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FAT - DOES IT HELP PERFORMANCE

ABOUT FAT

Fat plays an important role in your body and in your diet. Body fat provides insulation, protection against bumps, energy reserves, and the curves for which the female form is admired. Dietary fat provides energy (kilojoules), essential fatty acids, carries fat-soluble vitamins, and a lot of the taste and texture we enjoy in food. A healthy body has a moderate cover of fat, while a healthy diet provides a moderate amount of fat, with a preference for healthier fats such as monounsaturates and the omega-3 family of polyunsaturates to replace saturated fat.

In sport, ideas come and go in cycles – often ranging between extremes. So, it is not surprising, after a period when high carbohydrate diets reigned supreme, that there would be a resurgence of interest in high fat eating. There are a couple of theories in which fat has been promoted as a magic bullet for sports performance.

FATS AS EXERCISE FUEL

During sub-maximal exercise, fat and carbohydrate are both major fuel sources, with the 'burn' ratio of each being determined by training, the duration and intensity of exercise, and dietary intake before and during the session. For example, fats make up a greater percentage of the fuel mix at lower intensities of exercise, and increase in contribution as the event continues. For any given exercise load, a fit person burns more fat than an unfit person. Luckily, even the leanest athlete has a reserve of body fat that could fuel exercise for many days. By comparison, our muscles can only store a carbohydrate reserve (glycogen) equal to one to two hours of exercise, making it possible to run out of carbohydrate fuel mid-activity. Your muscles and brain can both suffer when carbohydrate becomes limited, meaning that you may experience a loss of skills and concentration as well as slowing down. This explains why sports dietitians encourage athletes to match their carbohydrate intake to the daily fuel needs of their exercise or sports activities. Focusing on carbohydrate foods and drinks in the periods before, during, or after exercise is a great way to achieve this strategy because it directly links dietary fuel to muscle needs and makes it easy to scale up or down according to the workload.

Consuming carbohydrate before or during exercise allows blood glucose to contribute to your muscle's fuel needs, but we think it provides minimal savings to the muscle's own glycogen stores.

Another way to make the limited glycogen stores go further would be to find a fuel source that could replace glycogen and slow its rate of use. One effect of training is to make the body more efficient at using fat for this purpose. However, training doesn't "max" out the fat burning potential of the muscle.

ADAPTATION TO HIGH FAT DIETS

Research in the 1960s found that a short-term high fat, low-carbohydrate diet caused dramatic reductions in exercise capacity. Three days of a low carbohydrate eating plan lowered muscle glycogen stores prior to exercise, resulting in an earlier onset of fuel depletion and fatigue. However, follow-up studies found that if an athlete continues this diet for a longer period, they gradually adapt to carbohydrate deprivation by increasing their use of fat as an exercise fuel, and using their precious glycogen stores at a slower rate.

One study compared cycling endurance before and after four weeks of this extreme eating plan. It found no overall change to endurance despite the change from high carbohydrate eating – a result that prompted some scientists to question the importance of current sports nutrition guidelines. On the other hand, this study was limited by small numbers and the bias of unusual results for one of the five cyclists. It was also conducted using a very modest exercise intensity that would not apply to most competitive endurance events. And, since all subjects received the high fat diet as their second treatment, they received the benefits of an extra four weeks of training before their second cycling test. Most importantly, it did not show that fat adaptation enhanced sports performance.

Other research on high-fat, carbohydrate-restricted diets have shown that, at best, they should be considered a dietary periodisation strategy rather than a long-term eating plan. When untrained subjects took up a training program accompanied by either a high fat or a high carbohydrate diet, the high carbohydrate group performed substantially better at the end of the study.

The high fat group then switched to a high carbohydrate diet for a week to restore muscle glycogen levels. Although performance was improved by re-fuelling, it still lagged behind that of the high carbohydrate training group.

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This suggests that long-term high fat eating interferes with optimal training gains – a suggestion that seems sensible when we consider that muscle glycogen is required for the high-intensity exercise or 'quality training' that should be part of the program for competitive athletes.

FAT ADAPTATION & CARBOHYDRATE LOADING

Research from several laboratories including the University of Cape Town in South Africa, and the Australian Institute of Sport, has examined the theory that strategies to enhance fat use and carbohydrate availability might not be mutually exclusive. In fact, if undertaken together they might offer an endurance athlete 'the best of both worlds'. The protocol has involved five to six days of a high-fat, low-carbohydrate diet to adapt to increased fat use, followed by one day of low fat, high carbohydrate intake to refuel glycogen stores. Compared to the recommended carbohydrate preparation, this combination diet was successful in creating a situation of high glycogen stores with reduced glycogen use during exercise. However, this did not appear to translate into a performance benefit during a variety of cycling protocols lasting from 2 ½ to 5 ½ hours in duration. In these studies, performance was measured in the form of a time-trial added to the end of a period of steady-state cycling.

A number of different theories were put forward to explain why this "metabolic advantage" didn't allow the cyclists to perform better. These included individual differences between subjects, and the choice of performance measurements that were not sensitive enough to detect a real change. However, further studies came up with a worrying result. The first, which looked at changes within the muscle, found that the fat adaptation treatment reduced the activity of an enzyme called PDH, which is important in the use of carbohydrate as a fuel for high-intensity exercise. In fact, the muscle was not really "sparing" glycogen use after the fat adaptation treatment. Rather it was suffering from an impairment of its ability to burn carbohydrate. The second study showed why this change was important, by switching to a more sports-related performance of a 100km time trial including a series of 1km and 4km "sprints". The differences over 100km were small and were considered not to be significant according to usual statistical analysis. However, differences in performance of the sprints were more sensitive. In fact, the fat-adapt / carbohydrate loading diet clearly reduced power output during the 1km sprints. Similarly, a later study showed that consuming carbohydrate DURING training sessions was important for optimizing the muscle's ability to utilize ingested carbohydrate during a competitive event. In other words, when high rates of carbohydrate burning are on the line, fat adaptation causes problems.

There may be individuals who benefit more from fat adaptation strategies, and there may be some sports in which athletes can afford to "chug along" at fat-burning intensities. To many outsiders, all endurance and ultra-endurance sports might seem like moderate intensity work! However, even if your average speed is moderate, most sports still require an athlete to have a top gear – to sprint to the line, to surge up a hill, or to break-away from the pack. For these reasons we don't consider fat adaptation strategies to have many real uses in sport.

USE OF FISH OILS IN INJURY AND FOR PERFORMANCE

Fish oils (omega-3 polyunsaturated fatty acids, incorporating eicosapentanoic acid (EPC) and docosahexanoic acid (DHA) have been proposed to help athletes due to their anti-inflammatory and immunomodulatory effects. Omega-3 fatty acids may also increase lipid metabolism during exercise, support training responses, and improve cognitive function and mood, thereby making them potentially beneficial for athletes for a range of reasons. While some of these theories are well supported in animal studies, the results are limited and variable in human studies. In addition, excessive doses may compromise immune function and prolong bleeding. Moderate doses of fish oils may be useful to consider for the management of inflammation of muscle and tendon – i.e. injury management, and for athletes involved in sports requiring frequent decision making, such as team sports.

IN SUMMARY

• There is no clear evidence that fat adaptation strategies offer any benefits for the endurance athlete over the traditional high carbohydrate diet.

• In fact, there is evidence that fat adaptation strategies may impair the muscle's ability to burn carbohydrate at high rates. This could reduce the athlete's ability to perform high intensity activities – and ultimately affect their overall competition outcomes.

Intake of 1-2 g of EPA and DHA (in a 2:1 ratio) may be beneficial for athletes, especially those with an inflammatory-based injury.

• Athletes should follow strategies for healthy eating which focus on moderate amounts of mono-unsaturated and omega-3 fats, and a reduction in intake of saturated fats.