



Carbohydrate Limit and the Wall

The fastest pace the carbohydrate on board can actually pay for.

Rapoport's arithmetic: the cost of the distance, the share of it that must come from carbohydrate at a given intensity, and what the legs, the liver and the feed zone can supply.

SPORT

Athletics

FAMILY

The athlete

LICENCE

£249

one-off, perpetual

RUNNING IN THE PLATFORM

<https://edgewortharena.com/arena/api/factors/athlete?event=marathon>

Inputs

NAME	TYPE	UNITS	WHERE IT COMES FROM
mass, VO2max	floats	kg, ml/kg/min	the athlete
leg muscle fraction, glycogen density (optional)	floats	fraction, mmol/kg	measurement or literature defaults
intake (optional)	float	g/hour	the plan

Outputs

NAME	TYPE	UNITS	NOTES
limit intensity	float	fraction of VO2max	
predicted time	float	h:mm:ss	
need and supply curves	arrays	grams	

Method

1 Cost the race at about 1 kcal per kg per km.

THIS IS THE SAMPLE

The method runs to 3 steps; one is shown. The assumptions, the limits, the module layout and the reference implementation come with the licence. Everything on the page below this -- what the model was measured at -- is the same in both versions, because that is the part you should not have to take on trust.



What it was measured at

Solved now, for a 62 kg runner at VO_{2max} 70.

MEASURE	RESULT	READING
Muscle glycogen on board	305 g	plus about 90 g in the liver
Eating nothing	wall at 76% of VO_{2max}	a 2:46:34 marathon
Eating 60 g an hour	limit at 90%	a 2:20:39 marathon
What it gives you	a ceiling, not a prediction	runners slow for other reasons too

Assumptions

What has to be true for the numbers to mean what they say.

- Steady pace, and gut tolerance for the intake you plan. Both are the athlete's problem more often than the model's.

Limits

Where it is known to be wrong. Published because a model without stated limits is one nobody has pushed on.

- It gives a ceiling, not a prediction: plenty of runners slow for reasons that have nothing to do with glycogen.

LICENCE

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