

## Chapter 1 : 21 Impressive Examples of HIIT Workouts That Will Get You Lean | Yuri Elkaim

*Acute Physiological Responses to Short- and Long-Stage High-Intensity Interval Exercise in Cardiac Rehabilitation: A Pilot Study* Gerhard Tschakert 1,2, Julia M. Kroepfl 1,5, Alexander Mueller 2, Hanns Harpf 3, Leonhard Harpf 3.

Axe content is medically reviewed or fact checked to ensure factually accurate information. With strict editorial sourcing guidelines, we only link to academic research institutions, reputable media sites and, when research is available, medically peer-reviewed studies. Note that the numbers in parentheses 1, 2, etc. The information in our articles is NOT intended to replace a one-on-one relationship with a qualified health care professional and is not intended as medical advice. Our team includes licensed nutritionists and dietitians, certified health education specialists, as well as certified strength and conditioning specialists, personal trainers and corrective exercise specialists. Our team aims to be not only thorough with its research, but also objective and unbiased. November 4, Dr. Axe on Facebook Dr. Axe on Twitter 18 Dr. Axe on Instagram Dr. Axe on Google Plus Dr. Axe on Youtube Dr. Axe on Pintrest Share on Email Print Article High-intensity interval training , also called HIIT workouts, have become known in the fitness and medical world as one of the most effective means of improving cardiovascular health, respiratory endurance, as well as metabolic function. HIIT workouts are known to be an excellent way to burn fat in a short period of time and to help improve the physical performance of athletes of all kinds. This sequence is repeated several times in a row usually for a duration between 20â€”30 minutes. HIIT workouts versus steady-state exercise. Additionally, the study concluded that while the HIIT workout helped build muscle, the steady-state workouts actually broke muscle down. Researchers concluded that not only does HIIT burn more fat over the duration of the day, but it also builds more muscle and improves metabolic function. What stays the same throughout different types of HIIT programs? In order to follow an interval schedule, you switch between sprints that require roughly 90 percent of your energy, followed by walking or slowly jogging to rest and recover. When researchers measured blood flow before, immediately following and at one and two hours after working out, participants with type 2 diabetes saw improvements at each time. In fact, VO2max is considered the best indicator of cardiovascular endurance. This is the measurement most commonly used in fitness studies to show the effects that the exercise is having on the body. Specifically, VO2max is defined as the maximum amount of oxygen in milliliters that a person can use in one minute per kilogram of their body weight. This measurement is important because the amount of oxygen that a person can utilize within one minute is an indicator of their overall fitness level and also their lung and heart health. During the short rest intervals, you work on recovering more quickly and needing less time to rest. This is how you build stamina over time and increase your ability to perform physical exercises more effectively. Knowing your VO2 max can help you to establish fitness goals to work towards and gives you a starting point as to how capable you are of maintaining a high level of effort over a period of time. A higher level of oxygen is needed during recovery in order to facilitate in the restoration of hormone levels, refueling your glucose stores, and repairing your muscle fibers and tissue. The best part about EPOC? After intense exercise, fat stores within your body are actually broken down and free fatty acids are released into the bloodstream. During the post-workout recovery phase, these free fatty acids become oxidized and your body uses them for energy. As your body uses more oxygen to bring itself back into a resting state, more calories are burned in the process, even while you are done working out. This means you continue to experience benefits and fat loss during the remainder of your day following a HIIT workout. New ATP adenosine triphosphate â€” which is the fuel source or energy that your body works off of â€” is also synthesized. Additionally, post-exercise oxygen is used to reduce lactic acid. Lactic acid travels via the bloodstream to the kidneys, cardiac muscle and liver during workouts; then an increased amount of oxygen is necessary to convert the lactic acid back to pyruvic acid so that your pain subsides and body enters a resting state. Due to all of these vital tasks that the body must undergo during a period of EPOC, you can see why HIIT workouts have such a huge effect on your strength, stamina and health. Certain studies have shown that high-intensity exercise can be potentially unsafe for sedentary middle-aged adults. That being said, anyone can work towards practicing HIIT workouts for their multiple benefits. In conclusion, an exercise plan that

includes consistent high-intensity interval exercise has been shown to improve body composition, boost cardio-metabolic health, lessen the risk for heart disease, and help improve exercise tolerance, even in obese and overweight participants. Even seasoned athletes use HIIT workouts to gain stamina and bust through plateaus that they are experiencing after practicing one particular type of exercise for a long time. Start off with shorter bursts of intense periods and increase the duration as you build strength and stamina. Pay attention to how long of rests you are taking and aim to shorten the restful period duration as your abilities improve. The amount of reps you perform during your intense bursts Instead of aiming to improve the duration of time you spend in an intense interval, you can also focus on how many reps you are able to do in a row, for example, or your speed of work. You will likely notice your ability to do reps quickly improves as you become accustomed to HIIT workouts and that you need less recovery time in between sets. You may also notice that your sprints get quicker or your cycling pace gets faster if you choose to run or bike during your HIIT workout. The body needs an adequate break period between HIIT workouts to fully repair and grow stronger. In fact, this is just as important as the workout itself and if you fail to properly give yourself enough rest, you miss out on some of the benefits of HIIT. That being said, you will improve your ability to practice HIIT workouts closer to each other as your recovery periods become shorter. Keeping all of the above factors in mind, you can start practicing HIIT workouts using one of these example plans: Next, move into your interval period for about 10 minutes. Each minute you will do 20 seconds of intense work followed by 40 seconds of recovery. Do this 10 times to start out, and as you become more fit you can increase to 15 minutes and beyond. Cool down with a 3 minute jog. In order to do interval training, this same ratio can be used in any other form of exercise as well. Start by cycling at a restful pace for three minutes to warm up. Move into your interval period for the next 10 minutes, where you will be cycling as hard as you possibly can for 20 seconds and then resting for 10 seconds. You can use a timer to keep track of the time or count in your head. Repeat this interval schedule 10-20 times depending on your abilities and current fitness level. Cool down with a slow, restful three minutes of cycling. Perform the following three exercise moves back-to-back according these reps: Start by doing 10 reps of each, then repeat the cycle doing 15 reps of each, then repeat the cycle doing 20 reps of each. Burpees Mountain Climbers Jumping Jacks In place of these 3 moves, you could also try performing fast alternating lunges, push-ups or kettlebell swings. This can mean jogging, running in place, hopping on an exercise bike, etc. You want to be working at about half of your ability. Go through each move described below for an intense 20 seconds, moving very quickly through as many reps as you can perform in 20 seconds, followed by 10 seconds of rest. Then move on to the next move following the same timing.

### Chapter 2 : How Much Cardio Should I Do When Bulking? | racedaydvl.com

*The big difference between phase 4 and phase 3 training is that the zone 3 intervals in phase 4 are performed at or near maximal intensity. As such, they are of very short duration (e.g., 10 seconds) and have much longer recovery periods (e.g., work-to-rest ratio = or ).*

She has contributed material through various online publications. Hitchcock has worked as a personal trainer and a health screening specialist. She graduated from Indiana University with a Bachelor of Science in exercise science. For some people, this can lead to fat gain instead of muscle gain, especially if the calorie intake is too high. In that case you may want to lay off cardio for the first couple months of your training program. Benefits of Cardio Exercise Almost everyone should be doing some type of cardio during the bulking phase. To build mass you have to eat a large amount of calories; regular cardio will enable you to eat more calories without gaining a lot of fat. Cardio exercise also increases blood flow, delivering more oxygen to your muscles and removing waste products, such as carbon dioxide and lactic acid. The increase in blood flow to the muscles promotes muscle building by delivering fresh nutrients to the muscles needed for growth and aiding in recovery. Lastly, you probably do more in your daily life than just lifting weights. To have the stamina to play a football game with friends, or even climb a long flight of stairs, you need to keep up your cardiovascular fitness with cardio exercise. The Best Foods for Bodybuilders Special Consideration for Ectomorphs People with an ectomorph body type are naturally skinny and have trouble keeping on body weight and building muscle mass. They can often eat whatever they want without gaining fat. These people have a tough time building mass. Absolute beginner ectomorphs are the only weightlifters who should not do cardio in the beginning of the bulking phase, according to strength and conditioning specialist Jason Ferruggia. For this group, often referred to as "hardgainers," Ferruggia recommends laying off cardio for eight to 12 weeks, getting your training and diet dialed in until you have put on 15 to 20 pounds of mass. If you feel that you need to do some type of cardio, stick to two or three low-intensity sessions of 20 minutes a week. Types of Cardio After the initial period, beginner hardgainers should add in three minute sessions of moderate-intensity cardio each week, advises Ferruggia. He recommends riding a bike to limit stress on the joints. Everyone else should be doing two to three cardio sessions per week of either long, slow cardio; moderate-intensity cardio; or high-intensity intervals. Bodybuilding coach Sean Nalewanyj recommends one to two high-intensity interval sessions of eight to 20 minutes and one to two longer and lower-intensity sessions of 40 to 60 minutes. When to Do Cardio When you do your cardio depends on your training schedule. Lower intensity cardio is great active recovery. You can do your cardio after lifting, but not before. You want to devote most of your energy to making every lift count. If you have to do cardio before, bodybuilder Aaron Nimmo advises doing it no less than three hours prior to lifting to give your body a chance to recover. According to Nimmo, your best bet is to do your cardio as far apart from lifting as possible.

## Chapter 3 : What Is The Best HIIT Workout?

*Stage III is a form of high-intensity interval training involving short, intense bouts of exercise (i.e. sprinting), interspersed with active bouts of recovery (i.e., light jogging). Clients training in stage III should use intervals ranging from 65 to 95% of HR max; or 17 to 19 RPE.*

Who wants to walk or jog nowhere for hours at a time? And for minimal results at that. By introducing you to the power of a type of training that will have you in and out of the gym in less than 30 minutes. This type of training is called high-intensity interval training, or HIIT. HIIT workouts consist of alternating between bursts of high-intensity exercise and low-intensity exercise, usually with a ratio of 20 to 30 seconds of intense exercise followed by 15 to 30 seconds of rest or less-intense exercise. For instance, HIIT workouts have proven in countless studies to be superior to steady-state cardio when it comes to burning fat. In fact, in one study, HIIT exercisers burned percent more fat than their steady-state cardio counterparts 1. HIIT workouts actually help your body burn more calories after your workouts than steady-state workouts. This is another reason they can be so short yet still effective. The ramp-up in after-workout fat burning is due to a phenomena called excess post-exercise oxygen consumption, or EPOC. After you do a hard workout, your body has to work extra hard to return your systems to normal: That requires extra calories, which is the EPOC effect “for hours post-workout, your body burns up that extra fuel. Yes, while a little intensity is better than nothing, true HIIT workouts are not necessarily a jog in the park. In reality, HIIT workouts done the right way should be intense. Think at least 75 percent of your maximum effort for those 20 to 45 seconds of work. Check out this post if you need some more ideas for a dynamic warm-up. Beginner intermediate and advanced options

Equipment needed: The beginner level of this workout has a work-to-rest ratio that gives your body enough recovery time but still keeps the workout challenging. Not sure about sprinting on a treadmill? Find the workout here: Muscle and Fitness 2. Poses like downward dog and chair pose work to tone your entire body, while intense bursts of cardio moves like burpees and jump squats get you a burst of HIIT. Is jumping not for you? Substitute regular squats and still get an awesome workout. Towel or sliders Time: Using just a towel and the weight of your body, this 5-exercise workout will give you three rounds of total-body toning in the form of intense intervals. This workout uses nothing but 3 different variations of squats to quickly tone your legs, lift and strengthen your glutes, and get your heart pumping. Take Five Level of difficulty: Beginner “Intermediate Equipment needed: Your goal is to keep pushing and see how many minutes you can get in. Kettlebell, dumbbells, bench or box Time: This workout drives home the point that 7 minutes is more than enough time to blast fat and build muscle. Prepare yourself for rigorous intervals using your bodyweight, kettlebells, dumbbells, and the nearest bench.

**Chapter 4 : The Ultimate 8-Week HIIT For Fat-Burning Program**

*High-intensity interval training (HIIT) has become a popular way to burn fat in the gym, but that's not all this type of cardio training is good for.*

Evidence for Exercise Training Fifty years ago, the most common advice given to patients who had experienced an MI was to take several weeks of complete bed rest<sup>3</sup>. Today, however, exercise training is an ordinary part of treatment for people with CHD. Cardiac rehabilitation programs use a multidisciplinary approach of education and exercise to help clients with heart disease return to normal function within the limits of their disease. There is no question that patients with CHD have improved cardiovascular function as a result of exercising. This is evidenced by higher V. O<sub>2</sub>max values, higher work rates achieved without ischemia as shown by angina pectoris or ST segment changes, and an increased capacity for prolonged submaximal work<sup>7, 19</sup>. The improved lipid profile is a function of more than the exercise alone, given that weight loss and the saturated-fat content of the diet can modify these variables. A major focus of cardiac rehabilitation programs is to reduce the occurrence of subsequent MIs<sup>3</sup>. This is referred to as secondary prevention of CHD. The Framingham Heart Study has shown that people who have experienced one heart attack are at increased risk of a second heart attack. Further, the likelihood of recurrence clearly is associated with many of the same risk factors that caused atherosclerosis in the first place. Thus, cardiac rehabilitation personnel must monitor BP, blood cholesterol levels, and smoking in their patients. This is good news, because it indicates that such patients derive a substantial benefit from participating in cardiac rehabilitation. In addition, patients gain an improved sense of well-being. One of the most exciting developments in cardiac rehabilitation in recent years is the demonstration that lifestyle modification can reverse CAD. Ornish and colleagues<sup>18</sup> conducted a series of studies in which they showed that a program consisting of a strict vegetarian diet, yoga, meditation, smoking cessation, and physical activity reversed the atherosclerotic process. Patients in this study showed actual reversal of blockages in their coronary arteries, lending credibility to the idea that this condition can, in some cases, be treated with nonsurgical interventions. The lifestyle intervention group had more regression of CHD after 5 yr than after 1 yr, while the control group which made more modest changes in lifestyle showed continued progression of atherosclerosis and more than twice as many cardiac events. There are some classes of patients with CHD for whom exercise or exercise testing is inappropriate and dangerous<sup>2</sup>. See chapter 7 for absolute and relative contraindications to exercise. In others, however, the benefits of a graded exercise test (GXT) outweigh the risks. Diagnostic exercise testing is nearly always performed in a hospital environment with a physician present. A lead ECG is monitored at discrete intervals during the GXT, and three leads are displayed continuously on an oscilloscope. BP, RPE, and various signs and symptoms also are noted. Emergency equipment includes a defibrillator, supplemental oxygen, and emergency medications. Personnel trained and certified in advanced cardiac life support (ACLS) are on hand to provide assistance if needed. Treadmill tests commonly used in diagnostic exercise testing are the Naughton, Balke, Bruce, and Ellestad protocols, named after their developers<sup>2</sup>. These protocols are all GXTs that increase speed or grade at regular intervals to increase the exercise intensity. For those who are unable to perform treadmill exercise, a cycle test or arm ergometer test may be used. The criteria for terminating the GXT focus on various pathological signs. A subjective angina scale may be used to assess the severity of the symptoms (see table). Other tests of heart function include radionuclide procedures, typically administered in conjunction with either exercise or pharmacological nonexercise stress tests<sup>5, 6</sup>. In the latter case, the pharmacologic agents provoke myocardial ischemia through either increased myocardial oxygen demand or coronary vasodilation. For instance, thallium, a radioactive substance, can be injected intravenously to assess myocardial perfusion. Thallium is taken up by well-perfused myocardium similarly to the way potassium is taken up. Ischemic myocardium tends not to take up the thallium, thus identifying areas of the heart with poor blood flow. Another technique involves a radioisotope that binds to the red blood cells, technetium-99m, which is useful for cardiac blood pool imaging. This allows the end-systolic volume (ESV) and end-diastolic volume (EDV) to be measured, and the ejection fraction then can be computed as follows:

Ventricular wall motion abnormalities also can be identified. In angiography, a cardiac catheter is inserted into the femoral artery and pushed all the way up the aorta until it reaches the entrance to a coronary artery, where the curved tip of the catheter guide allows it to be inserted into the artery. A contrast dye is injected through the catheter into the coronary artery. By viewing an image of the coronary arteries on a screen, the cardiologist can measure the degree of occlusion narrowing that exists (see figure). PET scans use [<sup>18</sup>F]deoxyglucose or [<sup>13</sup>N]ammonia. These substances allow the level of myocardial cell metabolism to be assessed. Metabolically active areas, indicative of good perfusion, can be distinguished from underperfused areas by color. Radionuclide tests can more definitively confirm the presence or absence of heart disease.

Typical Exercise Prescription Fitness professionals who work in health clubs and YMCAs often encounter clients who have gone through a cardiac rehabilitation program. Thus, it is important to have an understanding and appreciation of what these clients have experienced during their recovery process. As part of a team of medical professionals that includes physicians, nurses, dieticians, physical therapists, and clinical psychologists, the fitness professional can play an important role in helping patients to resume a healthy life after a heart event. A fitness professional working in cardiac rehabilitation must be vigilant about monitoring the signs and symptoms of heart disease. This involves knowing how to read an ECG, take BP readings, and administer the angina rating scale (refer back to table). Fitness professionals should be trained in emergency procedures and preferably should achieve certification in ACLS. The details of how to design and implement cardiac rehabilitation programs, from the first steps taken after patients are confined to bed to the time that they return to work and beyond, are provided in the AACVPR guidelines. This section briefly introduces these programs. Cardiac rehabilitation programs are organized in progressive phases of programming to meet the needs of clients and their families.

Phase I: the acute phase begins when a patient arrives in the hospital step-down unit after leaving the intensive or coronary care unit. Within 1 to 3 days of the MI or revascularization procedure, the patient has already been taught the risk factors for atherosclerotic disease and begun the rehabilitation process. Patients are exposed to orthostatic or gravitation stress by intermittently sitting and standing. Later, bedside activities and slow ambulation are initiated. Rhythmic activities using large muscle groups are recommended for physical conditioning; these activities include treadmill exercise, cycle ergometry, combined arm and leg exercise, rowing, and stair-climbing. Light to moderate resistance training is accomplished with free weights (dumbbells) and elastic tubing. Special care must be taken when prescribing upper-body exercises to clients who have undergone CABG procedures because of limitations related to the chest incision. See chapter 13 for more details on resistance training in cardiac populations. Recommendations for aerobic exercise programming in outpatient cardiac rehabilitation phases II and III are as follows, with patients progressing on an individual basis.

**O<sub>2</sub>max or HRR Duration:** Patients who are on beta-blockers require special consideration, because the Karvonen formula for computing THR range is invalid if the client was not on beta-blockers at the time of testing. However, in view of the wide differences in physiological responses to beta-blockade, another approach is to use RPE ratings around somewhat hard, which correspond to 11 to 14 on the original Borg RPE scale. In phase II, clients are monitored carefully for vital signs (HR, BP, ventilation), and the ECG is monitored at a central observation station via telemetry radio signals. A single-channel recording of 6 to 10 patients can be monitored simultaneously on a computer screen, and in the event of arrhythmias or ST segment changes, a rhythm strip is printed out. The rate-pressure product (SBP × HR) is sometimes used as an indicator of myocardial oxygen demand. After training, the rate-pressure product at a fixed work rate is reduced, allowing the cardiac patient to exercise at higher work rates before the onset of angina.

In addition to exercise classes, patient education classes are offered, and they cover topics such as healthy eating, stress management, cardiovascular medications, and principles of behavior modification. Phase II programs typically last about 12 wk and are covered by health insurance. Phase III programs are hospital-based programs in which outpatients are encouraged to continue their exercise regimens and are provided access to continuing health care and patient education. Eventually, clients may enter the maintenance phase and move to a phase IV program in a nonhospital setting. For heart patients who are unable to attend a traditional cardiac rehabilitation outpatient program due to geography or finances, there are other options. In addition, a group called Mended Hearts ([mendedhearts.org](http://mendedhearts.org)) provides cardiac rehabilitation

programs are divided into four phases. Phase I is the acute phase, performed while the patient is still in the hospital. Cardiac patients can benefit from aerobic and resistance training, but working with this population requires special knowledge of their medical conditions. Define atherosclerosis, and list three alterable cardiovascular risk factors that promote the atherosclerotic process. Describe what will happen if an atherosclerotic plaque leads to a blockage in blood flow to a carotid artery, coronary artery, or femoral artery. What are four subcategories of CVD? Describe the effects of aerobic exercise on people with hypertension. What are some other recommended treatments for hypertension? List four specific patient populations who are commonly referred to cardiac rehabilitation programs. What evidence is there that exercise training can be beneficial for individuals with CHD? One of the goals of any cardiac rehabilitation program is secondary prevention of CHD. Explain what this means. Identify diagnostic tests that can be used to detect the presence of CHD. Outline the recommendations for aerobic exercise programming in phase II and phase III cardiac rehabilitation in terms of frequency, intensity, duration, and mode. Is weight training recommended? Why is the Karvonen formula often not very useful in establishing a THR for a cardiac patient? Case Studies You can check your answers by referring to appendix A. John is a 55-yr-old male. He is an insurance executive who is married with two children. John is active in his church and plays golf on the weekends. He went to see his cardiologist because he experienced recent fatigue with chest pain on exertion.

### Chapter 5 : Cardiac Rehabilitation Geneva, New York (NY), Finger Lakes Health

*For each of the three exercise tests, capillary blood samples were taken at rest and at the end of the warm-up phase, after 4, 7, 11, 14, 18, 21, 25, and 28 min of the specific exercise protocol, and after the 5 min cool-down phase.*

If you burn more calories than you consume, you lose weight. Slow runs at a comfortable pace are good for boosting your metabolism, but they are not very effective at blasting fat. Intense workouts that produce a high training stimulus are better at burning calories. Plus, your muscles require a lot of energy post-workout for the recovery process. Aerobic intervals In this type of interval training , the ratio between work and recovery is 1 to 2. The intense phase should last a maximum of 30 seconds. The work phase consists of a submaximal sprint and the recovery phase, a slow walk. How to do it: The work phase lasts 20 seconds. Fast, but not full gas. This is followed by a recovery phase consisting of 40 seconds of slow walking. Repeat this cycle for 20 minutes, or in other words, a total of 20 intervals. It is important that you hold back a little during the first intervals. You will know that you have chosen the right pace when you can run the last sprint as fast as the first one. Add style to your workouts. Intervals at your 5k race pace In these intervals, the work and recovery periods are equal. You should run at the average pace of your 5k personal best. Running intervals based on your maximum heart rate is not very precise. That is also why it is better to run your intervals based on your race pace. The work phase lasts 4 minutes. This is followed by a recovery phase consisting of 4 minutes of slow jogging. Repeat the cycle 4 times, or in other words, run for a total of 32 minutes, 16 minutes of it at a fast pace. Continuous run at your 10k race pace In contrast to the intervals, you run at a constant pace throughout this training exercise. You should run at the average pace of your 10k personal best. The work phase lasts 30 minutes. Make sure to give your body plenty of recovery time. Wait at least 48 hours before doing your next intense training session. Follow this with short accelerations gradually increase your pace over a short distance of about m until you almost reach a maximum sprint to get your muscles ready for the intense workout coming up. After your workout, jog at a slow pace for at least 10 minutes to cool down. Are you interested in learning more about improving your running performance? Check out our best bodyweight trainings to improve your strength as a runner.

### Chapter 6 : The 3 Most Effective Running Workouts for Losing Weight

*In this review, we will discuss the most recent forms of exercise training available to cardiac patients, their comparison and/or their combination during short and long-term (phase II and III).*

### Chapter 7 : HIIT Workouts Beat Conventional Cardio - Dr. Axe

*Get the ultimate follow-along interval cardio workout, which will burn more fat and improve your cardio endurance in just 5 minutes. The Speed Burst Workout is a \$19 value - but you can get it for FREE!*

### Chapter 8 : Fitness Professional's Handbook 6E: Create effective cardiac rehabilitation exercise programs

*Outline the recommendations for aerobic exercise programming in phase II and phase III cardiac rehabilitation in terms of frequency, intensity, duration, and mode. Is weight training recommended?*