Understanding Your Heart Rate

Your heart rate at any given moment is a useful piece of information. But it's only useful if you know how to interpret it. Runners often get confused by their heart rate numbers because they lack some of the basic knowledge they need to "decode" those numbers. You don't need a medical degree to understand your heart rate. You just need to know a few basic facts.

Resting Pulse

The hearts of larger people typically beat at a slower rate than the hearts of smaller people when they are sitting or lying still. Besides being influenced by body size, resting pulse is also an indicator of fitness. The fitter you become, the slower your resting pulse will be. That's because your heart gets bigger and more powerful as your fitness improves, so that it is able to pump more blood per contraction.

Maximum Heart Rate

Just as every car has a maximum speed, every heart has a maximum contraction rate. To max out your heart rate you need to sustain a very high-intensity effort for a minute or so. A 400-meter time trial (that is, running one lap around a standard track as fast as you can) will usually do the trick.

Maximum heart rate tends to gradually decline with age. However, not everyone of the same age has the same maximum heart rate, because individual physiological factors also affect this value. For this reason, age-based formulas for determining maximum heart rate are inaccurate for most people.

Heart Rate During Exercise

When you move, your muscles need more oxygen than they do at rest. To meet that demand your heart beats faster. As your speed of movement increases, your muscles' oxygen demands continue to increase and so does your heart rate, which is therefore a reliable indicator of your exercise intensity. Armed with some basic information about how your heart responds to exercise, you can use heart rate monitoring to measure and control your exercise intensity, setting appropriate target heart rates for each portion of each run.

Heart Rate And Fitness

The way your heart rate responds to exercise changes as your fitness improves. Gaining fitness will not increase your maximum heart rate, but it will reduce the rate at which your maximum heart rate decreases with age. A more immediately noticeable effect of improving fitness is a gradual decline in your heart rate at any given running pace. For example, if your heart rate is 150 beats per minute at a pace of 10 minutes per mile when you start a training program, it may be 140 beats per

minute at 10 minutes per mile six weeks later. At that point you may have to run 9 minutes per mile to get your heart rate up to 150 bpm.

As your fitness level rises you will also be able to sustain higher heart rates for longer periods of time. For example, at the start of a training plan you might be able to sustain a heart rate of 180 bpm for 10 minutes before fatigue forces you to quit. After six weeks of training you might be able to sustain the same heart rate for 20 minutes.

Another change you will see as you get fitter has to do with heart rate recovery. The term "heart rate recovery" refers to the slowing of you heart rate that occurs when you stop running or reduce your running speed. The fitter you get, the faster your pulse rate will decrease. Some runners like to track their heart rate recovery as a way to measure changes in their fitness.

Heart Rate and Recovery Status

Speaking of recovery, another thing that many runners like to do is take their pulse first thing in the morning each day. Fluctuations in morning pulse rate indicate how well your body has recovered generally from recent training. A morning pulse rate that's higher than normal indicates that your body is fatigued and that it may need some extra rest.

Cardiac Lag

When you speed up during a run, your heart rate will increase until it reaches the rate that is required to supply your muscles with the extra oxygen they're ask for. That change in heart rate is not instantaneous. Depending on how much your velocity increases, it may take your heart rate 30 seconds or longer to adjust. This phenomenon is known as cardiac lag.

Cardiac lag has important implications for heart rate monitoring during workouts that include changes in pace. For example, suppose your are doing a run that features six intervals of 30 seconds each in zone 5 with 2-minute recoveries in zone 1 between intervals. When you start the first interval, you will accelerate abruptly and your heart rate will climb. But chances are your heart rate will not actually reach zone 5 until the very end of the 30-second interval, if ever. That doesn't mean you failed to do the interval at the right intensity. As long as you were running fast enough for your heart rate to have reached zone 5 *eventually* if you had continued at that pace, then you did it correctly.

Likewise, when you slow down for recovery at the end of your first 30-second zone 5 interval, your heart rate will begin to decrease. But because of cardiac lag, no matter how much you slow down, your heart right might not get all the way back down to zone 1 before your 2-minute recovery ends and it's time to start the next interval. Again, this doesn't mean you messed up. As long as you jogged slowly

enough so that your heart rate would have dropped down to zone 1 eventually, you did it correctly.

A helpful way to avoid getting mixed up by cardiac lag when doing workouts with changes in pace is to learn the relationship between your heart rate and your pace in each zone. For example, by paying attention in your training you can learn what is the minimum steady pace that you have to sustain to get your heart rate up to zone 5. Let's say it's 6 minutes per mile. Because speed and distance devices respond to changes in pace faster than heart rate, you can use this information to ensure that you adjust your pace appropriately in workouts like the one I just described. In this case, at the start of your first 30-second interval in zone 5 you would increase your pace to 6:00 per mile. Even if your heart rate did not quite reach zone 5 by the end of the 30-second interval, you would know you did the interval correctly because of your pace.

This strategy also works for the recovery portion of such workouts. Through experience in training you will learn the steady running pace that is associated with your zone 1 heart rate. Let's say it's 10:30/mile. When you reach the end of your 30-second zone 5 intervals in the workout that we've been using as an example, you will slow down from 6:00/mile to 10:30/mile, knowing that pace puts you at the right intensity for recovery even if your heart rate doesn't get all the way back down to zone 1 by the end of the 2-minute recovery period.

Cardiac Drift

Up to this point I've been talking as if your heart rate will at least remain steady as long as your pace does, but that's actually not quite the case. If you run at a steady pace for a very long time your heart rate will slowly drift upward—not a ton, but a little. This happens because, as your body becomes dehydrated and fatigued, your heart has to work harder to keep you moving at the same pace.

Runners who experience this phenomenon in their longer runs sometimes wonder if they should maintain the same pace even though their heart rate is rising or slow down to keep their heart rate steady. As a general rule you should keep a steady pace and let your heart rate drift, unless you feel more comfortable slowing down.

Hills

You're running along at a certain steady pace and heart rate on flat terrain when you come upon a steep hill. If you keep running at the same pace, your heart rate will skyrocket. To keep your heart rate steady, you'll have to slow down drastically. What should you do?

Since it's your heart rate that determines the intensity of your running, you should generally adjust your pace as necessary on hills to keep your heart rate fairly steady. But it's okay and almost unavoidable to let your heart rate increase slightly (5-8

bpm) when running uphill. This isn't a problem because runners are actually able to sustain higher heart rates when running uphill. For example, if you ran a 1-hour uphill race, your average heart rate would actually be higher than it would be in a 1-hour race on flat ground—meaning you were able to work harder for that 1-hour period—even though your pace would be much slower. What this means is that an "uphill heart rate" that is a few beats higher a "level ground heart rate" is actually no more stressful.

Other Factors

It's important to be aware that other factors besides your pace and your fitness level will influence your heart rate during runs. For example, at higher altitudes and on hotter and more humid days your heart rate will tend to be a little higher at any given pace. If you've recently had caffeine your heart rate may also be higher. None of these factors should be major concerns to you. They're just things to be aware of.

You should know also that monitoring your heart rate during races can be tricky because adrenaline may cause your heart rate to be as much as 10 beats per minute higher than normal at your race pace. If this is the case, ignore your heart rate and run by pace and by how you feel.

Flat Days

Every runner has good days and bad days in training. These fluctuations are normal and can be hard to predict. Because higher heart rates are associated with "harder efforts", many runners expect their heart rate to be higher than normal during those runs when they feel unexpectedly "flat". But it's usually precisely the opposite that happens. Runners often report, "I just couldn't get my heart rate up today."

This seeming resistance of the heart to climb up to normal levels on days when a runner feels lousy probably the body's way of trying to protect itself from overexertion in a fatigued state . On such days it is a mistake to speed up and risk feeling even worse just to get your heart rate up to accustomed levels. Instead, listen to your body and run as slowly as necessary to feel comfortable.