no heart failure, good left ventricular function, no arrhythmias) can continue to exercise without supervision. Continued medical supervision may be necessary for higher risk patients with a low functional capacity, significant left ventricular dysfunction or history of complex dysrhythmias.[7] The ongoing safety of cardiac rehabilitation programs is dependent on the medical screening of patients, appropriate supervision by personnel trained in cardiopulmonary resuscitation and adherence to the prescribed intensity of exercise.

CONCLUSION

In view of the known benefits of exercise, in the context of a global cardiac rehabilitation program including risk factor modification, many patients with cardiac disease could benefit from regular physical activity. Such a program should clearly define the type, intensity, frequency and duration of exercise. Careful screening of patients, appropriate medical supervision, when indicated, and adherence to the exercise prescription help to provide maximal benefits at the lowest risk

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SUGGESTED READING

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2. ACSM Position Stand: Exercise for patients with coronary artery disease. Med Sci Sports Exerc 1994; 26:i-v.

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Continuing Medical Education

Information for Patients

Exercising with Cardiac Disease

Many patients with a history of heart disease can benefit from a program of regular physical activity. Exercising can give you the ability to do more, without being limited by fatigue or angina. After you have had a complete medical evaluation, your physician may give you a personalized exercise prescription, which defines the type, intensity, frequency and duration of exercise.

A period of monitored exercise sessions supervised by qualified personnel can help you become familiar with the exercise prescription and learn how to regulate your activity level during exercise

TYPE OF EXERCISE

Aerobic exercise involves large muscle groups in repetitive motions, with low resistance. Walking, dancing, cycling, swimming and cross-country skiing are examples. Choose activities that you enjoy doing and fit easily into your schedule.

INTENSITY OF EXERCISE

The recommended level of exercise will be determined from an exercise stress test. You will be given a target heart rate and a corresponding rate of perceived exertion to help you regulate your level of exercise. There is no advantage to exercising at levels higher than recommended because you can increase your risk of complications.

DURATION OF EXERCISE

Exercise sessions should last between 20 and 40 minutes. Physicai activity should be preceded by a warm-up-period and followed by a cool-down-period of about 10 minutes each.

FREQUENCY OF EXERCISE

Exercise should be performed three to five times per week.

Initially, you should exercise on alternate days to allow for adequate rest and recovery.

EXERCISE PRECAUTIONS

Start slowly and progress gradually. If the following symptoms occur, contact your doctor before continuing with the exercise program:

- Discomfort in the chest, arm, neck or jaw during exercise.
- Dizziness or fainting during exercise.
- Shortness of breath during exercise. The rate of breathing increases during exercise, but should not be uncomfortable.You should be able to talk easily during exercise. If you have difficulty talking, the intensity of activity may be too high.

Aches and pains in the joints. Although there may be some muscle discomfort following exercise, painful joints or back discomfort may indicate poor technique.

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