Lactate Case Study: Optimising Runner Performance

Background

In my ongoing quest to enhance running performance, I conducted a detailed lactate case study with a dedicated runner. The primary goal was to pinpoint both the aerobic (LT1) and lactate (LT2) thresholds and provide a fine-tuned training programme which was integrating my running technique coaching, all aimed to optimise endurance and speed. The tests were conducted two years apart, under identical conditions, to measure performance improvements accurately.

Methodology

The runner underwent a progressive treadmill test where speed increased at set intervals. At each stage, a small blood sample was taken to measure lactate levels. This data enabled me to determine their aerobic and lactate thresholds, which are key indicators of endurance capacity and sustainable race pace.

Objective

To shift the runner's lactate curve to the right, allowing them to sustain higher speeds with the same—or even reduced—effort level.

Results

Aerobic Threshold Improvements

Metric	2023	2025	% Change
Heart Rate (bpm)	127	130	+2.36%
Lactate (mmol/L)	2.26	1.72	-37.67%
Speed (km/h)	8.64	10.67	+23.04

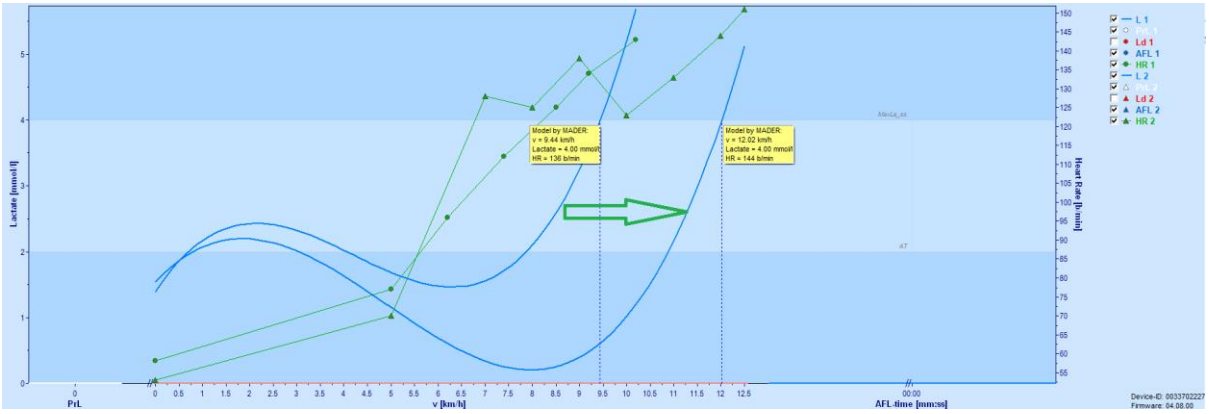
- A **37.7% decrease in lactate** at the aerobic threshold indicates improved efficiency, meaning the runner can sustain a higher pace with less fatigue.
- A **23.04% increase in speed** at this threshold demonstrates a significant endurance boost.

Lactate Threshold (LT2) Improvements

Metric	2023	2025	% Change
Heart Rate (bpm)	136	144	+5.88%
Lactate (mmol/L)	4.0	4.0	N/A
Speed (km/h)	9.44	12.02	+27.33%

- Heart rate at LT2 increased modestly by **5.88%**, showing improved cardiac efficiency.
- Speed at LT2 improved **by 27.33%**, meaning the runner can sustain a much faster pace without additional lactate accumulation.
- Lactate levels remained stable at **4.0 mmol/L**, proving that the runner's metabolic efficiency has significantly improved at higher intensities.

Lactate Threshold Chart



(Figure 1: A visual representation of the lactate threshold shift from 2023 to 2025, demonstrating increased speed and heart rate efficiency.)

Conclusion & Key Takeaways

This case study highlights the power of structured, data-driven endurance training. Over two years, the runner demonstrated:

- **Greater Aerobic Efficiency** – Lower lactate levels at higher speeds mean better endurance.
- **Improved Lactate Threshold Performance** – The ability to sustain a faster pace without excessive fatigue.
- **Optimised Training Adaptations** – A scientific approach to training, backed by measurable results.

By incorporating **lactate testing into a personalised training plan**, runners can fine-tune their training, break through performance plateaus, and achieve race-day success.

Want These Results? Let's Work Together!

🚀 **Take your running to the next level with a personalised, data-driven training plan and running technique package, click below to book your lactate test and consultation today!**

👉 Book Your Lactate Test Now