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CARBOHYDRATE LOADING:- MYTH OR REALITY

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WHAT ARE CARBOHYDRATES?

Carbohydrates are the body's main source of energy. They are the most important fuel source for athletes as they provide the fuel to perform high intensity exercise. They are stored in the body as glycogen (12).

However, there is limited glycogen storage capacity within our bodies, so it is important these stores are topped up with adequate carbohydrate before training and replenished after exercise. Your body can only store enough glycogen to sustain around 90 minutes of moderate intensity exercise. Performing high intensity exercise will utilise glycogen stores at an even quicker rate. Exercising beyond this, without sufficient fuel, energy levels drop and fatigue sets in. Therefore, if you are exercising for over an hour it is important to consume carbohydrate sources during exercise.

WHAT IS CARBOHYDRATE LOADING?

Carbohydrate loading, also known as glycogen loading or glycogen super compensation, is a performance-enhancement strategy, most commonly used by endurance athletes before a competition or event (3). Carbohydrate loading involves increasing carbohydrate intake around 1-4 days before an endurance event.

Carbohydrate loading was first developed by Scandinavian researchers in the late 1960s and involved either a 3- or 6-day exercise and diet manipulation (1, 2). Increasing carbohydrate intake through dietary sources increases muscle glycogen stores and enhances performance by delaying the onset of fatigue (1, 2, 4, 5). It has been reported that performance benefits from carbohydrate loading are most likely to occur in events lasting longer than 90 minutes (8). Therefore, endurance events such as marathon and ultra-running, long distance cycling and triathlon, are all events which would benefit from carbohydrate loading.

WHAT ARE THE BENEFITS OF CARBOHYDRATE LOADING?

When applied to training appropriately, carbohydrate loading can be effective for athletes to go for longer without experiencing fatigue. Carbohydrate loading increases muscle glycogen stores, giving individuals more energy at their disposal to use during exercise. Eating sufficient carbohydrates also helps to build muscle mass and prevent muscle loss.

Research studies have shown that muscle glycogen stores can remain elevated for several days after being maximised. For example, in one study endurance-trained men underwent a 6-day carbohydrate loading process, followed by a 3-day post loading phase consisting of moderate carbohydrate intake (~60% total energy) and limited physical activity. The results showed that muscle glycogen stayed significantly elevated during the post loading phase (6).

Another study in trained cyclists showed that following carbohydrate loading intake of approximately 60% total energy and limited physical activity, muscle glycogen remained significantly elevated (7).

ARE THERE ANY NEGATIVES OF CARBOHYDRATE LOADING?

There are lots of factors that can determine the effectiveness of carbohydrate loading. For example; type of carbohydrates ingested, timing of increased carbohydrate intake relative to the performance event, the type of performance event and gender (3).

Individual athletes have different levels of tolerability in relation to high carbohydrate intake. Side effects such as bloating and general gastrointestinal discomfort that often accompany high carbohydrate intake (3). The menstrual cycle phase may also determine the effectiveness of carbohydrate loading. For example, it has been shown that women have a greater capacity for storing glycogen during the luteal phase in comparison to the follicular phase (9, 10, 11). However, due to the dominant hormones present during the luteal phase, women are not as efficient at utilising their glycogen stores.

It is possible to eat too much carbohydrate, just as it is with any other food group. Therefore, it is important to keep following a balanced diet leading up to a long-distance event not focusing solely on carbohydrates. It also needs to be remembered the point of carbohydrate loading is maximise glycogen stores, and there is a limit to how much your body can actually store.

HOW DO ONE CAN CARBOHYDRATE LOAD?

Aim to start carbohydrate loading process 1-4 days before your endurance event. For example, if your endurance event is on Sunday then it is recommended to start the process from Wednesday-Friday.

Renee McGregor recommends eating little and often not necessarily increasing volume or overall energy but changing the composition of the diet so it's higher in carbohydrate. For example, swapping porridge and nuts to porridge with banana and honey or choosing to snack on malt loaf instead of yoghurt.

'Pasta parties' have become a common part of carbohydrate loading in the lead up to long distance endurance events. However, there are numerous ways that you can meet your

carbohydrate requirements beyond pasta. For example, bread, rice, noodles, potatoes, loaf cakes and bananas are just some of the options you could consider as part of your carbohydrate loading plan. It's also important to eat foods that can be better absorbed by the muscles and will not cause gastrointestinal discomfort. The glycaemic index (GI) determines the effect a certain food has on blood glucose with high-GI foods being broken down much quicker during digestion than low-GI foods and are absorbed by the muscles more effectively (13). Foods with a high glycaemic load (GL)have a higher quantity of carbohydrates and together with high GI allow your muscles to efficiently obtain more carbohydrates. A large consumption of high fibre (typically low-GI) foods can lead to gastrointestinal discomfort. Choosing foods lower in fibre will help to reduce the risk of developing gastrointestinal discomfort on race day. White potatoes are high-GI and GL and removing the skins reduces the fibre content. Therefore, mashed potatoes are an ideal choice when carbohydrate loading. It is also normal to gain some weight over this period. For every gram of glycogen, your body stores around 2.6g of water too. This extra weight isn't going to slow you down and it can be helpful in keeping you hydrated during the endurance event. Additionally, if you maintain adequate hydration then glycogen storage is more efficient.

It is important to understand that every individual athlete is unique. Therefore, carbohydrate loading can be an effective performance-enhancing strategy for some endurance athletes but perhaps not others. If you choose to 'carb load' be sure to practice the process during training to see if it is easy to tolerate and effective for you!

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