



Train Low Race High

What is it and how could it help you?
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As a cyclist, you'll certainly be aware of the importance of dietary carbohydrate for maximising your performance. Carbohydrate is your body's premium grade of fuel for exercise because not only can it be stored where it's needed, it can also be rapidly converted to energy in the muscles. This explains why numerous scientific studies have demonstrated beyond doubt that consuming ample carbohydrate, before, during and after exercise can dramatically extend endurance, especially when working at higher intensities.

Despite these facts however, our basic metabolism and genetic makeup are hardly any different from that of our ancient forebears. When they roamed the plains as hunter-gatherers in the Late-Palaeolithic era, their gene selection would have been strongly influenced by the need to ensure survival during periods of famine. They would not have had the ample supplies of carbohydrate that modern farming now gives us but they would still have needed good endurance and speed – both to hunt prey and to avoid becoming prey!

This ancient gene selection may have

profound implications for today's 21st Century cyclist; given that these genes evolved to help us maximise our adaptation to and physical capacity in a 'low carbohydrate' environment, is the almost universally recommended high-carbohydrate diet for cyclists disadvantageous in any way? Or to put it another way, could training in a muscle carbohydrate (glycogen) depleted state (as would have been the norm for our ancestors) possibly produce better training adaptations in modern cycling legs?

Twice daily, alternate day endurance training

One of the earliest studies to look into the effects of low-glycogen training compared the training adaptations in muscle produced by performing leg extension exercise either twice a day on alternate days, or once a day on consecutive days. Exercising twice daily resulted in muscles performing an identical volume and intensity of training, but doing so in a low glycogen state during the second session of the day.

The striking finding was the very significant gain in both time to exhaustion and total work performed in

the twice daily, low-glycogen trained muscles compared to daily trained muscles. **In addition, the researchers discovered that the low-glycogen trained muscles became better at burning fat for energy and soaking up carbohydrate to store muscle glycogen once carbohydrate feeding was resumed.**

The implications of these findings were startling because they seemed to completely contradict one of the most universally accepted tenets of sports nutrition – that muscle glycogen depletion should be avoided at all costs. In plain English, this research indicated that although low muscle glycogen content is known blunt performance on race day, when it comes to training adaptation, this might not be a reason to avoid glycogen depletion. Subsequent studies have indeed confirmed that low-glycogen training seems to boost fat-burning capacity and the ability of recovering muscle to synthesise and store glycogen, once carbohydrate is available again.

Train low, compete (race) high approach

It should be pointed out that not all studies on low-glycogen training have shown performance benefits. However,

a growing number of exercise physiologists now believe that there could be real merit in a 'train low, compete high approach'. This approach is **most definitely not about trying to train on a low-carbohydrate diet**; cyclists who tried to do this would be asking for trouble (see below for potential risks).

Some potential risks of low-glycogen training

- Lowered post-exercise immunity and increased risk of upper respiratory tract infections
- Increased risk of burnout and overtraining;
- Reduced hydration in hot-weather training (muscle glycogen is complexed with three times its own weight of water)
- Increased muscle tissue damage and breakdown, leading strength loss and increased injury risk

What it is about is about trying to teach your body to become as efficient as possible at producing energy by including some (read a few) regular low-glycogen workouts into your training routine. By doing so, you can enhance your energy efficiency and ability to

burn fat, which when combined at a later date with a high-glycogen stores/high carbohydrate intake during racing, could help you achieve improved performance or a PB (see our suggestions, right, on how to introduce some low glycogen training into your routine).

It should be stressed, however, that caution is the name of the game. If you do decide to experiment with some low-glycogen training, only do so for limited periods, and not at times of stress or tiredness. Be sure too to watch very carefully for symptoms of overtraining and fatigue. Remember, our ancient forebears were just trying to survive – not attempting to stage race, set PBs or break endurance/speed records!

How to train in a glycogen-depleted state

STAGE 1: TO obtain the positive effects of low-glycogen training, you first need to decrease your muscle glycogen levels by about 30-35%. This is achieved by pedalling at around 70% of your maximum heart rate for around 60 minutes. This should be done without

consuming any food or drink contain carbohydrate either during the 60 minutes exercise period or in the 2-3 hour period immediately beforehand (to make sure you really are significantly depleting those muscle stores). If you're good in the mornings, a convenient way to doing this is to perform the 60-minute depletion ride first thing in the morning before breakfast.

STAGE 2: CONSISTS of a training session in the glycogen-depleted state. This session should be performed immediately after the 60-minute depletion phase (Stage 1), and should include some high intensity intervals, as this type of training is particularly effective at activating improved endurance performance.

It's also important to stress that caution is required; you should monitor your performance carefully to determine whether low-glycogen training is affecting your recovery and therefore the overall intensity/quality of your overall training programme.

ZERO SPORT TABLETS

During Train-Low-Race-High training, you should not use a drink containing carbohydrate, but you do need to use a sports drink with electrolytes to ensure that you remain fully hydrated. High5 has provided each reader with three tablets of its new low calorie sports drink ZERO – enough to make 1.5 litres.

Zero is a low calorie zero sugar electrolyte drink, and the perfect companion for low glycogen training to:

- › Boost fat burning capacity
- › Enhance the ability of muscles to store glycogen
- › Reduce the calorie intake of your sports drink

It is important to use a recovery drink like EnergySource or 4:1 immediately after your low glycogen training, to provide the energy for subsequent normal sessions.

For more information on Zero visit www.highfive.co.uk

High Five is the UK's leading sports nutrition company. If your local cycling shop is not yet stocking Zero get them to call Raleigh P&A on: 0800 0969060