

Heart Rate Based Training

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Racewalk training requires improving a number of physiological attributes: cardiovascular endurance, maximal oxygen uptake ($\text{VO}_2 \text{ max}$), lactate threshold, and technical and physiological efficiency or economy. Each of these attributes can be dramatically improved with training, but each responds best to training at different workout intensities. Endurance, for example, is improved by working at relatively low intensities (slower paces) for sustained periods, while $\text{VO}_2 \text{ max}$ responds best to shorter workouts at much higher intensities.

There are a number of ways to quantify these different intensity levels, such as perceived exertion, percentage of maximum heart rate, percentage of $\text{VO}_2 \text{ max}$, blood lactate levels, and even cadence rate. Heart rate is an attractive choice because it is precise, non-subjective, and easily measured—which explains why heart rate monitors have become so popular in recent years. But for heart rate—or any measure of relative workout intensity—to be effective as a training tool you must first know what constitutes a maximum effort. In other words, to know how hard a 75%, 80% or 90% effort is, you must first be able to quantify what a 100% effort is. So to use a heart rate monitor as a tool you must first find a way of finding or estimating maximum heart rate—the highest number of beats per minute your heart can achieve at an all-out, gut-busting maximum intensity effort. Since most people won't ever work this hard unless being chased by a hungry grizzly bear, finding true max heart rate can be tricky.

One way is to racewalk (or run, if your current technique won't allow you to go fast enough) a series of three 400-meter intervals with 1-minute rest breaks, the first at a very hard, but not all-out effort, and the third all-out. Another way is to get up to a sub-maximum effort and extrapolate. Most people will get to about 90 - 92% of maximum heart rate during a hard 30-minute effort, so for a lot of racewalkers, a 5K race can be used as a test. Average heart rate during the race, or a spot check of heart rate at about the 2-mile mark should come pretty close to 90% of maximum. Dividing by .9 will give a pretty reliable estimate of maximum heart rate.

Once you have an actual or estimated maximum heart rate value, you can go about determining heart rate intensity zones for different types of workouts. These are as follows:

Recovery: One of the most commons training errors is overdoing it on easy days. Your body actually gets weaker and less fit after hard workouts; the adaptation to training takes place after recovery from the hard efforts. Pushing too hard on the easy days doesn't allow for full recovery from the hard efforts, so the quality of your training will suffer on subsequent hard days. Heart rate should be 60 to 75% of maximum on recovery days.

General Endurance: The long day is designed to improve cardiovascular endurance. Endurance sports are all about getting as much oxygen to the working muscles as possible, and these workouts are the best sessions for improving your "plumbing." They increase the number of capillaries (tiny blood vessels) that supply each working muscle fiber with oxygenated blood, and they increase the number of red blood cells and the amount of oxygen-carrying hemoglobin in the blood. Muscle and joint strength is also improved. General endurance workouts should be done at about 65 to 75% of maximum heart rate.

Long sub-threshold training: These workouts are the most race-specific workouts. They are hard efforts that approach race distance, approaching race intensity. For 5K to 10K training these are the traditional 20 to 45 -minute tempo workouts at or near lactate threshold pace or heart rate. When training for longer races (1/2 marathon and marathon) these are long (9 to 15-mile) workouts at anywhere from 15 to 30 seconds per mile slower than race pace all the way up to race pace and faster if the distance is significantly shorter than race distance (e.g., when running a hard 15-miler at marathon race pace.) Heart rates will range from 80 to 90% of maximum. These workouts should be used sparingly, only in the weeks leading up to important races.

Lactate threshold intervals: These are long (800-meter to 5K) intervals at or very near 5K to 10K race pace, which corresponds closely to lactate threshold pace. Threshold training causes the metabolic enzymes in the muscles to get more "bang" out of the oxygen and fuel (fats and carbohydrates) that is supplied to them. High intra-muscular levels of lactic acid (which is really just incompletely burned carbohydrate) foul up the enzymes, causing the muscles to contract more slowly. (If you've ever started out too fast in a 5K and felt like you were running through mud after that first 3-4 minutes of sprinting, you know very well the feeling of high lactate levels. Lactate threshold training allows you to go faster without producing high levels of lactate, and allows you to keep going fast even if you do wind up with relatively high lactate levels. For 5K to half-marathon training, intervals should be done at current race pace. The total volume of the intervals should add up to close to the race duration, broken down into three to eight intervals. Examples include 6 x 800 meters for 5K training, 5 x 1 mile for 10K training, and 6 x 3K for 20K/half-marathon training. Heart rates should range from 85 to 92% of maximum.

VO₂ max intervals: A high VO₂ max means a higher volume (V) of precious oxygen (O₂) gets to the working muscles. Since VO₂ max is measured in milliliters of oxygen per kilogram of body mass per minute, it can be increased by losing body fat through regular endurance training. But quicker gains can be achieved through high-end interval training. 400-meter to 1-mile intervals with long recoveries (rests interals should equal the duration of the work interval) at 95 to 98% of maximum heart rate are typical VO₂ max interal workouts. Volume should be low, for example, 3 x 1 mile or 10 x 400 meters.

Economy intervals: Economy intervals are very short, very fast intervals designed to improve the body's ability to use oxygen efficiently by improving your high-speed racing technique. Since the intervals are so short (in general, 15 - 45 seconds in duration) the heart rate doesn't have a chance to rise much. Accordingly, heart rate isn't used to gauge the intensity of economy intervals. They should simply be walked at a very fast pace, but with perfect, relaxed technique.

Of course the devil is in the details.... Deciding the appropriate mix of hard and recovery workouts for your level and your race distance takes some work, but knowing that you're training at the right intensity each day will go a long way towards helping you to achieve your goals.