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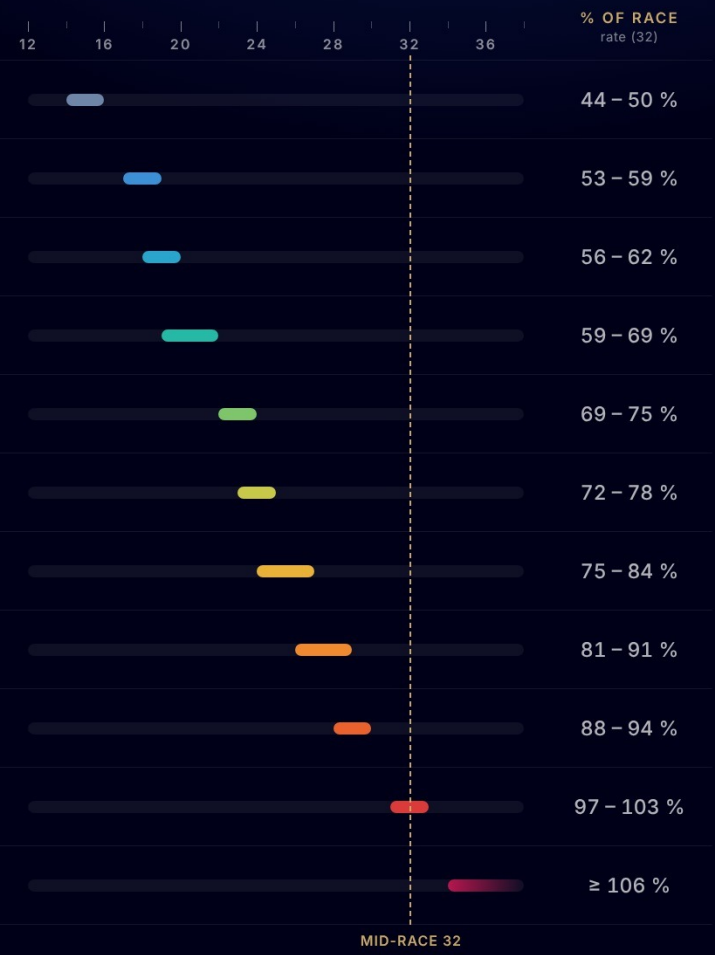
Training Zones Reg → HIT

Lactate · heart rate · perceived load · stroke rates for a mid-race rate of 32 spm

LACTATE ZONE	ZONE		LACTATE mmol/l	HEART RATE % of HR max	PERCEIVED load 1 – 6	STROKE RATE spm	% OF RACE rate (32)
Recovery < 1.5 mmol	Reg	Recovery pace * *Regenerativ*	1.0 – 1.4	61 – 64 %	1 – 1.5	**14 – 16**	44 – 50 %
Aerobic base below LT1 · ≈ 2 mmol	U	Low base steady state *Unteres Extensiv 1*	1.4 – 1.6	64 – 67 %	1.5	**17 – 19**	53 – 59 %
	M	Middle base *Mittleres Extensiv 1*	1.6 – 1.8	67 – 71 %	1.5 – 2	**18 – 20**	56 – 62 %
	O	Upper base *Oberes Extensiv 1*	1.9 – 2.1	72 – 75 %	2 – 2.5	**19 – 22**	59 – 69 %
Threshold around LT2 · ≈ 4 mmol	3	3 mmol *3mml-Schwelle*	2.8 – 3.1	78 – 83 %	2.5 – 3	**22 – 24**	69 – 75 %
	4	4 mmol *4mml-Schwelle*	3.8 – 4.1	84 – 89 %	3 – 3.5	**23 – 25**	72 – 78 %
	5	5 mmol *5mml-Schwelle*	4.8 – 5.1	89 – 91 %	3.5 – 4	**24 – 27**	75 – 84 %
Transition to race pace above LT2 · lactate builds	6	6 mmol *6mml*	5.7 – 6.2	91 – 93 %	4 – 4.5	**26 – 29**	81 – 91 %
	7	7 mmol *7mml-Schwelle*	6.8 – 7.2	93 – 95 %	4.5 – 5	**28 – 30**	88 – 94 %
Race pace & max maximal lactate	RP	Race pace *Renntempo*	max	96 – 98 %	5 – 6	**31 – 33**	97 – 103 %
	HIT	High intensity pace *Maximalgeschwindigkeit*	max	max	6	**34+**	≥ 106 %



Intensity first by stroke rate, watts and perceived load – heart rate and lactate confirm afterwards. Heart-rate zones are a general guideline; your own zones may sit higher or lower.
* Reg between two intensity blocks: paddle lightly, don't follow heart-rate or stroke-rate targets. · If a session names a rate (e.g. 1000 m at SR 24), that rate counts.
Different race rate? Multiply the % column by your own mid-race rate.

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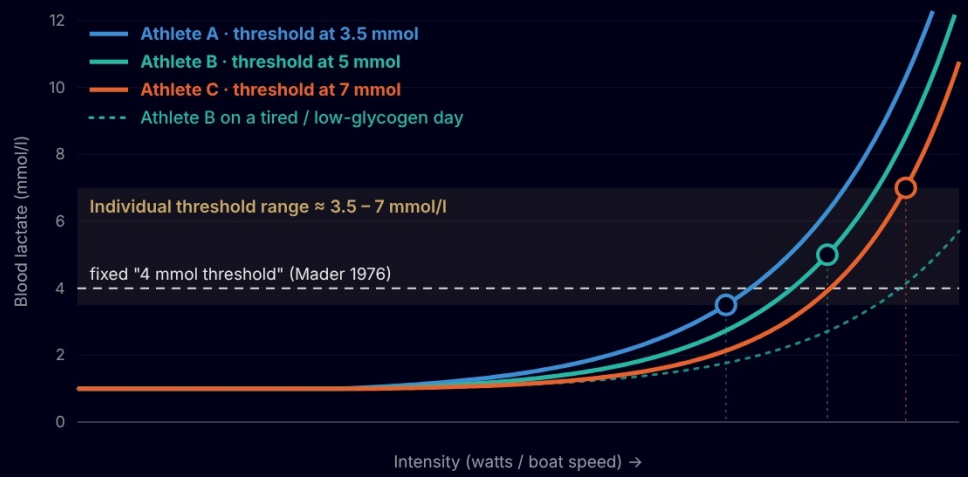
The anaerobic threshold is not 4 mmol

It is individual, it moves from day to day, and it marks a fuel shift — not an engine shutting down

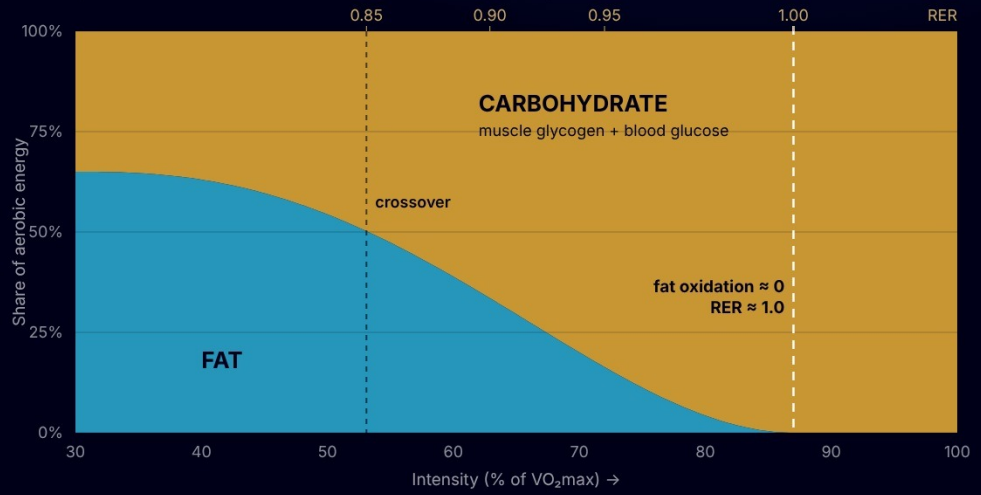
1 Same test, three athletes

Each athlete's threshold (the highest steady-state effort) sits at a different lactate value: typically 3.5 – 7 mmol/l, and it shifts with fatigue, glycogen stores, nutrition, sleep and heat. A fixed 4 mmol line over- or underestimates most rowers.



2 What the threshold changes: the fuel

As intensity rises the body burns less fat and more carbohydrate. At RER (RQ) ≈ 1.0 fat drops out and carbohydrate is the only fuel. Where that happens differs per athlete and per day — it is not tied to 4 mmol either.



3 Fermentation vs cell respiration

A fermented glucose molecule only passes stage ① — the Krebs cycle and the respiratory chain, which make ≈ 30 of the ≈ 32 ATP, are skipped. Cell respiration as a whole keeps running and still supplies roughly 70 – 84 % of a 2000 m race.



BELOW THE THRESHOLD

Most pyruvate goes into **cell respiration**. The lactate that is fermented gets **re-used as fast as it is made**, so blood lactate stays steady. Fat still supplies part of the fuel.

ABOVE THE THRESHOLD

The mitochondria are working at capacity, so glycolysis delivers more pyruvate than ② and ③ can take. The surplus is **fermented**: fast ATP, but only 2 per glucose. Lactate is made faster than it can be re-used, so it **accumulates**. Fat drops out as a fuel.

Phosphocreatine covers the first seconds of starts and spurts.

Schematic curves for illustration. Sources: Mader et al. 1976 (fixed 4 mmol) · Beneke 2003, maximal lactate steady state 2 – 8 mmol/l between individuals · Brooks & Mercier 1994 (crossover concept) · Hagerman 1984 and later studies (2000 m ≈ 70 – 84 % aerobic).

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