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Patient education: Exercise (Beyond the Basics)

Author: [Douglas M Peterson, MD, MBA, FACP, FACSM](#)Section Editors: [Francis G O'Connor, MD, MPH, FACSM](#), [Mark D Aronson, MD](#)Deputy Editor: [Lisa Kunins, MD](#)

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EXERCISE OVERVIEW — Physical activity is any activity that involves major muscle groups, including routine daily activities such as shopping or climbing stairs. Exercise includes any activity done with a goal of improving or maintaining physical fitness.

Physical fitness can be described as the ability to carry out daily tasks with vigor and alertness, without excessive fatigue, and with ample energy to enjoy leisure time pursuits and meet unforeseen emergencies.

Many Americans have little or no physical activity in their daily lives. Approximately 24 percent of adults in the United States do not engage in any leisure time physical activity, while only about 49 percent perform the recommended amount of physical activity (at least 30 minutes of moderate physical activity five or more days per week) [1].

There are three main types of exercise:

- Aerobic exercise
- Resistance training
- Stretching exercise

This topic review discusses exercise and its benefits for adults. A separate topic discusses exercise recommendations for people with arthritis. (See "[Patient education: Arthritis and exercise \(Beyond the Basics\)](#)".)

Aerobic exercise — Aerobic exercise involves exertion such as walking, running, or swimming, which increases the flow of blood through the heart. Aerobic means "with oxygen" and refers to working at a level where the large muscles get adequate oxygen from the blood to sustain prolonged activity. Spontaneous activity (fidgeting) can

burn 100 to 800 calories/day.

Resistance training — Resistance training is exercise designed to increase muscle strength and includes lifting weights. This kind of exercise is sometimes called anaerobic, meaning "without oxygen." In contrast to aerobic exercise, the muscles do not get enough oxygen to sustain anaerobic exercise for prolonged periods of time. As an example, anaerobic exercise might involve lifting a heavy weight a number of times, after which the involved muscles are deprived of oxygen and are too fatigued to continue that level of exertion.

Stretching exercise — Stretching exercises are movements designed to improve flexibility and prevent injury. Improving flexibility allows joints to move over a wider range of motion. Good range of motion in all joints helps to maintain musculoskeletal function, balance, and agility.

BENEFITS OF EXERCISE — Apart from improving overall physical fitness, exercise has numerous health benefits:

- The risk of dying is decreased in those who exercise regularly. As an example, one study found that men who engaged in moderately vigorous sports had a 23 percent lower risk of death than men who were less active [2]. Exercise also helps to lower the risk of death in men with coronary artery disease ([figure 1](#)) [3].
- Exercise is an essential component of weight management programs. Exercise burns calories and may help to burn calories even while not exercising. Dieting can lead to loss of muscle, but exercise can help maintain muscle mass while dieting. (See "[Patient education: Losing weight \(Beyond the Basics\)](#)".)
- Exercise improves blood sugar control in people with diabetes and can help prevent or delay the onset of type 2 diabetes. (See "[Patient education: Type 2 diabetes: Overview \(Beyond the Basics\)](#)".)
- Aerobic exercise helps decrease blood pressure; this effect may be even greater in people with high blood pressure. (See "[Patient education: High blood pressure treatment in adults \(Beyond the Basics\)](#)".)
- Exercise often improves the blood fats (lipid profile) by decreasing triglyceride levels and raising high-density lipoprotein (good cholesterol) levels. (See "[Patient education: High cholesterol and lipids \(hyperlipidemia\) \(Beyond the Basics\)](#)".)
- Most people report a reduction in stress after they exercise. Research has shown that exercise is associated with reduced tension, anxiety, and depression.
- Weightbearing exercise helps to prevent osteoporosis and reduces the incidence of fractures. (See "[Patient education: Osteoporosis prevention and treatment \(Beyond the Basics\)](#)".)
- Exercise training can improve circulation and exercise tolerance for people who have angina (chest pain from a reduced blood supply to the heart). After exercise training, a person may be able to exercise longer or at a greater intensity. (See "[Patient education: Angina treatment — medical versus interventional therapy \(Beyond the Basics\)](#)".)
- Some evidence suggests that exercise can provide protection against breast and prostate cancer, delay or prevent dementia, and decrease the risk of gallstone disease.

- Exercise can help with quitting smoking. (See "[Patient education: Quitting smoking \(Beyond the Basics\)](#)".)

A summary of benefits is provided here ([table 1](#)).

TESTING BEFORE AN EXERCISE PROGRAM — Most people do not need any special testing before starting to exercise, but it is best to check with a health care provider. People with diabetes or multiple risk factors for heart disease may need an exercise test before starting an exercise program. An exercise test is performed in a doctor's office or hospital and usually involves walking or running on a treadmill with monitoring leads on the chest.

GETTING STARTED — If you do not normally get much exercise, start by exercising for a few minutes at a low intensity (eg, walking). As physical fitness improves, you can slowly begin to exercise harder, more frequently, or for a longer time, with a goal of getting at least 30 minutes of exercise on five days each week.

Exercise does not need to be continuous to produce health benefits; it can be broken up into three or four 10-minute sessions per day. Moderate-intensity exercise should be performed on most days of the week. However, exercising only one or two days per week is better than not exercising at all.

The greatest health benefits are seen in those who change from a sedentary lifestyle to being moderately active ([figure 2](#)). Moderate exercise can be integrated into your daily routine with activities such as brisk walking (at three to four miles per hour), yard work, or dancing.

A simple way to start exercising is to walk. Start by walking a comfortable distance; establish a personal baseline by walking at a speed and for a length of time that is easily tolerated. Doing too much too fast may result in discomfort, disappointment, or disability from muscle pulls and strains. Try to increase your baseline distance by 10 percent each week. Measure out the distance in a neighborhood, walking trail, or shopping mall.

After reaching 45 to 60 minutes per day, you can increase the intensity of exercise by walking a greater distance in the same time. The goal is to develop a habit of regular physical activity at a level that is comfortable.

EXERCISE PROGRAM — An exercise program should include aerobic exercise, resistance training, and stretching.

Warm up — Exercise sessions should begin with a 5- to 10-minute period of warm-up. Start with some low-level aerobic exercises (walking, stationary cycling, calisthenics) and then do stretches and flexibility movements. The warm-up period allows for a gradual increase in the heart rate and may reduce the risk of injuries.

Workout — It is a good idea to mix up aerobic exercise, strength training, and stretching so as to keep the workout fun and interesting.

Aerobic exercise — Walking is an excellent aerobic activity. Cycling, rowing, stair machine climbing, and other endurance-type activities are also great. Swimming and water aerobics are excellent for people with arthritis. Low-impact activities are recommended because they are less likely to result in physical injury. Running on a street is a higher-impact activity because of the stresses on the feet and legs as they strike the ground with each step.

The exercises should be enjoyable and simple to carry out to encourage a long-term commitment. It may be best

to vary the exercises you do each week (such as swim on three of the days and walk on three of the days) to decrease repetitive strain to your muscles and other tissues.

There is no age specific heart rate recommendation; a specific heart rate is not necessary to achieve health benefits. If you are breathless, fatigued, and sweating, you have worked hard enough. During moderate-intensity exercise, you should be able to carry on a conversation.

A minimum of 30 minutes of moderate-intensity aerobic exercise (eg, brisk walking) is recommended on five days each week. Alternately, you can perform 20 minutes of vigorous-intensity aerobic exercise (eg, jogging) on three days each week. This recommendation is in addition to routine, light-intensity activities of daily living (eg, cooking, casual walking, shopping, etc) [4].

Resistance training — Resistance training can be done with weights, machines, or exercise bands. It should be performed at least twice a week with at least 48 hours of rest between sessions. Resistance training is commonly described in terms of "sets" of "repetitions."

- A repetition is a single completed back and forth motion of a resistance exercise, such as bending and extending the arm at the elbow while holding a weight in the hand.
- A set is a number of repetitions done without resting.

Most experts recommend at least one set of exercises, including 8 to 12 repetitions, for each of the major muscle groups.

Begin with minimal resistance (light weights, resistive bands, or even a can of food) to allow the muscles and other tissues to adapt. Examples of exercises for the upper body are shown in a figure (figure 3).

It is important to use proper technique. If you belong to a health club or gym you might ask a trainer to observe technique. Be sure to breathe normally while lifting weights. Do not hold the breath; instead, exhale with exertion. Do not perform resistance training if you are in pain or have swelling anywhere.

Stretching — Stretching and flexibility exercises should include every major joint (hip, back, shoulder, knee, upper trunk, neck). It is best not to stretch "cold" muscles, so engage in a few minutes of low-intensity aerobic exercise first. Movement into a stretch should be slow, and the stretch itself should be held for approximately 10 to 30 seconds. Do not bounce while beginning or performing a stretch.

Stretching exercises are shown in a figure (figure 4). Each exercise should be performed several times. Stretch and yoga classes are also a good way to remain flexible. The stretch should not cause pain but only mild discomfort.

Cool down — Cool-down exercises should be done for approximately five minutes at the end of an exercise session. Similar to the warm-up period, cool-down may include low-level aerobic exercise (such as slow walking), calisthenics, and stretching. This allows the body to clear acid that has built up in the muscles and allows more blood back into the circulation because less is sent to the muscles. This helps to prevent muscle cramps and sudden drops in blood pressure that can cause lightheadedness.

EVALUATING AN EXERCISE PROGRAM — Exercise should fit into the daily schedule, be enjoyable, and feel

safe. After beginning an exercise program, most people start to notice that they feel healthier.

However, it is common for an exercise program to be disrupted by health problems, changes in job type or hours, personal relationships, and vacations. Getting back on track can be tough but is an important step in maintaining the benefits of exercise.

If your exercise program does not fit into your daily life, try to find ways to integrate exercise so that it can remain a part of your daily routine. For example, take the stairs instead of the elevator, park in a space that is further from the door, or take a longer route to walk from one place to another.

WHEN TO SEEK HELP — In order to exercise safely, it's important to know the warning signs that could indicate a problem. If any of these problems occur, you should stop the exercise or activity and contact your health care provider immediately:

- Pain or pressure in the chest, arms, throat, jaw or back
- Nausea or vomiting during or after exercise
- Palpitations or heart flutters or a sudden burst of a very fast heart rate
- Inability to catch your breath
- Lightheadedness, dizziness or feeling faint **during** exercise (feeling lightheaded **after** exercise may mean that a longer cool-down period is needed)
- Feeling very weak or very tired
- Pains in joints, shins, heels or calf muscles (this is not an emergency but should be evaluated if it does not resolve)

PRECAUTIONS

- Remember to drink fluids during and after exercise. Thirst is a good indicator that more fluids are needed.
- Do not exercise outdoors if the temperature is too hot or too cold.
- In cooler weather, it is better to wear layers of clothes while exercising outdoors. A layer of clothing can be removed if needed.
- Wear supportive, well-fitting running or walking shoes. Replace shoes when signs of deterioration develop (eg, cracking, separation of shoe from the sole, imprint of the foot in the insole). The amount of time exercise shoes will last depends upon a number of factors, including how often and where the shoes are worn.

WHERE TO GET MORE INFORMATION — Your healthcare provider is the best source of information for questions and concerns related to your medical problem.

This article will be updated as needed on our web site (www.uptodate.com/patients). Related topics for patients,

as well as selected articles written for healthcare professionals, are also available. Some of the most relevant are listed below.

Patient level information — UpToDate offers two types of patient education materials.

The Basics — The Basics patient education pieces answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials.

[Patient education: Exercise \(The Basics\)](#)

[Patient education: Diabetes and diet \(The Basics\)](#)

[Patient education: Arthritis and exercise \(The Basics\)](#)

[Patient education: Premenstrual syndrome \(PMS\) and premenstrual dysphoric disorder \(PMDD\) \(The Basics\)](#)

[Patient education: High blood pressure emergencies \(The Basics\)](#)

[Patient education: Chronic compartment syndrome \(The Basics\)](#)

[Patient education: Periodic paralysis syndrome \(The Basics\)](#)

[Patient education: Activity during pregnancy \(The Basics\)](#)

[Patient education: Coronary heart disease in women \(The Basics\)](#)

[Patient education: Medicines for osteoporosis \(The Basics\)](#)

[Patient education: Hamstring injury \(The Basics\)](#)

[Patient education: Shin splints \(The Basics\)](#)

Beyond the Basics — Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are best for patients who want in-depth information and are comfortable with some medical jargon.

[Patient education: Arthritis and exercise \(Beyond the Basics\)](#)

[Patient education: Losing weight \(Beyond the Basics\)](#)

[Patient education: Type 2 diabetes: Overview \(Beyond the Basics\)](#)

[Patient education: High blood pressure treatment in adults \(Beyond the Basics\)](#)

[Patient education: High cholesterol and lipids \(hyperlipidemia\) \(Beyond the Basics\)](#)

[Patient education: Osteoporosis prevention and treatment \(Beyond the Basics\)](#)

[Patient education: Angina treatment — medical versus interventional therapy \(Beyond the Basics\)](#)

[Patient education: Quitting smoking \(Beyond the Basics\)](#)

Professional level information — Professional level articles are designed to keep doctors and other health professionals up-to-date on the latest medical findings. These articles are thorough, long, and complex, and they contain multiple references to the research on which they are based. Professional level articles are best for people who are comfortable with a lot of medical terminology and who want to read the same materials their doctors are reading.

[Effects of exercise in adults with diabetes mellitus](#)

[Exercise and fitness in the prevention of atherosclerotic cardiovascular disease](#)

[Exercise physiology](#)

[The benefits and risks of exercise](#)

[Exercise during pregnancy and the postpartum period](#)[Athletes: Overview of sudden cardiac death risk and sport participation](#)

The following organizations also provide reliable health information.

- National Library of Medicine

(www.nlm.nih.gov/medlineplus/healthtopics.html)

- Centers for Disease Control and Prevention

(www.cdc.gov)

- American Heart Association

(www.americanheart.org)

- American Council on Exercise

(www.acefitness.org)

[1-5]

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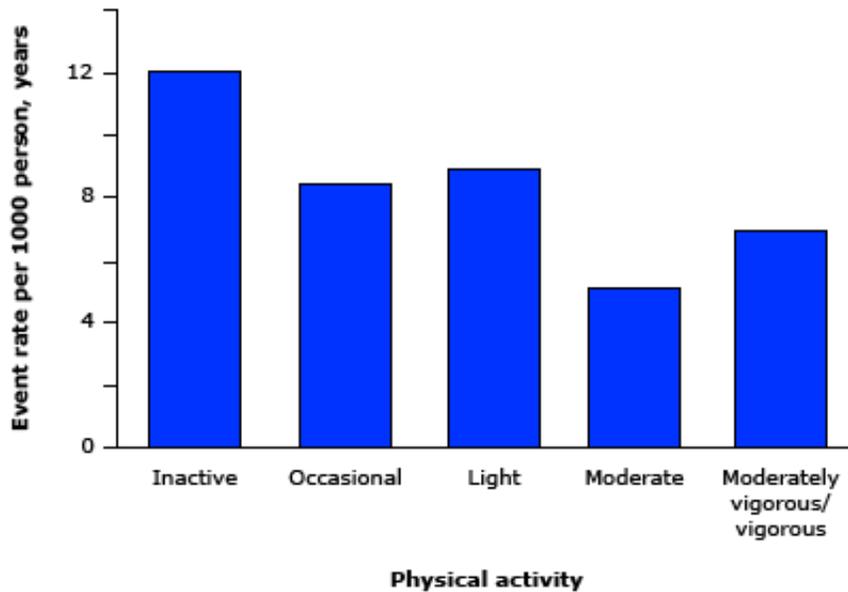
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Topic 1989 Version 32.0

GRAPHICS

Coronary heart disease



Coronary events are less frequent among those who exercise. In a study of 5159 men, aged 40 to 49 years, followed for an average of almost 19 years, the age-adjusted coronary heart disease event rate per 1000 person-years is lower in those who perform any physical activity compared to inactive subjects.

Data from: Wannamethee, SG, Shaper, AG, Alberti, KG, Arch Intern Med 2000; 160:2108.

Graphic 54004 Version 1.0

Benefits of regular physical activity

Reduces the risk of dying prematurely
Reduces the risk of dying from heart disease
Reduces the risk of stroke
Reduces the risk of developing diabetes
Reduces the risk of developing high blood pressure
Helps reduce blood pressure in people who already have high blood pressure
Reduces the risk of developing colon cancer
Reduces feelings of depression and anxiety
Helps control weight
Helps build and maintain healthy bones, muscles and joints
Helps older adults become stronger and better able to move about without falling
Promotes psychological well-being

Graphic 72243 Version 1.0

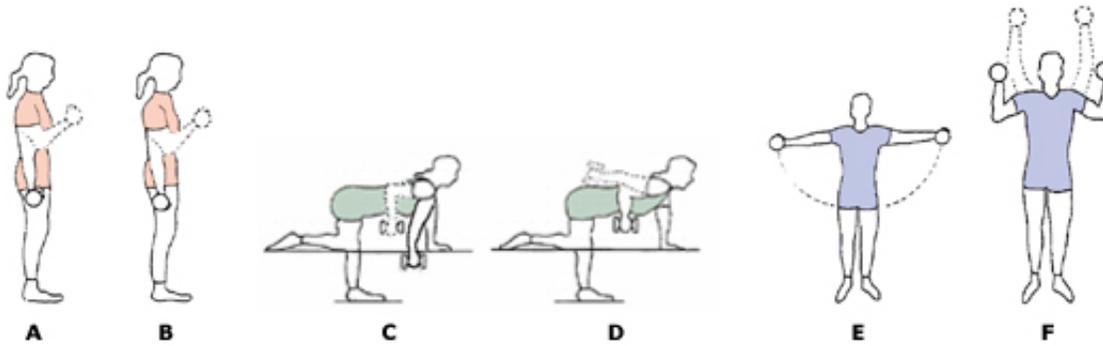
Examples of moderate physical activity

Washing and waxing a car for 45 to 60 minutes	 <p>Less vigorous, more time</p> <p>More vigorous, less time</p>
Washing windows or floors for 45 to 60 minutes	
Playing volleyball for 45 minutes	
Playing touch football for 30 to 45 minutes	
Gardening for 30 to 45 minutes	
Wheeling self in wheelchair for 30 to 40 minutes	
Walking 1 3/4 miles in 35 minutes (20 minutes/mile)	
Basketball (shooting baskets) for 30 minutes	
Bicycling 5 miles in 30 minutes	
Dancing fast (social) for 30 minutes	
Pushing a stroller 1.5 miles in 30 minutes	
Raking leaves for 30 minutes	
Walking 2 miles in 30 minutes (15 minutes/mile)	
Water aerobics for 30 minutes	
Swimming laps for 20 minutes	
Wheelchair basketball for 20 minutes	
Basketball (playing a game) for 15 to 20 minutes	
Bicycling 4 miles in 15 minutes	
Jumping rope for 15 minutes	
Running 1.5 miles in 15 minutes (10 minutes/mile)	
Shoveling snow for 15 minutes	
Stairwalking for 15 minutes	

A moderate amount of physical activity is roughly equivalent to physical activity that uses approximately 150 calories (kcal) of energy per day, or 1000 calories per week. Some activities can be performed at various intensities; the suggested durations correspond to the expected intensity of effort.

Graphic 57200 Version 3.0

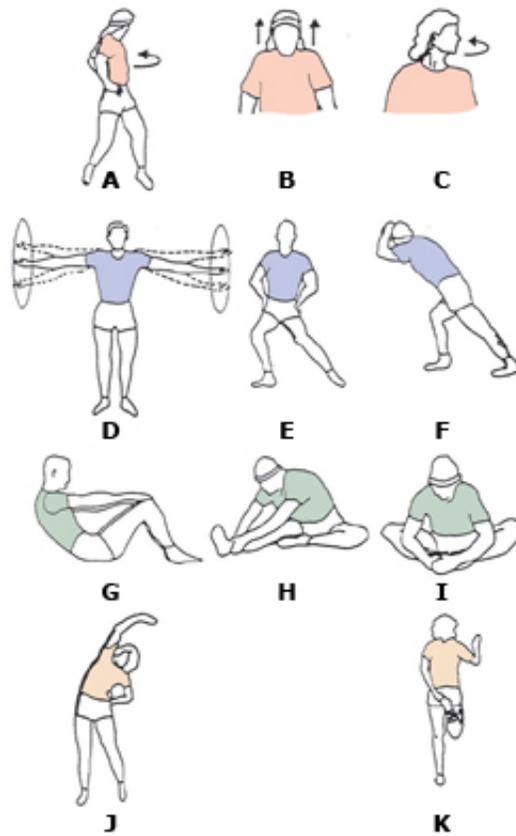
Upper body weight routine



- (A) Curls/palms up.
- (B) Reverse curls/palms down.
- (C) Bent knee over rows.
- (D) Tricep kick-backs.
- (E) Side lift.
- (F) Military press.

Graphic 76577 Version 3.0

Stretching exercises



-
- (A) Back stretch.
 - (B) Shoulder shrug.
 - (C) Neck stretch.
 - (D) Arm circles.
 - (E) Standing groin stretch.
 - (F) Calf stretch.
 - (G) Modified sit-up.
 - (H) Hamstring stretch.
 - (I) Sitting groin stretch.
 - (J) Side stretch.
 - (K) Quadriceps stretch.

Graphic 74870 Version 3.0

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