

Fable or fact?

2. “Carbohydrates are indispensable for endurance training sessions and high-intensity (interval) training sessions.”

It is generally known that you use carbohydrates as fuel during endurance training sessions and high-intensity (interval) training sessions. For example, an endurance ride on the racing bike against the wind, a tough ergometer training session, a CrossFit class where strength and cardio are alternated or a trail run through the hills of Nijmegen. But are carbohydrates indispensable?

Which fuel do you use when?

During all types of training, our body uses both fats and carbohydrates as fuel. At low intensity our body mainly burns fats, but with increasing intensity our heart rate goes up and our body uses proportionally more carbohydrates as fuel.^{1,2} Unfortunately, our carbohydrate supply, the so-called glycogen storage, is limited. But why does our body choose carbohydrates at a higher intensity, while we have a larger fat store? This has to do with the fact that the process of carbohydrate combustion is much more efficient and therefore faster. More energy is released in a shorter time, which is of course important for endurance training sessions, but even more with high-intensity (interval) training sessions.^{1,3}

Type of training session	Contribution to energy supply	
	Carbs (%)	Fats (%)
Recovery or extensive endurance training session (60-75% of your max. heart rate)	47.20	52.80
	50.70	49.30
Intensive endurance training session (75-82% of your max. heart rate)	54.10	45.90
	57.50	42.50
Threshold training session (82-89% of your max. heart rate)	60.80	39.20
	64.20	35.80
	67.50	32.50
	70.80	29.20
Intensive interval training session (89-100% of your max. heart rate)	74.10	25.90
	77.40	22.60
	80.70	19.30
	84.00	16.00
	87.20	12.80
	90.40	9.58
93.60	6.17	
96.80	3.18	
100.00	0.00	

¹ Burke L, Deakin V. (2015). *Clinical Sports Nutrition* (5e ed.) Sydney, Australia: McGraw-Hill Education.

² Fox EL, Bowers RW, Foss ML. (1995). *Fysiologie voor lichamelijke opvoeding, sport en revalidatie* (4e ed.) Amsterdam, Nederland: Reed Business.

³ Pannekoek S, van der Stelt T, Wisse V. (2017). *Eet als een atleet*. (1e ed.) Amsterdam, Nederland: I'm a foodie Publishing.

Glycogen storage

Carbohydrates are stored in the form of glycogen in the muscles and liver. A full glycogen storage provides fuel for approximately 60-90 minutes of exercise.¹ This of course depends on the type of activity, the intensity, but it also differs per individual. When the glycogen storage is not completely filled, you will logically run out of fuel faster.

It is therefore important to eat enough carbohydrates before the start of an endurance or a high-intensity (interval) training session and possibly also to eat carbohydrates during exercise. If you don't will not be able to achieve optimal performance.^{3,4}

Yet there are reasons to consciously eat fewer carbohydrates around this type of training.

Train low

In theory, it could be beneficial to exercise occasionally with little carbohydrates to activate enzymes and proteins that play an important role in the conversion of fats into energy. This is also called 'train low'.^{5,6} In this way endurance athletes could stimulate their fat burning and last longer with their glycogen storage.

Research has indeed shown that train low training sessions have an effect on cellular level, but unfortunately the effect on performance level is limited. Only 37% of the studies also found an effect on performance.⁷

If you want to apply the train low principle, keep the following points in mind:

- 1) Do not use train low methods during competitions, but only during preseason training sessions, 4-6 weeks before the competition season.⁴
- 2) Do not use the train low method too often. The advice for (sub) professional athletes is to do this maximum 1-2 times per week. But the lower the weekly number of training sessions, the less you have to do low carb training sessions. I advise avid amateur athletes not to do this more often than twice a month. After all, the train low method does reduce your performance, so you cannot get the most out of your training session.⁴
- 3) Make sure the intensity during a train low training session is lower than during a performance training session: not > 80% of your maximum heart rate.⁴
- 4) Choose a train low method that suits you! There are 6 different methods.⁸ For example, a long endurance training session without supplementing carbohydrates during the training session or a training session early in the morning without breakfast or after a low-carbohydrate breakfast.

⁴ Burke LM (2020). Ketogenic low-CHO, high-fat diet: the future of elite endurance sport? *Journal of Physiology*, 599 (3), 819-843.

⁵ Bartlett JD et al. (2013). Reduced carbohydrate availability enhances exercise-induced p53 signalling in human skeletal muscle: Implications for mitochondrial biogenesis. *American Journal of Physiology. Regulatory, Integrative and Comparative Physiology*, 304 (6), 450-458.

⁶ Yeo WK et al. (2010). Acute signalling responses to intense endurance training commenced with low or normal muscle glycogen. *Experimental Physiology*, 95 (2), 351-358.

⁷ Impey SG et al. (2018). Fuel for the work required: A theoretical framework for carbohydrate periodization and the glycogen threshold hypothesis. *Sports Medicine*, 48 (5), 1031-1048.

⁸ Jeukendrup, A. (2015, 13 juli). 6 Ways to "train-low". Geraadpleegd van <https://www.mysportscience.com/post/2015/07/13/6-ways-to-trainlow>

Conclusion

Carbohydrates are absolutely indispensable for endurance training sessions and high-intensity (interval) training sessions. You cannot achieve optimal performance without carbohydrates. However, you can regularly apply a train low method to stimulate fat burning and teach your body to use less carbohydrates so the glycogen storage lasts longer. That does not necessarily mean that you automatically lower your fat percentage. After all, a negative energy balance is also important to reach this goal: you need to consume fewer calories than your body needs. So, think carefully in advance why you want to apply a train low method and remember that you will simply have to supplement carbohydrates for the majority of your endurance and high-intensity (interval) training sessions.