



EMPOWERING IRISH SPORT



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HYDRATION

An Introduction



COACHING IRELAND THE LUCOZADE SPORT EDUCATION PROGRAMME



HYDRATION

AN INTRODUCTION

WHY & HOW?

It is now common to see athletes regularly drinking from sports bottles during training and competition. However, the wealth of information regarding fluids and exercise often leads to confusion about what, when and how much to drink. Substantial benefits can result from the inclusion of an oral rehydration sports drink as part of a well-balanced healthy diet. To obtain these benefits, the athlete must have the necessary knowledge to, firstly, select an appropriate sports drink and, secondly, to know when and how often to top-up fluid and fuel stores. The purpose of this fact sheet is to provide the sportsperson with the information necessary to correctly answer these questions. To do this, it is first of all necessary to review some basic physiology....

WHAT HAPPENS TO THE BODY IN RESPONSE TO EXERCISE?

During exercise the internal (core) temperature of the body increases. This is the result of mechanical heat generated by the active muscles and chemical reactions which occur within the body, to produce the energy required to power the exercise. Humans can only tolerate small increases in internal temperature; therefore the body must get rid of this heat to prevent overheating and heatstroke.

HOW DOES THE BODY DO THIS?

In order to regulate core temperature and protect from the adverse effects of excessive heat accumulation, the body must initiate various heat regulation mechanisms. The sweat response is the main method used to lose heat and maintain an optimal core temperature during exercise. The evaporation of sweat accounts for up to 80% of heat loss during vigorous activity. For example, a moderate intensity

workout generally produces 0.5 - 1.5 litres of sweat over a 1 hour period.

The heat required to convert the liquid sweat on the skin to vapour (in other words to 'evaporate' the sweat) is taken from the body, leading to a reduction in core temperature. Sweating therefore fulfils an essential function in the regulation of body temperature however there is a price to pay.

Our bodies are made up of approximately 55-65% fluid, so when some of this fluid is lost through sweat, our ability to function adequately is compromised. Fluid loss places a significant strain on circulatory function, which ultimately impairs exercise capacity and athletic performance.

WHAT DRINK IS BEST? WATER V'S SPORTS DRINKS THE DANGERS OF DEHYDRATION

An additional consequence of prolonged exercise is the depletion of bodily stores of carbohydrate. Carbohydrate is the body's preferred fuel for energy during intense exercise. However our reserves of carbohydrate are limited and during prolonged exercise these stores can become depleted resulting in a reliance on less efficient fuel sources, and an associated decrease in sporting performance. Replenishment of carbohydrate stores is therefore necessary for optimum sporting performance in events of an extended duration.

In order to maximise sports performance, it is important that both hydration levels and carbohydrate stores are maintained at optimum levels. Individuals with gruelling training schedules, consisting of multiple sessions per



week, and those who compete in events lasting up to an hour or longer may find it difficult to effectively replace fluid and fuel losses. The complete replenishment of carbohydrate stores through solid food sources may involve eating large volumes of bulky complex carbohydrates and is not always practical or comfortable for those with high-energy expenditures and busy schedules. Concentrated carbohydrate sources such as commercially available energy bars or carbohydrate replacement drinks, in addition to the consumption of solid food sources of carbohydrate, allows the athlete to fully replenish carbohydrate stores without compromising a healthy diet. In addition a properly formulated isotonic energy replacement drink has the dual benefit of simultaneously replenishing both fuel and fluid losses.

The benefits of carbohydrate feeding during exercise are well documented (See Table 1). Carbohydrate is present in the body as glycogen, in the muscle and liver, and as glucose in the blood. A decrease in carbohydrate availability will negatively impair sporting performance. Consumption of a sports drink containing 6-8g/100ml carbohydrate (isotonic) during exercise can benefit high intensity, long duration aerobic exercise and also repetitive short bouts of near-maximal efforts. It does this by either sparing muscle glycogen, and/or, by maintaining blood glucose levels. Consumption of an appropriate sports drink can also prevent the headaches, dizziness and nausea often associated with exercising with low blood glucose levels. Blood glucose also supplies muscles with glucose when glycogen supplies become depleted.

THE ROLE OF SODIUM

A key benefit of isotonic sports drinks is that they contain sodium and other electrolytes that are lost through sweating. Changes in sodium concentration play a vital role in both retaining ingested fluid and promoting thirst. One of the limitations of using water as a rehydration fluid is that it is very effective at satisfying thirst. When thirst is removed we tend to drink less although we may still be dehydrated. The value of water as a rehydration fluid is further diminished by the fact that it stimulates urine output, thus reducing fluid retention and slowing the rehydration process. In contrast, a beverage containing sodium maintains thirst, improves palatability, slows the rate of urine production, and enhances fluid retention. The inclusion of an appropriate amount of sodium should therefore be considered an essential element of any properly formulated sports drink.

WHAT TO LOOK FOR IN A SPORTS DRINK

- No caffeine, which is a diuretic and may contribute to dehydration
- Not carbonated, which can lead to gastric bloating
- The right concentration of carbohydrate - isotonic proportions, 6-8% carbohydrate
- An appropriate form of carbohydrate - Glucose, sucrose, maltodextrin, or a combination of these. Fructose is not suitable as the only carbohydrate source as it may cause gastrointestinal distress. It may however be used in combination with other carbohydrate forms.
- Palatable taste
- Drink should be cool, not warm

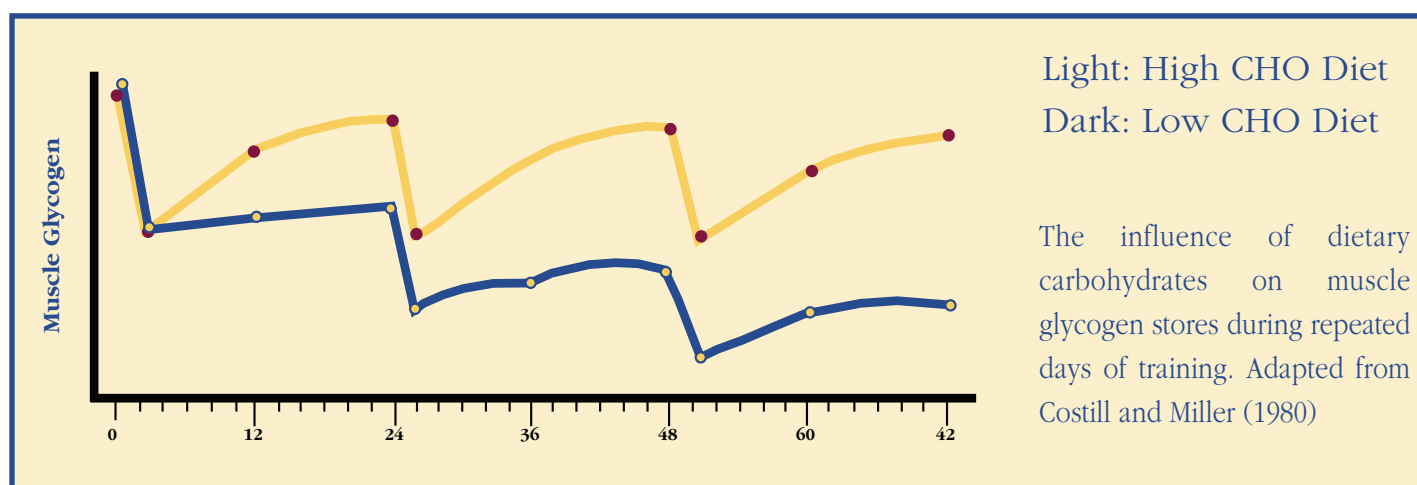


Table 1 Role of carbohydrate.



THE DANGERS OF DEHYDRATION

Dehydration occurs when fluid loss is not replaced by fluid intake. As body fluid levels are reduced blood plasma volume decreases. This means that there is less blood available to maintain vital oxygen supplies to the working tissues of the body and as a result, the heart must work harder to fulfil the body's oxygen demands. Also, there is now less blood available to fulfil the cooling function of transporting heat from the body's core to its surface. Therefore as an individual begins to dehydrate, their ability to regulate heat declines resulting in further sweat loss and an ever-worsening dehydration condition. Dehydration, in cases of extreme heat and chronic fluid deprivation can be fatal, although during athletic activities such occurrences are extremely rare. What is of more immediate concern to the athlete is the fact that physical abilities deteriorate in conjunction with dehydration, resulting in premature fatigue. Sweat losses of as little as 2% of body weight have been demonstrated to adversely affect athletic performance (see Table 2).

WHAT ARE SPORTS DRINKS

Sports drinks are commercially available isotonic solutions designed to promote rapid fluid and carbohydrate replacement, thereby enhancing athletic performance.

REPLACING WHAT'S LOST

The primary benefit of water replacement during exercise is that blood volume is maintained, facilitating the efficient transfer of heat from the body's core to the skin, thereby preventing excessive storage of body heat. Maintaining optimum blood volume is also essential in facilitating the efficient supply of oxygen to the working muscles. There is an additional cooling benefit if the ingested liquid is cooler than body temperature. But water is not the only constituent of sweat nor is it the only limited bodily resource depleted during exercise, therefore is it reasonable to expect water to be the ideal fluid replacement beverage?

Avoid alcohol drinks (especially spirits) and caffeine based drinks such as tea, coffee and coke.

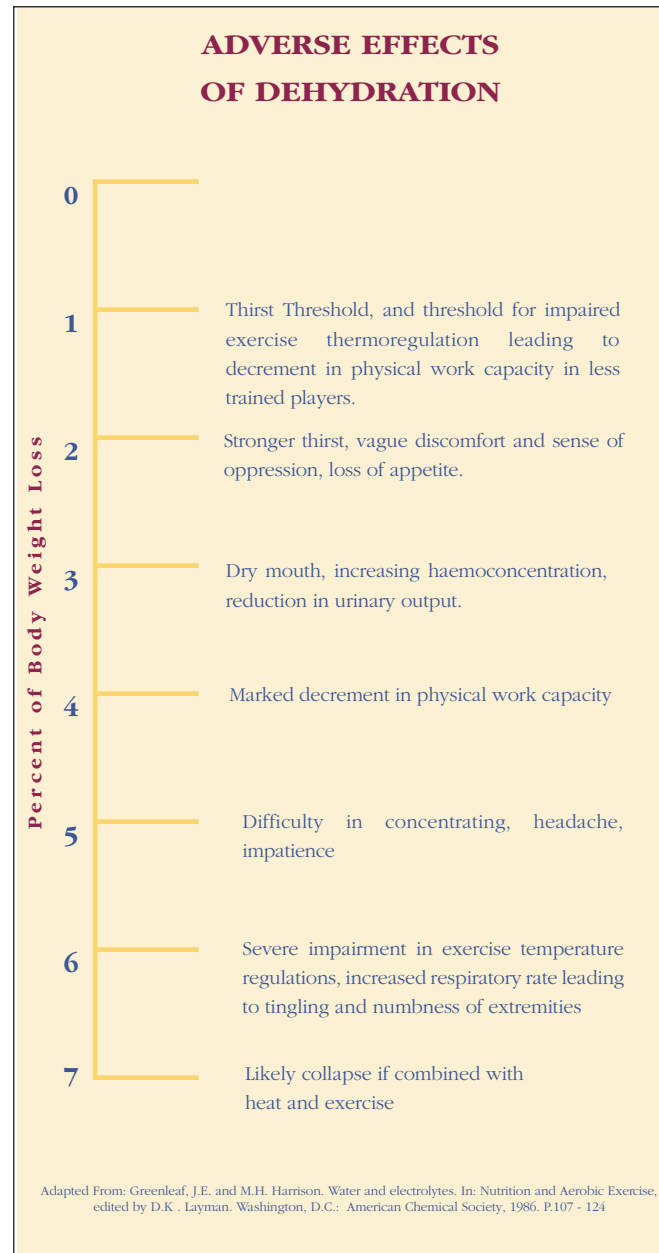


Table 2

HOW TO CHECK FOR HYDRATION STATUS

Monitor weight before and after exercise. For each kilo of weight lost drink 1.2 to 1.5 litres of fluid.

Urine should be pale in colour (except first thing in the morning)

Thirst is an unreliable indicator of fluid requirements, therefore carry a drinks bottle with you at all times and drink regularly.



THE FACTS: WHAT THE RESEARCH HAS TO SAY....

The findings of scientific research overwhelmingly indicate that sports drinks containing electrolytes (particularly sodium) and a low carbohydrate concentration (4-8%), improve performance more effectively than plain water.

Research has demonstrated that such sports drinks are more effective at restoring bodily fluid levels, whilst at the same time having the additional benefit of supplementing the bodies' limited store of carbohydrates.

Much of this research has been conducted using exercise bouts lasting an hour or longer in duration. The findings of this research confirm that ingestion of carbohydrate solutions results in improved athletic performance in long duration activities. There is also a growing body of evidence indicating that players and athletes involved in shorter duration (less than an hour) intermittent, high intensity activities (for example, tennis and soccer) may also benefit from simultaneous fluid and carbohydrate replenishment.

..... & FINALLY

The importance of adequate fluid intake to maintain performance should not be underestimated. The primary benefit of fluid ingestion during exercise is that it helps to maintain cardiac output. Thereby maintaining adequate blood flow to both the working muscles (providing the oxygen necessary for the production of energy), and to the skin facilitating a high rate of heat removal helping prevent overheating and heatstroke.

The inclusion of low concentrations of carbohydrate in sports drinks can serve to offset such losses and therefore may serve to prolong exercise duration and maintain exercise intensity. The inclusion of sodium is recommended as it enhances the palatability of the drink, maintains thirst and promotes greater associated with fluid retention.

HANDY HINTS

When exercising it is important to drink early and often.

Aim to drink larger volumes at the start and ~ 150 ml every 10-15min. Research demonstrates that dehydration can occur in as little as 20 minutes.

Practice drinking during training to become accustomed to drinking fluids while exercising.

Make sure you are fully hydrated prior to competition or training by ensuring a high fluid intake in the days prior to competition.

Thirst alone is not a good indicator of fluid requirements. Typically sports people tend to replenish 1/3 to 2/3 of sweat losses

Water is not the optimum hydration drink. Water effectively reduces thirst and stimulates urine production.

Remember that sweat losses happen while exercising in all weathers - remember to drink during those colder, windy days too!

Avoid sharing drinks bottles. Having your own bottle allows you keep an eye on how much fluid you have consumed.

Remember that individual fluid losses differ - no two people will lose the same amount of fluid! Fluid losses will also differ according to activity type, duration and intensity.



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