



FAQs answered (general)

What is the best exercise for the heart?

About 3 million years ago a distant ancestor found that his / her pelvis was different because it made bipedal (two legged) walking easier between branches and on the ground. The muscles of the body, including the heart, were already more used to low intensity, aerobic, low fuel burning activities with the very occasional quick acceleration to a short lived, anaerobic activity. These distant ancestors did an average of 44 hours per week hunting and gathering which meant at least a 10 mile walk per day. The body design of 3 million years ago has changed very little but our lifestyles have changed dramatically. We now sit in front of a computer, television screen and behind a steering wheel for more than 44 hours per week. We no longer see bipedalism as a useful form of transport. Our muscles, including our hearts, are now weak, under used and not very healthy.[1] So getting back to the original question. The answer is aerobic bipedal exercises are best for improving the health and fitness of the heart. They work because they are of a sustainable low to moderate intensity, continuous, repetitive, rhythmical, of low impact and use the large muscle groups of the legs, arms and back. Examples of this type of activity includes: brisk walking, hiking, jogging, cycling, rope skipping and even swimming. [2:31]

Do I need to warm up?

Yes! This needs to be a minimum of 5 to 10 minutes of slow stretching followed by light exercises in order to get your heart rate up, gradually in a step-like way, to your lower Target Heart Rate (THR) percentage, or a Rating of Perceived Exertion (RPE) of 11 to 15. This will reduce your risk of joint injuries and palpitations.[2:50][3:244,288][4:129][5:109]

How hard should I exercise?

You can judge the intensity of any exercise or activity by using the following ' tools of the trade ', preferably in this order:

- 1) by taking your pulse and making sure you stay within the Target Heart Rate Zone recommended for your cardiac condition(s), or use Resting Heart Rate plus 20 to 30 beats if you are on strong heart rate lowering medications
- 2) by using an RPE of 11 to 15 (do not go over 17)
- 3) by using the ' Talk Test ' and other Breathlessness Scales
- 4) by looking out for warning signs and symptoms of over exertion such as; chest pain, dizziness, headache, irregular pulse, shortness of breath, etc.

How long should I exercise for?

To begin with you should aim to do 15 to 20 minutes of aerobic exercise per day. You may have to break this up into 5 minute sessions throughout the day up to a total of 15 to 20 minutes. Later when you are fitter try to do 20 to 30 minutes as this is what gives the greatest health and fitness gains. Over 30 minutes burns more fat but has a higher risk of musculo-skeletal injuries such as strains and sprains.[2:40][3:43,289][4:222][5:55,108]

How soon can I exercise again?

Between exercise bouts: Before doing another bout (or set) of exercise make sure your heart rate is down to 100 beats per minute or within 10 beats of your resting pulse.[2:45]

Between exercise sessions: If your early morning pulse rate is slightly higher than normal this might mean that you are in the early stages of a fever or that you are over doing your training and may need another day of rest.

Are 'cool-downs' necessary?

Yes ! Again do 5 to 10 minutes or more of light exercises stepping down in intensity followed by slow stretches as this protects the heart against a sudden blood pressure drop leading to palpitations and dizziness and also helps start the recovery process between sessions.[3:244,288][4:129][5:115]

How frequently should I exercise?

This needs to be 3 to 5 days per week for best results depending on your fitness level and cardiac history. If you trained 6 to 7 times per week you increase your risk of musculo-skeletal injuries such as strains and sprains.[2:41][3:289][4:222][5:55,108]

Should I take my pulse?

Yes! There is no better way of knowing how hard you are stressing that heart of yours than taking your pulse and recognizing what is the safe maximum you can take it to.[2:34]

How do I take my pulse?

At the wrist: Lightly place the first two fingers of your hand on the thumb side of your other wrist. You will feel the pulsations between the tendons in the centre of your wrist and the wrist bone directly down from your thumb. Count your pulses for 10 or 15 seconds and multiply by 6 or 4 respectively to get pulses per minute, or use the quick conversion chart below.

At the neck: Be aware that some people have very sensitive pressure sensors in their neck arteries which slow the heart rate if pressed. Check with your doctor / physician first to find out if you are one of these people before you attempt to take your pulse at your neck. If it is alright for you to take your pulse here you must first find your ' Adam's Apple ' (or voice box) at the front upper part of your neck with your first two fingers. This is the structure that moves upward when you swallow. Move 1 to 1 and a half inches to the right or left side of your voice box and under the strap-like muscle (sternocleidomastoid) to feel your pulse. Count your pulses for 10 or 15 seconds and multiply by 6 or 4 respectively to get pulses per minute, or use the quick conversion chart below.[4:86][5:110]

If you are still having difficulty locating your pulse in either of these two places then ask a trained person to show you how to do it and then keep practicing until you can do it with ease.

Can I use a 30 second pulse count?

No. Heart rate drops quite quickly post exercise depending on how fit and young you are. Therefore it is better to count your pulse over 10 or 15 seconds.[2:36][4:86]

Quick Heart Rate Conversion Chart:

Pulses in ...	10 seconds	15 seconds
9	$x 6 = 54$ bpm	
10	$x 6 = 60$	
11	$x 6 = 66$	
12	$x 6 = 72$	
13	$x 6 = 78$	$x 4 = 52$
14	$x 6 = 84$	$x 4 = 56$
15	$x 6 = 90$	$x 4 = 60$
16	$x 6 = 96$	$x 4 = 64$
17	$x 6 = 102$	$x 4 = 68$
18	$x 6 = 108$	$x 4 = 72$
19	$x 6 = 114$	$x 4 = 76$
20	$x 6 = 120$	$x 4 = 80$
21	$x 6 = 126$	$x 4 = 84$
22	$x 6 = 132$	$x 4 = 88$
23	$x 6 = 138$	$x 4 = 92$
24	$x 6 = 144$	$x 4 = 96$
25	$x 6 = 150$	$x 4 = 100$
26	$x 6 = 156$	$x 4 = 104$
27	$x 6 = 162$	$x 4 = 108$
28	$x 6 = 168$	$x 4 = 112$
29	$x 6 = 174$	$x 4 = 116$
30	$x 6 = 180$	$x 4 = 120$
31		$x 4 = 124$
32		$x 4 = 128$
33		$x 4 = 132$
34		$x 4 = 136$
35		$x 4 = 140$
36		$x 4 = 144$
37		$x 4 = 148$
38		$x 4 = 152$
39		$x 4 = 156$
40		$x 4 = 160$

How do I work out my Training Heart Rate Range?

You should use the Percent of Heart Rate Reserve method (%HRR) or Karvonen method.

Karvonen formula: $THR = [(HR_{max} - HR_{rest}) \times \% Intensity] + HR_{rest}$

where: THR = Target Heart Rate
 HR_{max} = maximum heart rate achieved during an ECG stress test or if not known 220 - age
 HR_{rest} = resting heart rate (standing)
 (HR_{max} - HR_{rest}) = Heart Rate Reserve (HRR)

Example: A Cardiac Athlete with a resting HR of 70 bpm (beats per minute) who achieved a HR_{max} of 110 bpm on a graded exercise test before stopping due to shortness of breath, fatigue and mild ECG ST-segment changes. The training intensity recommendations for this person were decided at 60% - 70% of HRR range.

First the heart rate for 60% of the HRR was calculated:

$THR = [(110 - 70) \times 0.6] + 70$
 $THR = [40 \times 0.6] + 70$
 $THR = 24 + 70$
 $THR = 94 \text{ bpm}$

Then the heart rate for 70% of the HRR was calculated:

$THR = [(110 - 70) \times 0.7] + 70$
 $THR = [40 \times 0.7] + 70$
 $THR = 28 + 70$
 $THR = 98 \text{ bpm}$

Therefore the exercise intensity of 60% - 70% of HRR would be: THR = 94 - 98 bpm. A bit low for some but tailored to the fitness level of this Cardiac Athlete none the less. This cardiac athlete is very probably on heart rate suppressing medicines. Very probably anti-anginals such as nitrates, Beta-blockers and calcium channel blockers.

What if I am on beta-blockers?

It may be impractical to use heart rate for deciding exercise training intensity if you are on beta receptor blocking (and calcium channel blocking) medications because they will slow your exercising heart rate by anything from 15 to 60 beats per minute. Therefore, as a rough guide use your Standing Resting Heart Rate and add 20 to 30 beats per minute to this to calculate a safe, beginning exercise training intensity. You will have to adjust this figure depending on the dose of your medication(s). The alternative is to use the Borg perceived exertion rating (RPE) of 12 to 13 as an appropriate intensity to begin with.[2:56,148][3:151][5:59]

Are pulse watches any good?

Yes. There are many good pulse watches now being sold at reasonable prices. They are being used all over the globe in many institutions including college, university, military and hospital settings. They have many various features but the more useful for cardiac athletes includes audible alarms for programmable upper and lower training heart rates and coded transmission to avoid 'cross-talk' . Otherwise you could be exercising at someone else's heart

rate if they too are wearing an uncoded pulse watch !

What is the Borg RPE Scale?

The RPE (Rate of Perceived Exertion) scale was devised by Borg and is a 15-point scale ranging from 6 to 20 with exertional descriptions at every odd number. The RPE response has been shown to correlate highly (80 - 90%) with cardiorespiratory and metabolic variables such as breathing rate, oxygen uptake, blood lactate concentrations and heart rate.

The Borg RPE Scale:	
6	
7	Very, very light (example: sitting reading / watching TV, relaxed)
8	
9	Very light
10	
11	Fairly light
12	
13	Somewhat hard
14	
15	Hard
16	
17	Very hard
18	
19	Very, very hard (example: trying to run fast up a very steep hill)
20	

If you are not on heart rate lowering medicines add a zero to the end of the RPE score you have chosen to describe how hard an exercise / activity was and compare this with your peak exercising heart rate. For example an RPE of 12 becomes 120 and the cardiac athlete takes her pulse and finds it is 118 bpm ! This is very close to 120. An RPE of 12 - 13 is approximately 60% of HRR and an RPE of 15 is the equivalent of 90% HRR. Therefore cardiac athletes should be using a conditioning RPE of 12 to 15.[2:22,36][3:213][4:87][5:156]

What is the Modified Borg RPE Scale?

Some people prefer to use a 10 point rating scale when there is no easily demonstrated relationship between their heart rate and a rate of perceived exertion due to the cardiac medications they are taking. Borg has provided the following revised ratio scale for this purpose.

The Modified Borg RPE Scale:	
0	Nothing at all
0.5	Extremely easy
1	Very easy
2	Easy
3	Moderate
4	Somewhat difficult
5	Difficult
6	
7	Very difficult
8	
9	
10	Maximally difficult

A rating of 3 to 5 is considered adequate for a training effect.[2:22][3:213][4:88][5:156,159][6:13]

What is the Angina Scale?

Grading scales have been provided for use with cardiac patients during exercise testing in order to monitor the severity of angina and how it progresses with increasing workload.

The Angina Scale:	
1 CP+	Light, barely noticeable
2 CP++	Moderate, bothersome
3 CP+++	Severe, very uncomfortable
4 CP++++	Most severe pain ever experienced

Where CP = Chest Pain.

When your chest discomfort reaches 2 on the above scale you must stop whatever exercise or activity you are doing and sit down and rest. If the pain or discomfort does not go away within 5 minutes of stopping take your anti-angina medication (tablet or spray). If the chest pain or discomfort does not go away in another 10 minutes after taking your anti-angina medicine you must telephone your emergency number immediately and get a paramedic ambulance to

take you to the nearest hospital emergency room for checks and tests.[2:12][3:215][5:96][6:44]

At all other times keep a detailed record of your angina in your training diary and describe:

1. The pain.
2. Location of the pain.
3. Duration of the pain.
4. What may have contributed to it.
5. What helped to make it go away.
6. What was your exercise intensity at its onset.
7. Any recent adjustments made to your cardiac medications.

What is the 'Talk Test'?

This is a simple method of deciding if the exercise / activity you are doing is too strenuous or just right. It is determined by how short of breath you are. If you can talk whilst exercising / training then the intensity of exercise is probably ' Light ' (less than or equal to 40% of maximum capacity or HRR) and will not help to improve stamina much, but it is nevertheless excellent for preventing coronary disease. If conversation becomes a bit jerky, the exercise is probably moderate (50-70% of maximum capacity or HRR) and will help improve physical capacity. If you can no longer talk at all, the level of exercise is too high and you must ease back a bit.[5:110]

What is the Breathlessness Scale?

This scale has been designed to work alongside the angina scale in order to determine exercise severity.[2:12][3:215]

The Breathlessness Scale:		
1 SOB+	Onset	Mild, noticeable to patient but not observer
2 SOB++	Mild	Mild, some difficulty, noticeable to observer
3 SOB+++	Moderate	Moderate difficulty, but can continue
4 SOB++++	Severe	Severe difficulty, patient cannot continue

Where SOB = 'Shortness Of Breath'.

An SOB of 1 to 3 is adequate for an exercise conditioning response.

Grading scales that have been designed for patients with respiratory disorders can also be used as a cardiac rehabilitation tool. Below is an example of this.

The RPD (Rate of Perceived Dyspnea) Scale:	
0	None
1	
2	Just Noticeable
3	
4	Mild
5	
6	Moderate
7	
8	Severe
9	
10	Unbearable

An RPD score of 2 to 6 is adequate for a conditioning response.[12:4]

How do I know if I am over doing it?

By the time you experience symptoms of angina, dizziness, excessive breathlessness, etc, it is too late. In other words you have already stressed your heart unnecessarily too hard. You need to know you are exercising / training hard enough and effectively enough before you get any of these adverse symptoms. The best way is of course to take your pulse and to know what is a safe and effective exercise / training heart rate range for you and your unique cardiac history. Then there is the RPE Scale, the ' Talk Test ', the Dyspnea Scale, and the Angina Scale.[2:21,56][3:214,260][4:89][6:12]

What are the exercise 'Stop Signs and Symptoms' ?

Stop exercise training if you experience any of the following:[2:21,56][3:214,260][4:89][6:12]

1. Fatigue.
2. Light-headedness, pallor, breathlessness, nausea.
3. Increasing angina (up to a rating of 2 or CP++).
4. An extremely fast pulse.
5. Increasing palpitations or irregular heart beats.
6. An inappropriate drop in heart rate at rest or with increase in workload.

What is the best exercise program for cardiac patients?

The following exercise program is recommended for all ischemic (inadequate blood flow) cardiac conditions such as angina, angioplasty, stent, MI and CABG patients. Please also refer to the individual exercise recommendations for the various cardiac conditions you may have.[2:50]

Mode:	rhythmic, steady state (aerobic) exercises which use major muscle groups. Examples: brisk walking, hiking, jogging, step exercise, rope skipping, skating, cycling, rowing, swimming or cross-country skiing.[2:31]
Warm-up:	this should be gradually stepped up in intensity for more than 10 minutes. Start with stretching exercises, then do gentle callisthenic type exercises, jog on the spot, etc., to get your heart rate up to your lower Target Heart Rate or a Rating of Perceived Exertion (RPE) of 11 to 15.[2:50]
Intensity:	<p>should be in the range of 40% to 80% of Heart Rate Reserve (HRR)</p> <p>40 - 60% HRR Beginner 60 - 70% HRR Intermediate 70 - 80% HRR Advanced</p> <p>Only go onto the next intensity level when you can comfortably do 30 minutes or more of continuous aerobic exercise at your present intensity.[2:32,56]</p> <p>12 to 14 on the Borg Rate of Perceived Exertion (RPE) Scale [2:36] 5 to 7 on the Modified Borg RPE Scale 5 to 7 on the Modified Borg RPD Scale</p>
Duration:	<p>10 to 60 minutes of continuous aerobic activity depending on your fitness level.[2:32,61]</p> <p>10 - 20 minutes Beginner 20 - 30 minutes Intermediate 30 - 60 minutes Advanced</p>
Cool down:	lower your heart rate from your training zone in a stepwise fashion gradually over 10 minutes finishing with stretching and relaxation activities. Allow your heart rate to get down to 100 beats per minute or within 10 beats of your resting pulse before you head for the shower.[5:115]
Frequency:	repeat sessions 3 to 5 times per week.[2:32]

Can I go swimming yet?

Stent patients can start swimming after 3 weeks, but heart attack and CABG patients must wait until 4 to 6 weeks (the same is true for cycling). When you do go why not identify yourself to the lifeguard and ask if you can leave your GTN spray (with your name on), inhaler or diabetic food with them ? Be aware that hot and humid air is more likely to make you feel unwell if you are a heart patient. Do not dive head first into water which is on the cold side as it may stop your heart momentarily. Avoid excessive breath holding and underwater swimming as it puts the heart under unnecessary dangerous stresses. When you get up and out of the water do so slowly as the water has been providing buoyancy to and squeeze on your blood vessels and so you may feel dizzy and experience palpitations if you move too quickly.[5:108]

Can I go to the gym?

This is not normally recommended for people with CHD (Coronary Heart Disease), high blood pressure, frequent arrhythmias or poor cardiac reserve. This is okay after 5 to 6 weeks of a supervised cardiac rehabilitation program if the nurse / therapist and doctor / physician agree. Do NOT however start lifting heavy weights because the static effort involved pushes your blood pressure and heart rate up to dangerous levels. Even if you have selected a light to moderate weight and are doing around 25 repetitions of a movement, as soon as you tire and that weight begins to move slowly, you are straining too much. The same is true of other 'static' or isometric type exercises. You should avoid the Valsalva Manuver at all costs.[2:49]

Can I exercise with weights?

Below is a program which is suitable for most cardiac rehab patients. You must however ask your doctor / physician or nurse-specialist if you are permitted to perform this type of exercise program. It is not usually recommended for patients with high blood pressure, CHD (Coronary Heart Disease), frequent arrhythmias or poor cardiac reserve.[2:49] Please refer to the individual exercise recommendations for the cardiac conditions you may have.

Resistance Training Program:

Mode:	circuit weight training, using machines or free weights, or a combination of both. All major muscle groups, including upper body exercises, dynamic, repetitive motions.[3:247]
Exercises:	a total of 8 to 10 alternating upper then lower body exercises, emphasizing large muscles groups, 'compound' exercises (example: half squats) as opposed to 'isolation' exercises (example: biceps curls). Full normal ROM (Range Of Motion).[3:268][5:115]
Warm-up:	you should increase your heart rate almost stepwise up to your lower training heart rate, over 10 to 15 minutes. Starting with gentle joint stretching, calisthenics, jogging on the spot, etc.,
Intensity:	40% to 60% of 1 RM (Repetition Maximum) or maximum repetitions in allotted time.[3:269] 40 - 60% 1 RM Beginner 50 - 70% 1 RM Intermediate 60 - 80% 1 RM Advanced
Repetitions:	more than 10 and less than 25 (refer to ' 1 Rep Max ' calculation). Sets / Circuits: 2 to 3
Rest phase:	if performing sets of an exercise always give yourself at least a 1 minute rest period but no shorter than this and no longer than 3 minutes rest. Ideally your heart rate should get down to 100 beats per minute (depending on medication) or within 10 beats of your resting pulse before you attempt another set of exercise.
Duration:	10 to 60 minutes of continuous activity depending on your fitness level. 10 - 20 minutes Beginner 20 - 30 minutes Intermediate 30 - 60 minutes Advanced
Cool-down:	intensity and pulse rate should be gradually stepped down over 10 minutes and finish with gentle stretching exercises. This hopefully will guard against sudden blood pressure drops caused by suddenly stopping. You should feel rested and not fatigued within an hour following the exercise. If you do still feel fatigued you need to reduce your intensity and or duration
Warning:	avoid the Valsalva maneuver and isometric exercises.
Frequency:	2 to 3 sessions per week

What is the '1-Rep Max' ? The most accurate way for you to find a safe weight / resistance to lift is to very carefully find your ' 1-REP MAX '. After a suitable 5 to 10 minutes warm-up to your Training Heart Rate Range which is appropriate for your cardiac condition, select a weight which is moderately light and lift it once. If you can do this easily without straining and without holding your breath, repeat this procedure with the next increment in weight / resistance. Keep repeating the procedure until you find a weight / resistance you would not be able to lift without straining or holding your breath. This last weight / resistance you lifted is your ' 1-Rep Max '. Now calculate what 40% for this is by multiplying your 1-Rep Max by 0.4 and use this as your starting weight / resistance. See how many reps you can do with it. You should be doing around 20 to 25 repetitions of the exercise at this weight / resistance to begin with. Now calculate 70% (0.7) of your 1-Rep Max. This is the maximum you should gradually work up to. Never ever do less than 10 reps. The formula is just a guideline. A starting point. You will very probably have to adjust the weight

/ resistance so that you do not do any less than 10 reps.[2:49][4:105][5:109]

What is the 'Valsalva Maneuver' ?

Static straining whilst holding your breath results in increased systemic arterial blood pressure. This is detected by special blood pressure sensors in the walls of the main arteries. Heart rate is then slowed automatically to try to offset this high blood pressure. The raised blood pressure means the heart has to contract more forcibly against it which increases the work of the heart and its requirements for oxygen but at the same time increased thoracic (chest) pressure slows coronary blood flow and reduces venous return to the heart. There is a ' supply and demand problem ' with oxygen carrying blood to the heart. Not a very safe situation to be in if you have a cardiac history ! The correct way to breath when performing resistance type exercises is to breath out for a 2 second count on the up movement or contraction / effort phase and breath in for a 2 second count on the down movement or relaxation phase.[2:49][3:39,56]

How long do I have to wait after meals?

Food in the stomach places extra demands on the heart and circulation. If you exercise straight after a meal you will tire sooner and may end up feeling dizzy. If you have washed this down with a cup of strong coffee this may make your heart beat faster and more irregular and your blood pressure may go up. Alcohol does all of these things as well as mask the warning-signs of angina pains. Therefore you must wait ideally 2 to 3 hours after a heavy meal before exercising. A smaller meal and wait about one and a half hours.[2:14][3:150,260]

Can I exercise with a cold?

Do NOT exercise if you do not feel well, no matter how keen you are. You have a cardiac history don't forget, so play it safe. It is unsafe for you to exercise when you have a viral infection, in other words a sore throat or a temperature. Wait another 2 days once your symptoms have all gone to be absolutely sure and then start up again gradually.

What is the best time of day to exercise?

During summer try to exercise in the morning or evening when it is cooler and drink more glasses of water than you would normally do. The only disadvantage of exercising at these times is probably rush-hour traffic fumes. Such pollution can reduce your exercise tolerance by 4% and make you get angina sooner due to there being less oxygen but more carbonmonoxide present in the air.

During the winter months do your exercise more toward mid-day and be aware of the added stresses that cold air, buffeting winds and undulating hills can place on your heart. You may experience your angina quicker on colder days.[2:49][3:90][4:148,217]

Should I tell my doctor / physician that my condition has changed?

Yes ! If your condition has changed recently do NOT exercise and report these changes immediately to your doctor / physician so that they can be checked out before you resume your exercise / training program.[2:55][3:206,260]

Here are some of the things you should report:

- 1 Angina coming and going at rest.
- 2 For those of you who monitor your blood pressures at home, a resting systolic (top number) blood pressure over 200 mmHg or resting diastolic (lower number) blood pressure over 100 mmHg.
- 3 A significant drop of 20 mmHg or more in resting systolic blood pressure from your daily average level which can not be explained by medications.
- 4 Increased breathlessness.
- 5 Illness or fever.
- 6 Palpitations or irregular pulse.
- 7 A resting heart rate of more than 100 beats per minute.
- 8 Dizzy spells.
- 9 Persistent back pain, or chest pain.
- 10 Swollen ankles and feet.
- 11 Problems with your diabetes.
- 12 Joint or muscle problems likely to limit your exercise tolerance and stress your heart more.

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