

Training Document:

Training Intensity and Interval Description by Gale Bernhardt

A heart rate monitor is an excellent tool to help athletes gauge exercise intensity. Heart rate is a good indicator of your conditioning; present level of rest; the amount of stress you're experiencing; the effects of heat, humidity and fatigue. If you have a heart rate monitor, you should wear it for most of your running and cycling workouts. Whether or not you wear it during a race depends on your experience level and the distance of the event. Experienced athletes are more skilled at judging intensity and pace; whether or not they wear a heart rate monitor during a race tends to be personal preference. Inexperienced athletes can use a heart rate monitor during a race to help them keep from going out too fast and "blowing up" before the end of an event. In general I suggest athletes, experienced or not, wear a heart rate monitor for half-ironman and ironman distance racing.

While heart rate is a valuable tool, the subjective measure "rating of perceived exertion" (RPE) is also very useful and no less important than heart rate. Many athletes using one of the training plans for the first time may be new to endurance sports and may not own a heart rate monitor. For them, honing in on RPE intensity is critical.

If you do not have a heart rate monitor or you are just beginning to use a monitor, use breathing and RPE to estimate the appropriate training zone. For example, when one of the training plans instructs you to swim, ride or run in "Zone 1" use RPE and your breathing to estimate intensity and speed. Note your heart rate, RPE and pace whenever possible so you can begin to correlate the relationship between the three measures.

Ten-minute Time Trial to Estimate Lactate Threshold for Beginners

After gaining some base fitness, you can conduct a short time trial to estimate your lactate threshold heart rate. Warm up for 10 to 15 minutes at RPE Zone 1 to 2. After the warm-up, you are going to run or ride for about 10 minutes, increasing your pace each minute. If you expect to go beyond the first minute, it is obvious you can not sprint. As you increase pace, notice your heart rate at the end of each minute. How do you feel? What is your breathing rate?

There will be a point during your test where your breathing becomes noticeably labored and some while later, a burning sensation begins to creep into your legs. Take note of your heart rate when you first notice that your breathing becomes labored. Use this heart rate as your lactate threshold, for now. Also take note of when you feel the burning sensation. That sensation is often several minutes after your change in breathing. If you use the "burning leg" sensation to estimate lactate threshold heart rate, you might be overestimating your threshold. Overestimating threshold overestimates all the training zones, which means you might be working anaerobically when you intended to work aerobically. The result could be overtraining and underdevelopment of your aerobic system.

As you gain more sport experience, your estimated lactate threshold number can be further refined.

Continued

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Race or Individual Time Trial of 20 to 30 Minutes

A “beginner athlete” may not mean a “beginner” in endurance sports. Some athletes come to one sport such as triathlon with experience in another sport such as running or cycling. Athletes with experience running 5k or 10k races can estimate lactate threshold heart rate from a race. Some athletes take 30-minutes to complete a 5k race, while others can run a distance of 10k in that time. For this reason, I use race completion time rather than distance to estimate lactate threshold heart rate.

If you are an experienced runner, you can use the average heart rate you achieve during a running race that takes between 20 and 30 minutes to estimate lactate threshold heart rate. This is best accomplished by using a heart rate monitor that calculates average heart rate over a selected interval or period.

The average heart rate you achieve in an all-out 20- or 30-minute race, with others running too, is higher than what you can produce in a 60- to 90-minute all-out race. (Average heart rate produced in a 60- to 90-minute running or cycling event is often lactate threshold heart rate.) For this reason, divide your 20- to 30-minute average race heart rate by 1.04. In other words, this value is about 104 percent of your lactate threshold heart rate.

For example, assume you run a 5k race and it takes you 25 minutes to finish. Collect the average heart rate produced during the race, excluding warm-up and cool down heart rates, to find a value of 170 beats per minute. Your estimated lactate threshold heart rate is 170 divided by 1.04, or a value of 164.

Can you just do your own 20-minute time trial, without going to a race? Yes.

To conduct your own time trial, on the bike or running, find a flat course with no stoplights and minimal distractions. After a good warm-up, start your monitor and time trial as fast as possible for 20 minutes. This means metering your speed so you can produce the highest average, best effort for the full 20 minutes. (Read: Avoid a fast 5-minute effort then a slow fade.) Collect your heart rate average for the time trial and divide this value by 1.02. For example, if your average heart rate for the 20-minute time trial was 160, then threshold heart rate can be estimated by 160 divided by 1.02 or a value of 157.

Different Heart Rate Zones for Different Sports?

Once you've determined your threshold heart rate for cycling or running, you can use that heart rate to estimate the second sport. Running threshold heart rates tend to run five to 10 beats higher than cycling heart rates. Begin with a seven beat difference and adjust up or down as you gain more experience. For example, if your cycling threshold heart rate is 157, estimate your running threshold at 164.

Swimming

For swimming intensity, see the Swimming Instruction section.

Continued

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Shorthand for Intervals

For many of the training plans, intervals are included. For example, the plan may note:

4-6 x 4 minutes Z3, (1:00 RI)

For the sample workout, after your warm-up proceed to the intervals. As soon as you increase speed, the interval time begins. Gently increase speed until heart rate is in Zone 3 (Z3), then hold heart rate in that zone until the end of the interval. During the interval, speed may increase or decrease, depending on course conditions, but try to hold a steady Zone 3 heart rate once it has been achieved. The rest intervals are designated like the swim sessions, where (1:00RI) means a one-minute rest interval. During the rest time, spin or jog easy and at a low rating of perceived exertion (RPE). Heart rate should drop into Zone 1 or below during the rest interval. After finishing all the work intervals, be sure to cool down.

As you progress through the training plans and become more focused on improving your time, pace and power workouts are scheduled. If a plan requires that you know your average pace for running a 10k, for example, the plan description lets you know. Power meters are becoming more common as a training tool for cycling.

For more detailed information on energy production and exercise intensity, see Chapter 1 of Training Plans for Multisport Athletes.

Continued

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Reference Scale for Rating of Perceived Exertion and Training Zones

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Zone	Swim Pace	Percent of Lactate Threshold Heart Rate (Bike)	Percent of Lactate Threshold Heart Rate (Run)	Rating of Perceived Exertion or RPE— (Borg Scale)	Breathing and Perception Using Running as the Example	Purpose and Cross-reference of Terms Commonly Used To Describe Each Zone
1	Work on form, no clock watching.	80 and less	84 and less	6-9	Gentle rhythmic breathing. Pace is easy and relaxed. For running, intensity is a jog or trot.	Gentle rhythmic breathing. Pace is easy and relaxed. For running, intensity is a jog or trot.
2	T-pace + 10 sec per 100	81-88	85-91	10-12	Breathing rate and pace increase slightly. Many notice a change with slightly deeper breathing, although still comfortable. Running pace remains comfortable and conversations possible.	Aerobic, Extensive Endurance, Aerobic Threshold Endurance <i>Ironman-distance race pace for beginners is typically within Zones 1 and 2.</i>
3	T-Pace + 5 sec per 100	89-93	92-95	13-14	Aware of breathing a little harder, pace is moderate. It is more difficult to hold conversation.	Tempo, Intensive Endurance <i>Ironman-distance race pace for experienced athletes is typically within Zones 1 to 3</i>
4	T-Pace	94-99	96-99	15-16	Starting to breathe hard, pace is fast and beginning to get uncomfortable, approaching all-out one-hour run pace.	Subthreshold, Muscular Endurance, Threshold-Endurance, Anaerobic Threshold Endurance
5a	T-Pace	100-102	100-102	17	Breathing deep and forceful, many notice a second significant change in breathing pattern. Pace is all-out sustainable for one- to one-and-a-half hours. Mental focus required, moderately uncomfortable and conversation undesirable.	Lactate Threshold Endurance, Anaerobic Threshold Endurance, Superthreshold, Muscular Endurance <i>Olympic-distance race pace is typically Zones 4 to 5a for experienced athletes, Zones 1 to 3 for inexperienced athletes.</i>
5b	T-Pace – 5 sec per 100	103-105	103-106	18-19	Heavy, labored breathing. Pace is noticeably challenging but sustainable for 15 to 30 minutes. Discomfort is high but manageable.	Aerobic Capacity, Speed Endurance, Anaerobic Endurance <i>Sprint-distance race pace is typically Zones 4-5b, with limited 5c for experienced athletes.</i>
5c	As Fast as Possible	106+	107+	20	Maximal exertion in breathing, pace is sprinting effort, high discomfort that is unsustainable for over one minute.	Anaerobic Capacity, Power