Thresholds and training zones

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Advanced: for experienced endurance athletes.

Training zones built on your own thresholds fit your body better than zones based on a percentage of maximum heart rate.

Why it matters: Two people at the same percentage of maximum heart rate can be working at very different effort levels. Threshold-based zones make easy days truly easy and hard days hard enough.

The big picture: You can estimate your threshold with a 30-minute time trial, and the talk test tracks your first threshold well without any equipment.

What to do with this

- **Find your threshold heart rate or pace** with a 30-minute solo time trial (see the steps below).
- **Use the talk test** to check easy days: if you can't speak comfortably in full sentences, you're probably above your first threshold.
- **Use the zones as guides,** not laws. Heat, fatigue and caffeine shift heart rate.
- **Retest every 6 to 8 weeks** as fitness changes.
- **Beginners:** the heart rate zone tool and talk test are enough (see "The cardio dose").

Go deeper

The terms:

- **First threshold (LT1, VT1):** the effort where blood lactate and breathing first rise above resting levels. Below it is easy, conversational effort.
- **Second threshold (LT2, VT2, often just "threshold"):** the hardest effort you can hold steadily for a long time, roughly 30 to 60 minutes in trained people.
- **Lactate:** a byproduct of fast carbohydrate breakdown, measured with a finger-prick test.
- **Critical speed or critical power:** the boundary between hard but sustainable and unsustainable effort, estimated from two or more all-out tests.
- **Maximum heart rate:** the highest heart rate you can reach. See "Heart rate zone tool."

What people believe: A percentage of maximum heart rate, such as 70%, means the same effort for everyone.

Percentages vs thresholds:

- A 2020 review concluded that prescribing intensity as a fixed percentage of maximum heart rate or maximum oxygen uptake has little merit for producing consistent responses between people [1].
- The first lactate and ventilatory thresholds had some support for marking the line between moderate and heavy effort. Critical power and critical speed were the best-supported markers for the boundary above that [1].

Estimating your threshold without a lab:

- In 27 competitive runners and triathletes, a 30-minute time trial estimated running speed and heart rate at the lactate threshold without a significant difference from lab testing [2].
- The heart rate estimate was typically within about 8 beats a minute [2].

The talk test:

- A 2018 review found that the point where speaking becomes uncomfortable closely tracks the first ventilatory threshold, and training guided by the talk test produced results similar to heart rate–guided training [3].

Between the lines: Zones from a field test or the talk test are good enough for nearly everyone. Lab testing adds precision, mostly useful for serious competitors.

Reality check: Different methods define thresholds differently, so numbers from one test or watch won't always match another. The time-trial study was in trained runners.

How sure are we: Moderate that threshold-based zones are better than fixed percentages of maximum. Moderate that a 30-minute time trial estimates threshold well in trained runners. Moderate that the talk test tracks the first threshold.

Set your zones

1. **Warm up for 15 minutes.**

2. **Run (or ride) 30 minutes as hard as you can at an even effort,** alone, on a flat route.
3. **Note your average heart rate for the last 20 minutes,** and your average pace or power for the whole 30. These approximate your threshold.
4. **Set three zones** around that heart rate as a starting point:

Zone	Feel	Heart rate (common starting point)
1 Easy	Full sentences	Below about 85% of threshold heart rate, and passes the talk test
2 Moderate	Short phrases	About 85 to 100% of threshold heart rate
3 Hard	A few words	Above threshold heart rate

1. **Cross-check zone 1 with the talk test,** and adjust if needed.

The zone cutoffs in the table are common coaching practice, not tested rules.

Sources

1. Jamnick NA, Pettitt RW, Granata C, Pyne DB, Bishop DJ. An examination and critique of current methods to determine exercise intensity. *Sports Medicine*. 2020;50(10):1729–1756. doi:10.1007/s40279-020-01322-8
2. McGehee JC, Tanner CJ, Houmard JA. A comparison of methods for estimating the lactate threshold. *Journal of Strength and Conditioning Research*. 2005;19(3):553–558.
3. Foster C, Porcari JP, Ault S, et al. Exercise prescription when there is no exercise test: the talk test. *Kinesiology*. 2018;50(Suppl 1):33–48.