

# The Link Between Stride Frequency, Respiration Rate and Heart Rate

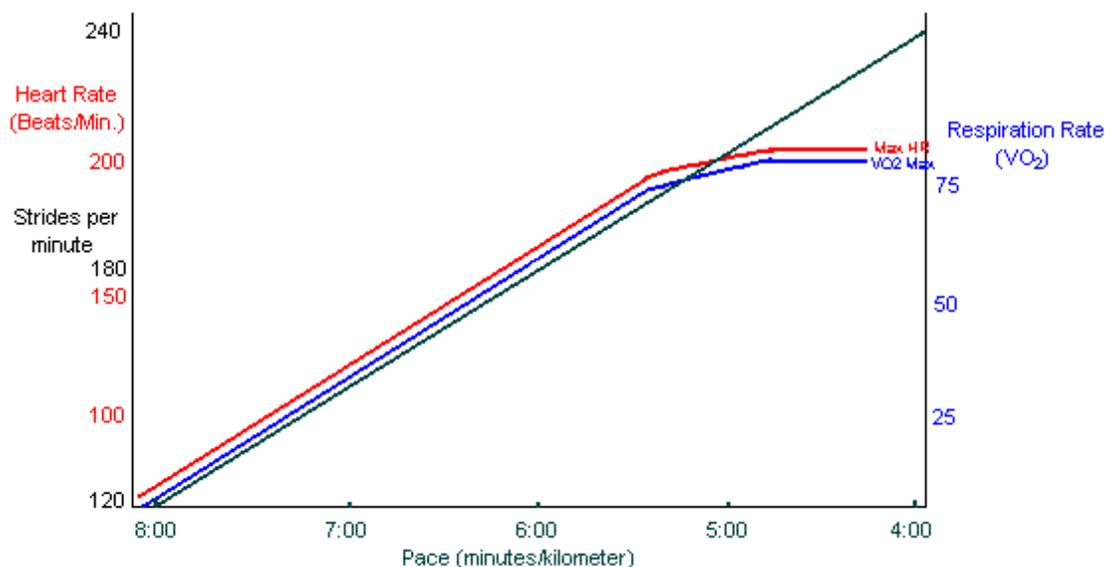
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I'm often asked by beginning walkers at my racewalking clinics how to breathe when racewalking. The easy answer is that you'll do just fine if you relax and don't even think about it. The cardio-pulmonary system is not controlled by conscious thought; if it were we'd "forget" to breathe when distracted by things like analytic geometry problems or the Playboy channel. Although we can control it to some extent, breathing "just happens."

Your muscles require oxygen to produce energy. As you walk faster and faster, the muscles require more and more oxygen to meet the increased energy demands. So you breathe faster and faster, and your heart pumps faster and faster to get oxygen-rich blood into these working muscles. Obviously these three variables are linked: As you walk incrementally faster, you require a proportionately greater amount of oxygen, so your lungs and heart have to work proportionately harder to get the oxygen where it needs to go. The relationship is linear—up to a point. Heart rate and respiration rate are both limited, so after a certain pace, you can't take in or circulate any more oxygen, even if you walk faster than that critical pace. These limits are your VO<sub>2</sub> max, and maximum heart rate, respectively.

Your stride frequency, however, does not necessarily have such limits. If your technique is good, you can spin your wheels very quickly—at least for short distances, anyway. Since stride length is relatively fixed (assuming you're keeping one foot on the ground at all times, which ain't necessarily a realistic assumption...) stride frequency must continue to increase as long as pace is increasing so, unlike respiration rate and heart rate, the relationship is linear at *any* pace:

## Stride Rate Vs. Respiration Rate and Heart Rate



Now would be a good time to scratch your head and say "what's it all mean, Dave?" It means that your breathing will get faster and faster as your stride rate gets faster and faster, until you reach that critical point where respiration rate (and heart rate) begin to level off (which occurs at or near lactate threshold). So most walkers are able to maintain the same breath-to-stride pattern for all sub-threshold paces. Many walkers maintain a 2-3 pattern: they take two strides while inhaling, then three strides while exhaling. This pattern is maintained until the leveling off point (lactate threshold) and then the ratio will change, usually to something faster, say a 2-2 pattern (2 strides while inhaling, 2 strides while exhaling).

"How does this help my walking?" you may ask. Knowing your usual breathing pattern, and looking for the change to a faster pattern is one good way of knowing you're training at or near lactate threshold. Beyond that, it's really not something you should be too worried about. If you like to keep track of minutia while you walk, you'd be better served by counting your stride frequency. A higher stride frequency at a given pace is usually an indication that you are walking with relatively short, fast, efficient steps rather than long, lopey inefficient ones. Got it? Good. Now put down the slide rule, turn of the Playboy channel and get out there and walk!

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