



HEART RATE MONITORS:
Train at your fitness level not your age
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Do not let your age have a negative or erroneous affect on your training. The days of calculating your target heart rate with an age related bias are over. For many of us forty and older, the old 220 minus your age equals your maximum heart rate has become increasing inaccurate and somewhat insulting. The use of a heart rate monitor (Polarusa.com) has allowed us to easily calculate our resting and maximum rates as well as heart rate reserve. This information is then easily employed to determine our heart rate for the following training zones: speed, VO₂Max, lactate threshold, endurance, recovery and even overtraining.

Your **Resting Heart Rate (RHR)** is taken when you wake in the morning before you get out of bed. This should be done over a period of several days so that you can find your average. If possible, this should be done at a time when you can wake without the use of an alarm clock. For some this is not possible and the evening may be the best time to monitor your heart rate. Just wear your heart rate monitor in the evening when you are likely to be calm and tired. This is also done for several days to determine your average resting heart rate.

Your **Maximum Heart Rate (MHR)** can safely and accurately be determined for any activity or sport. For running, do a good **10 minute** warm-up followed by some easy stretching just to loosen your muscles. Do another **10 minute** warm-up ending with several strides up to sprint speed. Finally, set your monitor to record your highest heart rate. While wearing your heart rate monitor, run hard for 2 minutes. It is recommended that you add 5 beats to the maximum number you recorded to establish your maximum heart rate. This test should be repeated on several different occasions for accuracy. Some runners prefer this test running up hill for greater intensity. Once you have determined your max heart rate simply multiply it by the various percentages to determine your training zones. For example: your maximum recorded rate was 186 + 5 beats = a max rate of 191. Your recovery training heart would equate to 191 x 70 % or 134 bpm or less.

Heart Rate Reserve (HRR) is the most accurate method for monitoring and determining training zones. The calculation of heart rate reserve is a little more complicated.

$$\text{Heart Rate Reserve (HRR)} = \text{Maximum Heart Rate} - \text{Resting Heart Rate}$$

$$\text{Target Heart Rate} = \text{Resting Heart Rate} + \text{appropriate \% of HRR}$$

For example: if your maximum heart rate is 191 – resting heart rate of 45 = 146 (HRR) , then your recovery target heart rate is your resting heart rate of 45 + (146 x 70 %) = 147 bpm or less. Heart rate reserve is the best method because it estimates the percentage of VO₂Max at which you are exercising and has the most data specific to your fitness level.

VO₂Max is defined as the capacity for oxygen consumption by the body during maximal exertion or as aerobic capacity and maximal oxygen consumption. In other words it is the capacity of your body's plumbing for aerobic exercise. It is the product of your heart rate times the amount of blood pumped per beat times the proportion of oxygen extracted from the blood and used by your muscles. The higher your VO₂Max the greater your capacity for increased pace. Maximal heart rate is the first determinate of VO₂Max and is determined by genetics. Stroke volume of the left ventricle with each heart beat and your tissues ability to extract oxygen from the blood to the muscles are the other two



variables in determining VO₂Max, both of which can be improved with appropriate training. VO₂Max is the most important factor for racing distances shorter than the 10k. Lactate threshold is the most important factor for racing 10k and greater distances

During exercise of increasing intensity, **Lactate Threshold (LT)** is the point at which lactate begins to accumulate above normal levels. This is also known as anaerobic threshold and is generally thought of as the fastest pace you can run and still have a conversation. Lactic acid is a by-product of carbohydrate metabolism. It begins to accumulate when you run at a level where production is greater than your bodies clearance rate. At this point, muscle fatigue and burn begins to accelerate until you either slow down and the excessive lactate is cleared or you will be forced to stop due to muscle pain.

See the diagram below for a comparison of how the three ways of calculating the various training zones affects your training. The data below is based on a 50 year old male with a resting heart rate of 45 and a maximum heart rate of 191:

Training Type (beats per minute)	Age (220 - age)	Max Heart Rate	Heart Rate Reserve
<i>Speed</i>	not used	not used	not used
<i>VO₂Max</i>	162 - 170	181 - 187	184 - 188
<i>Lactate Thershold</i>	136 - 153	153 - 172	162 - 176
<i>Endurance</i>	119 - 136	134 - 153	147 - 162
<i>Recovery</i>	< 119	< 134	< 147

The most significant information occurs at the recovery and VO₂Max training zones. Forcing a runner of this fitness level to do his recovery runs at a heart rate less than 119 is just a waste of time. Most import is the VO₂Max zone which reaches its maximum of 170 beats per minute in the age related method. The true VO₂Max zone for this person is above 180 bpm and would never be reached without using the Maximun Heart Rate or Heart Rate Reserve formulas. Since the 5k race is by far the most popular race in Houston, not training in your VO₂Max zone could have a horrible affect on your racing outcomes at this distance.

Remember, heat and humidity can cause the heart rate to drift upwards because they interfere with the body's ability to regulate temperature. In Houston, this means you should allow for an increase of about 5 beats per minute. If you find that your resting heart rate is elevated, chances are that you are overtraining, dehydrated or consuming too much caffeine. Even if you are not training for a race, using a heart monitor is still an important tool for adjusting your workout to keep yourself healthy and maximize your workout efforts.

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