

Using Heart Rate to Avoid the State of Over Training

The use of heart rate and heart rate monitors have become widely used training aid for a variety of sports. The rate at which the heart beats has a variety of uses including measurement of fitness level, adjusting training load, and monitoring for over training.

The cardinal sign of over training is decreased performance, times fall off. Symptoms associated with over training are early fatigue, changes in mood, muscle soreness, sleep disturbance, susceptibility to infections and staleness or disinterest in sport. The only intervention for over training is rest, not training, not racing.

A common opinion is that if the resting heart rate increases more than 5 beats/minute this suggests incomplete recovery and overtraining. However a close examination of the scientific literature reveals conflicting findings. A number of studies found an increase in resting heart rate when an individual becomes over trained; however other studies have found no relationship between being over trained and resting heart rate. There are several potential reasons which explain the conflicting findings. Resting heart rate can be affected by environmental temperature, state of hydration/dehydration, altitude, drugs (caffeine), and other parameters. The hotter the environmental temperature and the greater the degree of dehydration the harder the body must work, just to get rid of heat. Unless these factors are controlled for when measuring resting heart rate it will affect the reproducibility of the measure. Another explanation for conflicting opinion is differing definition of the amount of exercise needed to cause a state of being over trained. Studies have induced the state of over training with differing levels of exercise. There is no clear definition or test to determine if one is over trained except falling performance level.

Rather than use an increase in resting heart rate as a sign of overtraining some studies have shown that sleeping heart rate is a more reliable measure. Temperature, stress, and other issues are less likely to have an effect on the heart rate measured while sleeping compared to heart rate taken right after waking first thing in the morning. With the advent of heart rate monitors that can store data this is a relatively easy measure to monitor. Heart rate sleeping should be relatively study over months and if sleeping heart rate increases, it should be a good indication that it is time to decrease the volume and intensity of training.

If you do not have heart rate monitor which can record sleeping heart rate, measuring your heart rate on waking before getting out of the bed in the morning should be a relatively reliable measure. A technical point when counting your pulse rate the standard is to start with zero when counting the number of beats the pulse is making. Do not start by counting one, two, as this will be off by one if you count the pulse for the whole minute. If you are counting the number of beats for 15 seconds to multiply by four and you start with one instead of zero the rate will be off by 4.

Many experts recommend using heart rate during sub-maximal training efforts in order to adjust training intensity and volume. This measure has also been suggested as a means to prevent reaching a state of over training.

Ideally training programs should have a repeatable workout which measures time, effort (perceived exertion levels), and heart rate in order to assess changes in physiologic fitness. For triathletes a repeatable workout is needed for each of the three events. Most experts recommend an interval workout of 3 to 5 repeats of about 2 to 5 minutes in duration at a consistent level of perceived exertion. Measure the heart rate immediately after the last interval. Repeating the standard workout periodically (every 3 to 4 weeks) allows for a comparison.

Ideally for a given distance, and consistent level of perceived exertion either the time or heart rate at the end of the test should be lower comparing one test to another suggesting improved efficiency or performance level. If for a given distance, similar level of perceived exertion, the time or heart rate at the end of the test increases suggests signs of over training. Of course there are other possible responses, for a given distance, similar time, the level of perceived exertion and heart rate increase also suggest the possibility of overtraining.

Measuring heart rate at sub maximal work loads can be helpful, but it has been criticized as being a less reliable tool because there are so many parameters to control (level of perceived exertion, distance, and time). Training heart rate does not always increase to match your level of perceived exertion. Sometimes your muscles won't fully recover from previous work out, and you simply won't have the energy to run, swim, bike fast enough to elevate your heart rate to usual levels.

Another heart rate measure that has been used when measuring fitness is the maximum heart rate. This is the drop dead from exhaustion at the finish line heart rate. For a given age this measurement is supposed to be a very consistent measure. The most accurate way to determine the maximum heart rate is through an exercise stress test under the supervision of a health professional. The common way to predict the maximum heart rate is to use a formula, usually 220 minus your age. There can be an error as much as 12 to 36 beats per minute using a formula particularly for the very young, old, and chronically fit. Despite the shortcomings of this measurement some investigators have shown that the maximum heart rate that can be achieved is lower in athletes who are in a state of over training.

As with most physiologic measures heart rate can be used in several ways in order to determine if training load is too stiff. The best heart rate measurement seems to be sleeping heart rate.