

Benefits of Heart Rate Monitoring

Why is it important to monitor your heart rate when you exercise?

- ✘ Your heart rate is a convenient, reliable, personal indicator of the intensity of your exercise.
- ✘ It's good to know the intensity of your exercise so you can vary it depending on your fitness level and the goals you want to achieve by exercising.

Heart rate monitoring brings following benefits to all levels of users

Exercise Beginner

- ✘ Teaches you about your body's reaction to exercise
- ✘ Keeps you from starting out too hard (as beginners are often tempted)
- ✘ Helps you control the intensity of your exercise routine
- ✘ Provides feedback on your improvement

Regular exerciser

- ✘ Helps you control the intensity of your exercise program under different circumstances
- ✘ Helps you fine-tune your program for the best results
- ✘ Gives you plenty of feedback both during and after a session, teaching you more about your body's reaction to exercise
- ✘ Helps you see how you're progressing

Serious exerciser

- ✘ Helps you make sure you work out at the right planned intensities for your training program (hard enough on hard days, light enough on recovery days, enough recovery between intervals, etc.)
- ✘ Enables you to track and accurately adjust your training program
- ✘ Teaches you about your body's reaction to training, providing an early warning of overtraining, flu, etc.
- ✘ Provides feedback on your progress

How to Determine Your Maximum Heart Rate

The most accurate way of determining individual maximum heart rate (HRmax) is to have it clinically measured, usually on a maximal treadmill or by taking a bicycle stress test supervised by a cardiologist or exercise physiologist. HRmax can also be estimated by using the commonly used formula: 220 minus age. Research has shown that the formula is not very accurate, especially for people who have been fit for many years or for older people. The HRmax-p score, however, predicts individual maximum heart rate value more accurately. This feature is included in most Polar running computers.

If you have done some hard training in recent weeks and know that you can safely reach maximum heart rate, here is a simple test you can take.

You should consult your physician before undertaking this test. We also recommend you take the test together with a training partner.

Step 1: Warm up for 15 minutes on a flat surface, building to your usual training pace.

Step 2: Then choose a hill or stairwell that will take you more than 2 minutes to climb. Run up the hill/steps once, building to as hard a pace that you can hold for 20 min. Return to the base of the hill/steps.

Step 3: Run up the hill/steps again, building towards a pace you can just about hold for 3 km. Note your highest heart rate. Your maximum is approximately 10 beats higher than the noted value.

Step 4: Run back down the hill allowing your heart rate to drop 30 to 40 beats.

Step 5: Run up the hills/steps once again at a pace that you can only hold for 1 minute. Try to run half-way up the hills/steps. Note your highest heart rate. This brings you close to your maximum heart rate. Use this value as your maximum heart rate to set training zones.

Step 6: Make sure you get a good cool-down of a minimum of 10 minutes.

Different Training Heart rates are used for Different Purposes

Training heart rates are ranges of percentages of your maximum heart rate (HR_{max}).

Each range is useful for different purposes and is associated with different fitness benefits.

Training heart rate 50-60% HR_{max} - Great for recovery sessions.

Training heart rate 60-70% HR_{max} - Improves the heart's ability to pump blood- Increases the number of small blood vessels in your muscles- Increases the enzymes in your muscles responsible for oxygen metabolism- Increases the strength of your muscles, tendons, ligaments and bones- Improves your endurance- Burns fat as the body's main energy source at this intensity

Training heart rate 70-80% HR_{max} - Also called the "steady state" because it's the fastest pace you can maintain for long periods of time (for example, a competitive Ironman athlete will race near this intensity)- Accustoms the body with a faster pace- Improves endurance- Begins to raise the speed you can maintain without building up lactic acid (your anaerobic threshold)- The more fit you are, the greater the percentage of fat your body uses as fuel, enabling you to perform longer at this rate while preserving limited stores of glycogen

Training heart rate 80-90% HR_{max} - At this intensity, you begin to "go anaerobic" and build up lactic acid (reach your anaerobic threshold)- Your anaerobic threshold increases along with your fitness- This intensity can be maintained for about one hour in competition

Training heart rate 90-100% HR_{max} - Is only needed for sprint training - racing over short distances (track sprinters, short-distance swimmers).

A Healthy Heart Through Training

The cardiovascular system serves several important functions in the body.

For example, it delivers oxygen and nutrients to and removes carbon dioxide and metabolic waste products from every cell in the body. Your body's cardiovascular system has three components:

- The heart (cardiac muscle)
- The blood vessels
- The blood

The heart is the pump that moves blood from the lungs (where the blood picks up oxygen) to the muscles (which burn the oxygen as fuel) and back to the lungs again. The harder you are training, the more fuel your muscles need and the harder your heart has to work to pump oxygen-rich blood to the muscles.

As you get more fit, your heart is able to pump more blood with every beat. As a result, your heart doesn't have to beat as often to get the needed oxygen to your muscles - so both your resting heart rate and your exercise heart rate (at any given exertion level) decrease.

Heart rate is one of the simplest and most informative of the cardiovascular parameters. When you start training, your heart rate increases rapidly in proportion to the intensity of the training. In Polar Heart Rate Monitors the transmitter in the belt detects the electrocardiogram (ECG), the electric signal originating from your heart. The transmitter then sends an electromagnetic signal to the Polar wrist receiver, which shows you information about your heart rate.

Why Use a Heart Rate Monitor

Maximize the benefits of your training and follow your improvement.

There are a wide variety of reasons for using a heart rate monitor in your training program:

Put to good use the simple observation that the harder you exercise, the faster your heart beats. Your monitor acts as your rev counter to give you a precise measurement of your exercise intensity.

Individualize your program. You can train at your own ideal pace. Target heart rate settings are standard features in all Polar S-series Heart Rate Monitors.

Monitor and measure your progress. Polar S-series Heart Rate Monitors (except Polar S120 and Polar S150) provide an easy and reliable fitness test, which you do at rest to get an estimate of your VO₂max (OwnIndex™).

Witness your own improvement to get more motivated.

Maximize the benefits of exercise.

Introduce some objective observation into your workout. Are you on the right track? Are you improving?

Calculate your body's use of energy (OwnCal™) during training and racing with Polar S-series Heart Rate Monitors (except Polar S120 and Polar S150), which help you to plan your diet to forestall fatigue caused by energy shortage.

Train and rest in the right balance. Polar OwnOptimizer test tells you whether you have recovered enough for your next training session.

Use the Polar S625X Running Computer to combine running speed and distance measurement with heart rate. This ultimate training tool features also altitude and ascent for route profile, Polar OwnOptimizer recovery test, mobile connectivity and support for triathlon and cross training usage.

Use the Polar Cycling Heart Rate Monitors to combine heart rate with speed, distance, altitude, ascent, cadence and power output.

Running and Jogging - an Overview

Running or jogging is an easy and effective sport for beginners and active exercisers.

Running has been around as long as man has stood on two feet - some 1.5 million years! You could say it's as natural to run as it is to, well, walk. It's so natural that many fitness seekers first turn to it to lose those extra pounds or to reduce stress. Hundreds of thousands of runners around the world even try a marathon at least once in their lifetimes.

So why are running and jogging so popular? For starters, they're great for tackling many exercise goals:

If your goal is to look and feel fit or to lose some extra weight, an easy 20-30 minute jog at the lower end of your target heart rate zone three times a week should do the trick.

If your goal is to increase your aerobic capacity and develop a healthy heart and cardiovascular system, jogging or running for 20-40 minutes at the light-moderate and moderate heart rate zones four to five times a week will go a long way.

If your goal is to run your first marathon, there are countless running workouts to prepare you, such as interval training, fartleking runs (repeatedly speeding up and slowing down to quickly alternate between a high and low target heart rate), hill training and more. Generally though, you'll have to run five or more times a week, with one day devoted to a long, hard run of 45-60 minutes at 60-70% of your maximum heart rate.

In short, running or jogging is a effective sport for beginners and active exercisers alike to reach their optimal target heart rate and maintain it long enough to really get the benefits. It's also fun because you can enjoy being outdoors and even improve your social by running with friends.

So what's the downside to running? It's fairly weather-dependent, unless you have access to a gym with a treadmill. And more seriously, running-related injuries are quite common, so it's very important to take precautions and to mix running workouts with low-impact or strength-training exercises.

Aerobic and Anaerobic Exercise

The working ability of a muscle depends on sufficient blood flow, and oxygen and nutrition intake.

The body uses two different systems to supply energy to muscles:

1) Aerobic system: Carbohydrates and fat are used with oxygen and metabolized to carbon dioxide and water.

2) Anaerobic system: Carbohydrates are used for energy production without oxygen and metabolized to lactic acid.

At lower training intensities, your muscles' use of oxygen matches your oxygen intake. This kind of activity can be sustained for long periods of time. At high intensities, however, your heart and lungs cannot supply enough oxygen to keep up with the demands of your muscles. As a result, your muscles begin to work anaerobically.

The problem with anaerobic energy production is that after a few seconds, waste products like lactate rapidly build up. Lactate blocks fat metabolism and forces the body to stop the exercise. The metabolic turning point at which the body shifts from the aerobic to the anaerobic energy system is called the anaerobic threshold (AT).

Your Anaerobic Threshold (AT) is the exercise intensity at which you begin to go anaerobic and build up lactate. If you want to improve your performance, it's useful to train for short periods (three to five minutes) at a heart rate just below your AT in order to raise it.

If you're out of shape, your AT might be at 70-80% or less of your maximum heart rate. However, if your training progresses intensively, your AT will increase, so that in very fit competitive athletes it might be at 90% of their maximum heart rate.

What is Aerobic Fitness?

Aerobic (or cardiovascular) fitness is one of the most important components of overall physical fitness. It reflects the amount of oxygen in the blood pumped by the heart and transported to the working muscles, as well as the muscles' efficiency in using that oxygen.

When you're working hard, your body's metabolism increases. When faced with increasing energy demands, your body eventually reaches a limit for oxygen consumption/uptake (represented as VO_2). At this point VO_2 reaches a peak value referred to as your aerobic capacity, or maximal oxygen uptake (maximal aerobic power, VO_{2max}).

Increasing your aerobic fitness means increasing your heart and cardiovascular system's capacity to perform their most important task, supplying oxygen and energy to your entire body.

The best way to improve your aerobic fitness is through activities that put the body's large muscle groups to work dynamically—for example, walking, jogging, running, swimming, skating, cycling, climbing and cross-country skiing.

Although your exercise habits have a big affect on your aerobic fitness, it's also related to age, gender and heredity. Maximum fitness values occur between the ages of 15 and 30, decreasing progressively with age. With a sedentary lifestyle, VO_{2max} decreases by 10% per decade but if you maintain an active lifestyle, you can bring that number down to less than 5% per decade.

Fluid Balance

Whether you're training in hot or cold weather, you need to drink frequently.

Over long-term activity, your exercise tolerance decreases because of the water your body loses through sweating - unless you adequately replace the lost fluids. For marathon runners, fluid losses can be as high as 5.4 liters (1.5 gallons) per hour.

If you don't drink enough, you become dehydrated and your body's total blood volume drops. Because the heart has access to less blood, it has to pump faster to circulate the same amount of blood - and your heart rate rises. If you don't replace the lost fluids by drinking, your heart rate will increase, and your ability to perform will decrease rapidly.

So drinking fluids during exercise has several benefits:

- * Fights dehydration
- * Offsets body temperature increase
- * Minimizes cardiovascular stress

Missing a Training Session Due to Illness

Q: "What if I get sick and have to skip training?"

A: If you have missed a few sessions because of not feeling well, a flu or fever, do not train. If once recovered, you are still unsure whether you should resume training or not, it is best you don't. Consult a physician or an experienced coach instead.

In all cases, going for a very easy test run (less than 30 min in zones 1-2) is a good way to resume your training after a break.

Scenario 1: If you have only missed one of your shorter sessions, simply carry on with the program. You may not need to make any other alterations.

Scenario 2: If you miss a longer run, you may need to shorten the next few long runs to avoid the risk of injury or overtraining.

Scenario 3: If you miss a session that includes harder training (zones 3 or higher), then you may need to reduce some or all of your upcoming harder sessions.

Scenario 4: If you miss a longer run and several training sessions, seriously consider reducing all training sessions (both total distance/time and distance/time in zones 3 and 4) for the next week or two.

Missing a Training Session Due to Injury

Q "What if an injury forces me to skip training?"

A: Start by getting an accurate diagnosis by a physician or licensed physiotherapist and get their professional opinion on how long your break should be. As with sickness, start by taking a very short run to see in what shape you are. If you feel any pain or suspect that the test session is going to delay your return, stop and walk home. In fact, you should keep the run short (max 10 min) and close to your starting point, a small loop is a good idea. In all cases, when resuming training, make sure you run on softer surfaces. Also, consider consulting an experienced coach to guide you through the remaining training period.

Scenario 1: If you have only missed one of your shorter sessions, take a test run. If that goes well, simply carry on with the program - you may not need to make any other alterations. Pay attention to how you feel, nonetheless, you may still need to reduce the total distance/time during the next long run.

Seek softer surfaces if impact is a likely factor in the injury. Also, use pain as your guide - any pain at all and you should stop immediately.

Scenario 2: If you miss a longer run, you may need to reduce the next few long runs to avoid the risk of injury or overtraining.

Scenario 3: If you miss a session that includes harder training (zones 3 or higher), follow the advice in Scenario 1 first. Then consider reducing upcoming harder sessions (zone 3 or higher).

Scenario 4: If you miss a longer run and several training sessions, seriously consider reducing all training sessions (both total distance/time and distance/time in zones 3&4). You may need to alter a week or more to gradually work yourself back to your previous shape.

Scenario 5: If you miss more than a week's worth of sessions, ask your physician or physiotherapist if you may substitute running with some cross training activity and if so, which activity would be appropriate. For example, cycling or aquarunning may be a great way to maintain fitness yet allowing an injury to heal. Our recommendation is that cross training sessions are as long as the skipped running sessions, and not any longer. Also, remember to be very careful when going back to running, you may feel fit but your body may need to be reminded of all the pounding with a few short runs first!

In any case, you will probably need to redefine event goals or choose a different event altogether. This is the case particularly if you've skipped more than a week of training. Keep in mind that missing on training early in the program (with more than 7 weeks left) may not have much significance. Just follow the advice given here and make sure you listen to your body.

Proper Monitoring of Progress

Active runners aim to improve performance and usually train for a specific running event. **Fitness tests can help gauge progress to make sure you are training correctly.** Different methods are used for different tests. The important thing is to use them systematically. For example, perform tests at the end of similar training days. An **Average Heart Rate Test** taken on a treadmill or stationary bike determines general fitness level, as does **Polar Fitness Test**.

If you train to achieve better running results, or if running is otherwise your main method of training, the **Performance Development Test** is for you. This running test is performed on an even-levelled track of a set distance, for example 5 km. Heart rate should always remain at the same level, for example 80% maximum heart rate. During the test, speed development is monitored at that heart rate. In fact, this is an Average Heart Rate Test, only in reverse, since for runners tracking running speed is of special importance. Terrain should be even and comfortable to make sure heart rate remains as stable as possible.

The warm-up prior to testing should always be the same to make sure the body is at exactly the same point of departure everytime you take the test. Taking the test every four weeks is advisable. If your performance is clearly lower than the last time you took the test, do not make changes to your training routine before repeating the test in a few days' time.

The Performance Development Test:

* Once a month

To monitor training results, the **Polar OwnOptimizer test** is also important. Successful training requires temporary overloading: longer exercise duration, higher intensity or larger total volume. In order to avoid severe overtraining, overloading must always be followed by an adequate recovery period.

Otherwise, you may experience a decrease instead of improved performance as a result of high training volumes.

The Polar OwnOptimizer is an easy and reliable way to determine whether your training program is optimally developing your performance. The OwnOptimizer helps you optimize your training load during a training program so that you experience an increase in performance and do not undertrain or overtrain in the long run. It is a perfect tool for everyone training regularly, i.e. at least three times a week.

Stretching

Whenever you exercise, be sure to stretch.

Stretch first after your warm-up, when your muscles aren't so tight, and again after the cool-down period. Stretching for five minutes after you warm up will improve your workout and help prevent injuries.

Why? Because repetitive exercise tends to reduce muscle flexibility. Also, tissues like muscle and skin lose elasticity with age. So if you increase the intensity or duration of your workouts, maintaining muscular flexibility in your lower legs, thighs, gluteals and back will become even more important.

Without proper stretching, your range of motion will become limited, which will adversely affect your running and swimming technique. For example, tightness in the upper shoulder area will reduce the effectiveness of the pull and glide part of your freestyle swim stroke, slowing you down. And tightness in the hamstrings can decrease your stride length in running, forcing you to expend more energy to make up the difference.

There are stretching techniques for almost every major muscle group. If you aren't familiar with different techniques, consult any sports physiologist or coach for advice. Below are some tips to help you stretch properly no matter what technique you use.

Stretching Tips

1. Never stretch cold muscles. Be sure to warm them up before stretching.
2. Hold each stretch for 30-60 seconds to give your muscle time to adapt to the stretch.
3. Never bounce in a stretching pose or force a muscle into a position that causes pain.
4. Relax and breathe deeply and slowly while holding each stretch position.
5. If you are stretching your arms, legs or sides, remember to stretch both sides.

What is Fitness?

Learn the components of physical fitness.

There are four main elements that define physical fitness:

Aerobic (cardiovascular) fitness - The body's ability to take in and use oxygen to supply energy throughout the body

Muscular fitness - The strength and endurance of muscles

Flexibility - The ability to move joints and stretch muscles fully through their normal range of motion

Body composition - The amount of fat tissue in relation to other tissue in the body

All these are important elements to consider when analyzing your personal fitness. But aerobic fitness is a central component. Increasing your aerobic fitness has many health benefits, and can best be

improved with exercise that dynamically employs large muscle groups, such as running, cycling, rowing and cross-country skiing.

The Structure of a Running Workout

Warm up

The aim of a proper warm-up is to prepare your body for the exertion to come. You should be running at a lower speed than the actual running phase, and you may even want to include some stretching. This could last for 5-10 minutes. Warming up is also important prior to speed training as a way of priming the muscles. Your body prepares gradually for the actual training session, and your muscles carry oxygen more readily. Your heart rate should rise to the training level at the end of a warm-up and actual training can then begin. Some recovery sessions may be somewhat short (30-45 min) at warm-up speed.

Exercise in Target Zone

Monitor the intensity level you are at while training to make sure the session is beneficial. Your heart rate should rise towards the end of a session and not the other way around. Keep in mind that increasing speed is easy, but you should learn the basics about the way your heart rate reacts at different running speeds first.

A running session can include for example a 30-minute even-paced run at 65-75% maximal heart rate, or intervals of 5x3min at 75-85%, alternating with recovery to bring your heart rate down to 60% before the next interval.

Cool Down

The purpose of a cool-down is to slowly bring the heart rate back to normal. This is especially important after strenuous activity which has produced lactic acid. Lactic acid is easily eliminated from the system during slow-paced running. A cool-down lasts 5-10 minutes depending on how hard you trained. The harder you train, the longer the cool-down should last. A cool-down can also affect your next training session. If you haven't cooled down properly, your body will still contain lactic acid and your next training session will suffer as a result.

For optimal fitness results, train within your target heart rate limits, even if you are able to push yourself beyond them most of the time. Improving your physical condition by running is easy, but it is important to pace your development and to avoid monotony by training in a varied fashion.

Running & Jogging - Tips

Here are tips for better running or jogging:

- ✘ Run or jog regularly to get the greatest benefits.
- ✘ Be sure to wear comfortable clothes and proper running shoes.
- ✘ Stretch your leg muscles carefully for at least five to ten minutes before and after you run - but remember NOT to bounce when you stretch.

- ✘ Remember to warm up at the beginning and cool down at the end of your run. Start off easily, slowly increasing to a comfortable pace that you can maintain for 20 minutes or more (for optimal cardio-respiratory benefits), and then slow down again for your cool-down period.
- ✘ If you do a hard run, give your body a chance to recover properly with an easy run or even a day off before another hard workout.
- ✘ Check your technique and posture. Keep your body erect, your head up and your neck and shoulders relaxed.
- ✘ Run with a comfortable stride length and pace. Make sure you run heel-to-toe, pushing off with the toes at the end of each step and propelling your trailing leg forward to keep up a vigorous pace.
- ✘ Remember to wear your Polar Product, your personal trainer that will guide you safely and efficiently to your goal.

Endurance Training

Endurance training can be divided into three areas: Basic, speed and anaerobic endurance.

Basic endurance training is for improving aerobic capacity and impact tolerance. Such runs occur at 60-75% maximal heart rate, depending on the runner's experience and level. At least one long basic endurance run should be included in your weekly schedule. They can also be shorter in duration. Such recovery runs last typically 30-45 minutes. Training should increase gradually throughout the basic endurance period (base 1 and base 2). At the transitional phase, general endurance training is reduced and once your main goal is in sight, reduce training even further. During taper time, basic endurance sessions are typically for recovery only.

Speed sessions are slightly faster than basic endurance training, and can either be even-paced or intervals. Heart rate levels during speed training should be around 75-85% maximum heart rate. Even-paced sessions last typically 20-60 minutes, while intervals are between 4 and 15 minutes (e.g. 4x8min/5min recovery, or in kilometers 4x2km/1km recovery). During speed training, breathing is accelerated, but only during anaerobic endurance training does breathing rhythm peak. Developing speed is important when training for a marathon, for example, since part of the marathon is actually run at speed training pace. Include 1 or 2 speed sessions in your weekly schedule.

Interval training is a good choice when you first start working on speed, since it's easier to keep up a good pace during short repeats and exertion levels are not too high. As you progress, you can add even-paced runs to your schedule. Long, even-paced intervals are recommended for marathon runners (e.g. 3x20min at 80% maximum heart rate, alternate with 10 min light jog at 60%). Cut back on speed training during transition and tapering, when you replace some of the hard sessions with actual racing.

Anaerobic endurance training is generally very hard interval work, aimed at maximizing racing performance and oxygen uptake capacity. To make sure lactic acid levels remain at a manageable level, run at just below full speed, in other words at 90-95% maximum heart rate. It's advisable to run at the higher end only during the last repeat. Aim to increase speed with every repeat. A session can comprise 5x3min with 5min recovery jog.

For a goal-oriented active runner, including anaerobic endurance training 2-3 times a month is advisable. Training should begin at base 2 and intensify gradually through transition and tapering. Some runs

should be even-paced. When tapering, training includes anaerobic endurance and speed work, as well as basic endurance and recovery.

For an active runner, sprint training is fast-paced interval training at 90-100% maximum heart rate. Repeats last 45-90 seconds. Recover for around 5 minutes. Example: 8x60seconds 95% maximum heart rate + 5min recovery walk. Do sprint work during transition and tapering periods. Training frequency is at about 2 times/month.

Fluid Balance

Whether you're training in hot or cold weather, you need to drink frequently.

Over long-term activity, your exercise tolerance decreases because of the water your body loses through sweating - unless you adequately replace the lost fluids. For marathon runners, fluid losses can be as high as 5.4 liters (1.5 gallons) per hour.

If you don't drink enough, you become dehydrated and your body's total blood volume drops. Because the heart has access to less blood, it has to pump faster to circulate the same amount of blood - and your heart rate rises. If you don't replace the lost fluids by drinking, your heart rate will increase, and your ability to perform will decrease rapidly.

So drinking fluids during exercise has several benefits:

- * Fights dehydration
- * Offsets body temperature increase
- * Minimizes cardiovascular stress

Hill Training Boosts Performance and Muscle Fitness

Running on roads and level surfaces places a monotonous strain on your legs, and your musculoskeletal system will not develop as optimally as on uneven terrain.

Running on uneven terrain makes muscles develop more naturally, and for runners the important oxygen uptake capacity is also developed. Uneven terrains are also gentler on the feet. Nowadays, terrain running is being replaced with hill training, with repeats up a hill alternating with recovery jogs or walks (e.g. 8x300meters (50-60 seconds) at 80-90% maximum heart rate). Hill repeats add strength and intensity to your training. Also, maximizing oxygen uptake is easier up a hill than on an even-levelled track.

Good running technique is important during hill training. If you can run hard comfortably uphill, your running economy on an even-levelled track will obviously improve greatly. It is important for an athlete running a specific event (e.g. a marathon) to prepare the body and muscles by training in racetrack conditions. By measuring distance and elevation, runners can design training sessions that develop specific characteristics in specific conditions.

Hill training improves general endurance and speed, but keep in mind that such training is always hard on the muscles. In other words, you should recover well, even when your heart rate remains in the

general endurance area. It would be a good idea to do some hill training on rough terrain, for natural hill variety.

Hill training offers a perfect opportunity to improve running-specific muscle strength. When improving strength through hill work, it is important to keep repeats rather short, to avoid the high levels of lactic acid.

There are various ways to improve muscle strength, in fact varying the stimulation is very important. Try doing 20-50 meter repeats with a good combination of different ingredients, such as:

✘ backward running, side-leaps or jumps. (Very good for the buttocks and hamstrings.)

Remember to start with small doses, since this kind of hill training will easily overexert your muscles and require long recovery time. Once you've done a few sessions, your body will adapt and training will become more beneficial.

Interval Training for Better Results

Doing intervals is the most important part of training speed. It requires good general fitness and foot strike. Keep focus on the aim of your interval training. A typical mistake is to run too fast during short repeats, since having strength enough is rarely a problem, and distances are relatively short. Training intensity should increase gradually to prepare the body for harder routines.

The central components of successful interval training are the right technique, mobility and speed. In the initial stages of your training schedule (base 1), intervals may be e.g. 6x5min at 85% maximum heart rate + 3min recovery at 60%. At this stage, repeats shouldn't be too long to make sure your speed remains adequate. As your endurance improves, repeats during speed work may be up to 20 minutes long (80-90% maximum heart rate). Maximum endurance is generally improved through interval training, as well, and is aimed specifically at enhancing performance. Running faster during the latter part of sessions is important during maximum endurance work (e.g. 5x3min at approx 90% + 5 min recovery).

You learn to pace yourself during interval training, since you run faster doing intervals than you would during the targeted event, like a marathon. Increasing your speed reserve is also important to make sure your running technique remains comfortable. Moreover, interval work improves recovery time, important for running on uneven terrain.

Interval Training for Variety

A common belief is that athletes and fitness enthusiasts train in significantly different manners. That is true to a certain extent, but a fitness enthusiast can do much the same training as an athlete, only at a slower pace. Very often, enthusiasts exercise in a uniform way, and wonder why training is so difficult despite running 3-4 times a week. With interval training, you can develop both running technique and speed. Fast-paced runs also improve aerobic capacity. Enthusiasts frequently shun fast-paced running,

because they fear it will be too exhausting. Interval training once a week is, however, sufficient, and depending on your fitness level can comprise a 10-minute warm-up at approx. 60% heart rate, 6x 2-3 minute easy sprint at 80%, alternating with 2-3 minute recovery walks to bring down heart rate below 60% maximal heart rate. Top it off with a 10 minute cool-down at 60-70%.

Your running technique will improve if you do intervals, because the pelvis is naturally pushed forwards and up when running fast. Also, impact decreases. The range of motion will increase during faster intervals, and that, in turn, improves performance during slower-paced runs.

Moreover, developing a high running speed will help increase your speed reserve. It is important to remember that your speed during intervals is slightly higher than regular running. As you progress and gather experience, you will be able to intensify intervals and lengthen and vary interval duration from week to week. The success of an individual session increases if heart rate rises during the session and intervals intensify gradually. Once the session is over, you can check your average and maximum heart rates for every interval to see how successful training has been.

Introducing Training Changes

Our bodies take time to adapt. Give yours the opportunity adjust slowly to any changes you make in your training routine. The following guidelines explain how.

Training VolumeThe "10% rule" is a useful guideline. Don't increase the volume of your workouts (how much you exercise and for how long) by more than 10% per week. More experienced athletes can probably get away with increasing their volume by 15 or 20% during periods of lesser volume.

Training IntensitySuddenly starting to do hard, 90% effort intervals is just asking for injury or overtraining stress. Instead, introduce harder training into your routine slowly and gradually. Start with just a few 80% effort repeats, and then build slowly to doing a full set of 85-90% intervals.

EquipmentEven a small change in your equipment or environment - your brand of running shoe, the type of surfaces or terrain you run on, the seat height or seat position of your bike or even the type of pedals you use - can stress your body and cause an injury. Introduce these kinds of changes with care, staying aware of what feels different.

Overtraining

Our bodies are superbly designed for motion and physical activity and are able to withstand quite a bit of accumulated stress.

Still, if intense training is combined with a stressful job or lifestyle or insufficient sleep, or if you're simply exercising too much too soon, your body may be unable to adapt, and overtraining may be the result. Overtraining is most commonly a concern for athletes and others who train for high performance.

Heart rate may be one of the best indicators of overtraining. For many athletes, heart rate monitors can be used as an alarm that alerts them if they're training too hard, beyond levels that

improve performance. Overtraining is a common mistake, especially among athletes who believe that more is better and don't take a systematic approach to training.

Your morning resting heart rate is one of the indicators of overtraining. If this before-you-get-out-of-bed heart rate is five or more beats per minute higher than usual, you need to be concerned. An accelerated resting heart rate could indicate that you're overtraining, suffering from fatigue, slightly injured, or even fighting off a fever or a stress-related problem.

Rest is one of the best medicines an athlete can use. Elevated morning heart rates and decreased exercise heart rates for a standard workout are signs that your body is not fully rested and something is amiss-so this isn't the time to take on any hard training.

Some early warning signs of overtraining are:

- ✘ Slower recovery in your heart rate after exercise

General signs of overtraining in competitive athletes:

- ✘ Persistent colds, flu, or respiratory infections

The Polar OwnOptimizer recovery test is an easy and reliable way to determine whether your training program is optimally developing your performance.

Planning and Follow-up of Training Sessions

A successful training program is first and foremost systematic, and is guided by defined goals. It is divided into seasonal, monthly and weekly schedules, ending for many active runners in a targeted event like a marathon. Training is based on this target.

The importance of periodization in the program cannot be exaggerated, because the body will need to gradually prepare and adapt to an ever increasing workload. Training in four-week cycles is common practice. Intensity and volume increase steadily during the first three weeks, while the fourth is a recovery week. During base 1 and base 2, training volumes increase every four weeks, and decrease only once you reach the transition period. Correspondingly, intensity levels increase and decrease in four-week cycles. Two or three weeks before the main event, keeping your muscles primed on a daily basis is more important than sticking to your weekly targets.

When planning your training week, remember the delicate balance between training and recovery. Engage in fast-paced intensive training only once your body is well recovered and prepared. Also, leave long aerobic training for the end of the week, and make sure your energy reserves are well-stocked to make the most of the session.

Allow for sudden changes in your schedule. With proper follow-up, you will be able to ensure training success despite small variations.

Recovery

If you train very intensively, you need adequate recovery between training sessions.

Exercise puts positive stress on the body by forcing it to function outside its comfort zone. During rest, the body will make adjustments to better face the challenge next time you exercise. These adjustments are what will make your body stronger. In other words, fitness improves not during exercise but during rest. Giving your body ample time to recover from exercise is therefore crucial to getting fit.

Disregarding the need to rest and recover is quite common practice and may lead to injury, overtraining or fatigue. Resting properly isn't the same as skipping workouts or being lazy. Resting is about giving your body the time it needs to get stronger and fitter.

Suggestions for recovery:

1. Take one or two days off per week from exercising
2. Follow a hard workout day with an easy day
3. Don't be afraid to take a day off or reduce training if you're tired

Tapering

Tapering refers to a period of easy training immediately before a competition.

Before an important race, you might take an entire week of easy, low-volume training (25% of your high-volume week with one or two short, sharp, faster sessions early in the week).

Before a regular weekend race, you might take two to four days easy.

Rest to be at your best

Warming up and Cooling Down

Much like a high-performance car on a cold winter morning, our bodies need to start with a slow "warm-up" period before we can increase the pace into a full workout.

This crucial period allows blood to be directed from the abdominal organs and towards the exercising muscle so that it can get the oxygen and energy it needs. Blood also moves toward the skin to allow the extra heat created to escape, causing the body to sweat.

At the end of a workout, the cool-down period allows the body to flush out metabolic waste from exercise, such as lactic acid. It also ensures that the heart rate and distribution of blood flow returns to normal gently.

Warm-Up Examples

For Beginners:

Run - 10 minutes starting at a fast walk, easing into a slow, comfortable jog

Cycle - 10 minutes spinning (pedaling with a high cadence of 90-100 revs per minute) easily in a low gear

Swim - 10 minutes easy swimming in varied strokes, also taking the time to practice stroke drills and technique

For Competitive Athletes:






Run - 5-10 minutes warm-up for runs up to 80% HR_{max}. 15-20 minutes for hard intervals or time trials, finishing the warm-up with a thorough stretching session.

Cycle - 10-15 minutes warm-up for any ride up to 80% HR_{max}. 30 minutes warm-up for hard intervals or time trials, finishing the warm-up with a thorough stretching session.

Swim - 800m using different strokes, stroke drills.

Polar sport zones

Polar sport zones spell a new level of effectiveness in heart rate-based training. Training is divided into five sport zones based on percentages of maximum heart rate. With sport zones, you can easily select and monitor training intensities and follow Polar's sport zones-based training programs.

Target zone	Intensity % of HR _{max} , bpm	Example durations	Training benefit
5 MAXIMUM 	90–100% 171–190 bpm	less than 5 minutes	<i>Benefits:</i> Maximal or near maximal effort for breathing and muscles. <i>Feels like:</i> Very exhausting for breathing and muscles <i>Recommended for:</i> Very experienced and fit runners. Short intervals only, usually in final preparation for short running events
4 HARD 	80–90% 152–172 bpm	2–10 minutes	<i>Benefits:</i> Increased ability to sustain high speed endurance <i>Feels like:</i> Causes muscular fatigue and heavy breathing <i>Recommended for:</i> Experienced runners for all year round training in varying length. Becomes more important during pre competition season
3 MODERATE 	70–80% 133–152 bpm	10–40 minutes	<i>Benefits:</i> Enhances general training pace, makes Moderate intensity efforts easier and improves efficiency <i>Feels like:</i> Steady controlled fast breathing <i>Recommended for:</i> Runners progressing towards events or looking for performance gains, particularly for half and full marathon training.
2 LIGHT 	60–70% 114–133 bpm	40–80 minutes	<i>Benefits:</i> Improves general base fitness, improves recovery and boosts metabolism <i>Feels like:</i> Comfortable and easy, low muscle and cardiovascular load <i>Recommended for:</i> Everybody for long training sessions during base training periods and for recovery exercises during competition season
1 VERY LIGHT 	50–60% 104–114 bpm	20–40 minutes	<i>Benefits:</i> Helps to warm up and cool down and assists recovery <i>Feels like:</i> Very easy, little strain <i>Recommended for:</i> For recovery and cool-down exercises throughout the training season

HR_{max} = Maximum heart rate (220-age). Example: 30 years old, 220–30=190 bpm

Running intensity in **sport zone 1** is very low. The main training principle is that performance level improves during recovery, not during training. Sometimes, training has been so strenuous that you may not have recovered yet the next day, in which case, you can accelerate the recovery process with very light intensity training.

Endurance training occurs in **sport zone 2**, and features an easy aerobic run. Endurance training is an essential part of every runner's training program. In fact, endurance training is the base of any training. Making progress in endurance training requires persistence.

Aerobic power is enhanced in **sport zone 3**. Here, training intensity is higher than in sport zones 1 and 2 but is still mainly aerobic. Training in sport zone 3 can, for instance, consist of intervals followed by recovery. Running in this zone is especially effective for improving the efficiency of blood circulation in the heart and skeletal muscles.

To compete at your top potential, you will need to do some training in **sport zones 4 and 5**. In these zones, you run anaerobically in intervals of up to 10 minutes: the shorter the interval, the higher the intensity. Sufficient recovery between intervals is very important. Training in zones 4 and 5 is designed to bring the runner to peak performance.

When running in a certain sport zone, the idea is to utilize the entire zone. The mid-zone is a good target, but you don't need to keep your heart rate at that exact level all the time.

Heart rate will gradually adjust to training intensity. For instance, when graduating from sport zone 1 to sport zone 3, blood circulation and heart rate can adjust in 3-5 minutes.

The response time of heart rate to an exercise of certain intensity varies according to training, recovery, environmental and other factors. It is, therefore, important to pay attention to any signs of fatigue and to react accordingly.

Polar sport zones work best with your own maximum heart rate, aerobic and anaerobic thresholds. To determine your maximum heart rate, use the age formula (as a default in your running computer), predicted maximum heart rate (HRmax-p), or have the value measured in a laboratory. Use sport zones when you train for a specific running event or for specific benefits in each of your workouts.

Background to Polar Running Training Programs

For a personalized running training program, go to the www.polarpersonaltrainer.com web service. Here, you will find goal-oriented event programs (5 km, 10 km, 21 km and 42 km) as well as a fitness running program.

Programs are designed to improve fitness safely, and are based on your current fitness level. By answering a few questions you will be given a program that is suitable for your fitness level and goals. The optional questions about fitness level specifics like OwnIndex or VO2max will help create a program more accurately suited to your requirements.

The programs have been designed in cooperation with exercise physiologist and training consultant Brendon Downey. Brendon is a qualified triathlon coach with 13 years of experience working with beginners as well as elite-level athletes, including national champions and several ITU World Cup & Olympic competitors. He used to be a competitive cyclist and triathlete, competing at the World Championships in triathlon himself, and is a former New Zealand National Triathlon Champion. Having completed 6 Ironman Triathlons, he has a personal best of 8:59. Brendon has a bachelor's degree in science and a postgraduate diploma in physiology. He can be contacted at his website at www.endurancecoach.com

Programs Based on Polar sport zones

Each program uses the Polar sport zones terminology and structure. In other words, all training is broken down into five sport zones and intensities. This helps clarify the requirements for every session. For additional information on Polar sport zones, consult the article "Polar sport zones".

Program Structure

The 5 km programs are 9 weeks, the 10 km programs are 10 weeks and the ½ Marathon and Marathon programs are 14 weeks in duration. Fitness running programs last 4 weeks.

General aerobic training in zone 2 is an efficient and safe way to build endurance; therefore, training plans are designed to ensure that plenty of aerobic fitness is built first. All programs at lower fitness levels are based on two main principles: week-to-week progression of total exercise volumes, and a long run in zones 1 or 2 that builds up towards the speed required to complete the event. The programs also include some easier “breather” weeks. This is to make sure you complete your event safely, and can eventually move on to longer event programs.

Intermediate programs include more aerobic work in zone 2, and, since participants will have some history in running, we have thrown in additional event-specific work in zones 3 and 4, as well as some hills to build strength. Doing structured amounts of higher intensity work will be a new experience for many runners, so zone 3 work will increase gradually, helping participants improve their training pace and time. Most programs will consist of a small amount of zone 4 work. This will also lead to an increase in event speed and make sure you can advance to more demanding programs safely, should you want to.

For the programs at higher levels, more emphasis is placed on creating an even more solid foundation (more total distance/time) through aerobic running and increased amounts of hill work in zones 3-4. Also, training at event speed in zones 3 and 4 increase at this level.

In all cases, we stick to the principle of progressive loading, and ensuring recovery before repeating. In all, these programs spell quality preparation for running events.

Gradual Progress

The programs are designed to help runners progress towards better fitness, longer distances and more challenging training programs. Generally, once you have completed a particular training program, you can either advance to the same distance at a higher intensity level or to a longer distance at the same intensity level. For example, after a 5 km program, you should be able to advance to 10 km. But to do that, your fitness level should have improved sufficiently. This is determined once you ‘re-profile’ yourself for a new program.

Generally, all programs follow the 10% rule, i.e. volume will increase by around 10% every week. Note that in some cases, some runs may increase more than 10%, so monitor given distances and times carefully, and if in any doubt, just do less.

Progress occurs throughout the program, also in terms of training intensity. At first, intensities are kept low (most training in zones 1-2), increasing gradually to durations and distances closer to event levels.

Periodicity and Sharpening

Each program has a base phase where the emphasis is on increasing volume/distance, or as for some advanced programs, relatively more volume with less intensity. This initial phase of the program will generally include more hills and less speed sessions. This is because doing hills is an ideal way to exercise in higher zones (3+) without the high risk associated with the running speeds required to reach these zones on the flat. Running hills also helps improve exercise economy and develop running-specific leg strength. These are all valuable ways to develop a solid foundation to build on.

In the latter part of most programs, faster work is included in a specific speed phase (zones 3-5). Even the marathon programs, while emphasizing distance/time, include training in zones 3 and 4, as this will help boost efficiency at racing speed on event day.

Since these programs are designed with working people in mind, they will include easier periods of training every other week. Generally, these easy weeks amount to around half the training of the

previous week. This ensures good recovery and helps athletes benefit from the past two weeks of training before moving on.

Tapering

As running creates a fair amount of muscle damage due to its weight-pounding nature, programs include a fair amount of taper. Advanced programs include more of a change in volume due to the greater need for recovery after heavier training loads. Taper periods are, therefore, generally longer. All programs include an adequate taper, which will still include some intense running (in zones 3 and 4) to make sure you maintain good leg speed and strength while still allowing for recovery.

Time Limitations

Note that the programs are limited with regards to total amount of training, so for runners looking to compete at regional level or above, the programs can only offer some guidance. Additional training may, therefore, be required. In fact, we strongly recommend you seek the services of a coach.

The Benefits of Diversified Training

Uniform running may result in injuries that will take a long time to heal. Cross-training will help you strengthen your weaknesses. For example, long runs are usually very strenuous, because your legs and feet are not used to repetitive and prolonged impact. But a long run may be replaced by a long bike ride, hike or Nordic walking instead.

The main purpose of long sessions is to improve aerobic endurance. Many runners prefer the long runs to continuously improve impact tolerance. But impact tolerance is better improved gradually to avoid overtraining. For many runners even recovery runs are demanding, because running always places a large amount of stress on leg muscles. Swimming and fitness walking are excellent for recovering. Your muscles will simply be in much better shape if you strain them in a diverse manner.

By cross-training, you maximize your performance during the all-important intervals and even-paced runs because cross-training ensures your legs are well recovered. Swimming and walking strain the body more evenly, and improve aerobic endurance and oxygen uptake capacity.

A Training Plan that Motivates

We all have our own reasons to take up running. Some of us run to improve fitness or health, others enjoy the social aspect of the sport, while others run to manage weight. Whatever the reason, making exercise as enjoyable and interesting as possible is always a good idea, to make sure you stay enthusiastic about your new hobby for a long time.

Goal-oriented planning is a well-established trend in the business world, and the same principles can be successfully applied to fitness.

Monitoring heart rate parameters is an easy way to observe the way your fitness improves. Rather interestingly, exercising really does lead to better results. All you need to do is to determine your

personal goals and to reach for them through regular exercise. A well-defined goal is sport-specific and challenging, yet within reach (e.g., joining a 10 km running event).

Making a training plan is wise, mainly for good time management. With a clear schedule, you know how much time is needed for training, and can schedule remaining time accordingly. Schedule per week, month or period, but allow for periodical goal adjustments to keep you interested in the way your fitness is improving. You would also be wise to set up short-term goals, to make sure you're on track and allow for corrections.

When you plan per week, remember to alternate heavier days with lighter ones, and not to schedule all your sessions for the weekend. Spread them out evenly throughout the week for better results.