CARBOHYDRATE FOR ULTRA-ENDURANCE RACES: 🍭 OR 🍴

Popular ultra-endurance events such as the Comrades are in the not-to-distant future and with all the training going on, nutrition is one of the hot topics. There are a number of anecdotal reports of people claiming they have improved their endurance performance by changing their diets to a low carbohydrate (carb) and high fat diet.

"[Anecdotal reports are] not meant to serve as proof that a low-carb diet is equal or superior to a high-carb diet, but it does provide provocative empirical evidence to pursue critical research into their metabolic, physiological and performance effects." (Volek JS, Noakes T, Phinney S. 2015)

For the purpose of this article low carb high fat diet refers to diets with an intake of less than 10% of total energy from carbohydrate and more than 70% of the total energy from fat.

There are 4 main reasons why chronic low carb high fat diets have been proposed for endurance performance:

1. To possibly enhance training adaptations so that fat is more effectively used as a fuel source during exercise and therefore making athletes less carbohydrate dependent during endurance exercise;
2. To possibly decrease gastrointestinal distress often experienced by the ultra-distance athlete during events.
3. The production of compounds, called ketones, in the adapted athlete can possibly provide steady fuel supply for the brain during exercise and may improve recovery (by reducing the inflammatory process).
4. To aid in reducing and maintaining low levels of body fat - a goal commonly sought after by athletes.

But we still have to consider the following:

- Adapting to a low carb diet takes time and is often accompanied by a period of underperformance. Therefore it would not be advisable to try adapting to a low carb training diet close to any competition.
- ‘In the long run’ training for ultra-endurance events when following a low carb diet may impair the functioning of the immune system and reduce the rate of recovery. It can also increase the perception of effort during training (especially during high intensity sessions). This can result in poor quality training sessions and/or training sessions or competitions being missed thereby negatively affecting performance over time.
- In most cases, individuals who experienced an improved performance also experienced other benefits such as weight loss or decreased gastrointestinal distress. It can therefore be argued that the performance improvement is a result of other reasons rather than metabolic adaptations induced by the diet. If this is the case, there are many other proven dietary strategies that can effectively help athletes achieve these benefits without having to resort to a low carb diet.
- There is no “one size fits all”. There seems to be large individual variation in performance after adapting to a low carb diet. There is also a lack of consensus of the exact level of carbohydrate restriction and the overall composition of the diet between individuals.

**THEREFORE MORE LONG-TERM STUDIES IN ATHLETES ARE NEEDED. SO WATCH THIS SPACE!**

**TAKE HOME MESSAGE:**

1. Periodize your carbohydrate intake around your training and race program.

It is best to plan weight loss (reduce body fat) when your training intensity is lower (typically in the “off season”). During this time lower your total carbohydrate intake, specifically decreasing your intake of nutrient-poor carbohydrates as well as high fat sources of carbohydrate (see table below).

During low intensity or shorter training sessions (<75min) consume only water or if needed, rinse mouth with sports drink and spit out.
2. **Manipulate the type, amount and timing of carbohydrate intake around exercise.**

To enhance metabolic adaptations you can for example train in an overnight fasted state and without the intake of carbs during 1-2 sessions a week (“train low”). Alternatively choose a low carb, high protein meal after the training session. It is important to combine these “train low” sessions with more performance-based “quality” sessions (see point 3). Monitor your progress and adjust accordingly.

3. **Incorporate carbohydrate before and during hard training sessions i.e. race day or high intensity sessions.**

Consuming carbohydrate before and during high intensity sessions tops up your body’s carbohydrate fuel stores, improves certain metabolic adaptations and supports the central nervous system (reduces perception of effort).

- Consume a pre-race meal that contains predominantly carbohydrate-rich foods 2-4 hours before the start. It should ideally be low in fat and contain a moderate amount of lean protein e.g. porridge/ cereal with low fat milk and a fruit OR couple slices of toast with scrambled egg and fruit juice. Alternatively eat an easily digestible top up snack either 1-2 hours before or within 15min before the start such as a large banana or energy bar or liquid meal replacement.

- Aim to consume between 30-60g (up to 90g if you use multiple transportable carbohydrate) per hour of exercise. You can mix and match different options and experiment with what works best for you during training. Prolonged exercise may affect appetite and varying salty & sweet foods during the day can help. Additional protein may also play a role in ultra-endurance or stage races.

   **Carbohydrate-rich options containing 20-30g of carbohydrate per portion**
   - 250-500ml commercial sports drink (6-8% carbohydrate solution)
   - 200-300ml soft drink (10% carbohydrate solution e.g. Coke)
   - 1 energy/ cereal bar (that contains 30g of carbohydrate)
   - 1 large fruit e.g. banana
   - 4-5 gums or jelly babies OR 1 carbohydrate gel (~20g of carbs)
   - 3-4 baby boiled potatoes
   - 1 sandwich (2 slices bread) or bread roll (add marmite or peanut butter)

4. **Practice race-day strategies during training.**

Ensure that all nutritional strategies have been tried out during training - do not try anything new on race day. Apart from fine tuning choices to find what works best, practicing carbohydrate intake during exercise will train the gut to tolerate and increases its capacity to absorb carbs and minimizes gastro-intestinal discomfort.

5. **When recovery time between training sessions is limited, include carbohydrate as soon as possible after exercise e.g. during a stage race.**

Consuming carbohydrate after training improves the rate of recovery. Alternatively if you cannot consume large quantities of carbohydrate, incorporating 20-25g high quality protein together with 30-50g of carbohydrate as soon as possible after training will have similar results. Examples include low fat sweetened milk drink with an energy bar or some lean biltong and fruit juice.

### DIFFERENT TYPES OF CARBOHYDRATE

The quality of carbohydrate also plays a role. Choose appropriate types of carbohydrate depending on your training and body composition goals.

<table>
<thead>
<tr>
<th>Type of carbohydrate</th>
<th>Types of food &amp; fluid</th>
<th>Examples</th>
<th>Uses</th>
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<tbody>
<tr>
<td>Nutrient-rich carbohydrate</td>
<td>Provide additional nutrients such as vitamins, minerals, fibre, anti-oxidants and/or protein.</td>
<td>Wholegrain bread, cereals, grains, fruit, starchy vegetables (e.g. beetroot), legumes and low fat or fat free dairy</td>
<td>Should form part of daily diet. Lower fibre options may be a better choice right before training to ensure gastro-intestinal comfort</td>
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<tr>
<td>Nutrient-poor</td>
<td>High in carbohydrate (often)</td>
<td>Sports drinks, cool drinks,</td>
<td>Should only be used as a</td>
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<table>
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<tr>
<th>Carbohydrate</th>
<th>Sugar, glucose, fructose, maltodextrin etc.) but provide little of no additional nutrients</th>
<th>Cordials, sweets and gels</th>
<th>Carbohydrate 'top up' in and around training sessions if needed.</th>
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<tbody>
<tr>
<td>Foods rich in carbohydrate and fat</td>
<td>Contain carbohydrate (often sugar, glucose, fructose, honey etc.) and are high in fat.</td>
<td>Cakes, pastries, pies, hot chips, crisps, chocolate, some biscuits, desserts, milk shakes and ice cream</td>
<td>Limit to occasional treats and not around training.</td>
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