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Hydration & Nutrition Requirements for Triathlon & Multisport Events

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Over the years we've witnessed many people slow to a walk as they have run out of fuel. This generally occurs as a result of failing to have an adequate hydration plan and silly errors in their nutritional strategy, which could have been avoided with some practice in training prior to race day.

You need to plan your nutritional and hydration strategy and practice it in the lead up to your goal race. Don't let race day be the first time you try out your plan.

At Triathlon & Multisport Coaching (T&MC) our customised training programs include regular race simulation sessions in the build up to your goal race, which will allow you to trial your pre-race/race nutrition and hydration plan prior to your goal race. This will ensure you have your plan sorted out prior to race day.

This all sounds good in theory we here you ask, but where do I start. The following information will hopefully allow you to maximise your potential on race day and help you achieve your race goals.

Hydration & Nutrition requirements for Triathlon & Multisport Events

Triathlons are completed over varying distances ranging from the sprint distance of 500m swim, 20km ride and 5km run up to the Ironman distance of 3.8km swim, 180.2km ride and 42.2km run with a cut off time of 17 hours. As the distance increases so does the importance of nutrition and hydration.

Generally speaking for sprint distance triathlons and multisport events lasting up to one hour, you'll only need to consume water or sports drinks. You may decide to carry a sports gel in case you need an extra energy boost in the closing stages of the race.

If your race will take more than an hour to complete, you'll definitely need extra fuel e.g. sports drinks, gels and sports bars, bananas, etc, etc. As a general rule of thumb a good starting point is 1 gram of carbohydrates (CHO) and 10 mls of fluid per kg of body weight per hour. It is not easy to eat and drink on the move, so you'll need to test your plan in training at your perceived race effort, in the lead up to your race. Don't let race day be the first time to try and eat whilst on the move.

Your hourly nutritional and hydration requirements should be consumed at regular intervals of say every 15-20 mins for food and every 5-10 mins for fluid to ensure your body remains constantly fuelled throughout the race. Consuming your carbohydrates in one hit will overload your stomach and may result in discomfort.

So test your plan in training, play with the mix of fluids, gel, bars, etc and adjust if necessary to ensure you are consuming sufficient fuel throughout the race.

Carbohydrates

As a result of the daily training multisport athletes undertake, it is important to ensure meals and snacks meet our daily fuel and nutrient demands. Some of the common signs of failure to consume sufficient carbohydrates are fatigue, poor recovery, illness and weight loss. The daily intake of food needs to be planned in advance to ensure nutritious carbohydrates are consumed immediately following exercise to aid the recovery process.

Carbohydrates (CHO) are compounds consisting of Carbon, Hydrogen and Oxygen. The brain relies almost exclusively on CHO to function. Tissues, nerves and muscles use CHO for a significant proportion of their energy.

Complex CHO rich foods (thought to be nutritious and likely to promote a flatter, more sustained rise and fall in blood glucose and insulin levels):

- Breads -- white, wholegrain
- Breakfast cereals
- Rice/Pasta/Noodles
- Potato/Sweet corn
- Dry biscuits
- Legumes (e.g. Kidney beans, soy beans, baked beans)
- Grains including cous cous, barley and oats

Simple CHO rich foods (thought to be very sweet, non-nutritious, and cause a rapid rise in blood glucose and insulin level):

- All types of sugar
- Honey, golden syrup
- Jam, marmalade
- Jelly
- Soft Drinks and cordials
- Sugar-based confectionary
- Dairy products

The Glycemic Index

GI is the new way to classify CHO as the old method did not give an accurate prediction of glucose and insulin responses. CHO rich foods are ranked based on immediate effects on blood glucose levels compared to a reference food. Basically CHO foods that break down quickly during digestion have the highest GI factors. The blood sugar response is fast and high. CHOs which break down slower, releasing gradually into the blood stream, have low GI factors.

Glycemic Index Foods Categorized

High GI above 70	Medium GI of 50-70	Low GI below 50
Glucose	Sucrose	Fructose (some fruit and veg)
Honey	Mars bar	Chocolate
Jelly beans	Crisps	Sponge cake
Sports drink	Squash	Milk
Bagel	Bread	Fruit cake
Weetbix	Muesli	All-bran
White rice	Brown rice	Pasta
Baked potato	Boiled potato	Baked beans
Watermelon	Banana	Apple
Parsnip	Sweet corn	lentils

When should I eat before exercise?

Any food consumed before exercise is only useful once your body has digested and absorbed it. The time required for digestion depends on the type and quantity of food consumed.

Large quantities of food take longer to digest, so you'll need to experiment to work out what foods work best for you.

As a general guide meals should be consumed 3-4 hours before exercise and lighter snacks 1-2 hours.

What should I eat?

Food eaten before exercise should provide carbohydrates.

It should be low in fat and moderate in fibre to aid digestion and reduce the risk of discomfort.

The following foods are suitable to eat 3-4 hours before exercise:

- Crumpets with jam and honey & flavoured milk
- Baked potato + cottage cheese + glass of milk
- Baked beans on toast
- Breakfast cereal with milk
- Bread roll with cheese/meat filling + banana
- Fruit salad with fruit flavoured yoghurt

The following foods are suitable to eat 1-2 hours before exercise:

- Liquid meal supplement
- Milk shake or fruit smoothie
- Sports bars
- Breakfast cereal with milk
- Cereal bars
- Fruit-flavoured yoghurt
- Fruit

The following foods are suitable to eat if there is less than 1 hour before exercise:

- Sports drinks
- Carbohydrate gels
- Cordial
- Sports bars
- Jelly Lollies

Should I Avoid Carbohydrates 1 Hour Before exercise

Most athletes are able to consume carbohydrates in the hour before exercise without affecting performance, and in some cases it can even improve it.

A small percentage of people experience a drop in blood glucose levels and symptoms such as fatigue, shakiness and dizziness after consuming carbohydrates immediately before exercise. This reaction is associated with a rise in the levels of the hormone, insulin.

If you're affected in this way consider the following:

- Experiment to find the best timing for your pre-exercise meal. Try allowing a longer period between eating and exercise.

- If you need to eat close to exercise, opt for a snack that provides at least 70g of carbohydrates. There is some evidence to suggest that small amounts of carbohydrate (<50g) are more likely to cause problems in sensitive individuals than larger amounts.
- Consume carbohydrates during training and racing.

Eating before a race?

The pre-race meal is important to top up muscle and liver glycogen stores. This meal should include familiar foods and fluids that you have been trialling in your race simulation sessions in the lead up to your race.

Sports drinks and water should be consumed in the hour before the race to ensure you start the race well hydrated.

What if I'm too nervous to eat before a race?

You will perform better when you are well fuelled and well hydrated.

Experiment in training to find out what foods work for you and don't cause stomach discomfort. All Our T&MC training programs include regular race simulation sessions that will give you the opportunity to practice your pre-race nutrition and hydration strategy prior to race day.

Liquid meal supplements (e.g. PowerBar Protein Plus powder) will provide an alternative for anybody who has difficulty tolerating solid foods, pre-race.

You may also find that foods such as cereal bars and sports bars can be eaten if you nibble then slowly over the hours leading up to your race.

Eating during training and competition

Eating and drinking during long training sessions will help provide fuel to working muscles and meet daily energy and nutrient requirements. As previously mentioned our customised training sessions include brick sessions to allow you to practice and refine your nutrition and hydration strategy, prior to race day

Due to the high intensity of sprint and Olympic distance racing, it is not necessary or practical to eat whilst racing and athletes usually rely on sports drinks and gels to meet fuel and fluid losses.

Half Ironman and Ironman athletes competing over several hours will need to consume foods and fluids to meet their carbohydrate requirements. As previously mentioned, as a general guide you'll need to consume 1 gram of carbohydrates and 10 mls of fluid per kg of body weight per hour, making sure you drink every 5-10 mins and nibble on something every 15-20 mins to ensure your body stays constantly fuelled and hydrated.

Endurance athletes tend to get so involved in the race and forget to eat or drink or don't consume adequate amounts of food and fluids during the bike leg. This results in them running out of fuel and having to slow down considerably or at worst walking due to cramping and/or lack of energy. The bike leg should be treated as a rolling smorgasbord, with a variety of foods being consumed with adequate amounts of fluid to ensure you set yourself up for a strong finish in the run.

It is difficult to eat solid foods whilst on the run, so most athletes use sports drinks, gels and coca cola to meet their fluid and carbohydrate requirements to ensure they come home strong in the run.

Sports Bars & Gels

Many athletes rely on sports bars and gels as they are a compact and portable source of concentrated carbohydrates, low in fat and fibre that provide a substantial fuel boost. They are also practical where it is impractical to carry large amounts of food when training and competing in endurance events.

They are also useful as part of a pre-event meal for athletes that may experience stomach problems during exercise.

The use of sports bars and gels should be practiced in pre-event race simulation training sessions to assess taste and individual tolerance, prior to using in a race.

Sports Drinks

Sports drinks are one of the best researched nutrition supplements on the market.

Sports drinks are designed to provide carbohydrates and fluid, so that they empty from your stomach quickly and are rapidly absorbed from the small intestine. When used accordingly, they can enhance your performance, but depend on such factors as exercise type, nutrition and duration of exercise. Sports drinks have shown to enhance performance as follows:

- Prolonged exercise >90 mins at an intensity of 60% to 80%.
- High intensity exercise >60 mins at an intensity of 80% to 100%
- Athletes with heavy sweat losses

Sports drinks also include the electrolytes sodium and potassium.

Sports drinks also stimulate thirst receptors, so you drink more, replacing fluids faster.

Fluid intake utilising sports drinks is better when compared to water. Fluid intake when using water alone is generally less when compared to sports drinks. Water is suitable for lower intensity sessions <45 mins or when used in addition to sports drinks.

Sports drinks are generally high in sodium, but it plays a valuable role in improving fluid absorption. Sodium also helps in preventing hyponatremia, a result of sodium levels being diluted to lower than usual levels, particularly in endurance events such as an Ironman triathlon.

In summary sports drinks will enhance performance and are ideal to consume before, during and after exercise as part of your nutrition and hydration strategy. Therefore, you should experiment with sports drinks in training to assess taste and tolerance prior to using in a race.

Tips for Endurance Events

- Have your proven nutrition and hydration strategy worked out before race day, practice it in training. Keep in mind if you slow down during the race you must also reduce the amount of fuel and fluid you are consuming.
- Make sure your nutrition and hydration strategy involves eating at least every 15 - 20 mins and drinking every 5-10 mins during the bike and run. The majority of heart rate monitors can be set to beep at regular intervals as a reminder to eat and drink. Quantity depends on your body weight and heart rate you race at.
- Make sure you consume sports drinks during the race to retain fluids and reduce the onset of dehydration or hyponatremia.
- Consider using salt tablets as no sports drinks on the market have enough sodium in them.
- Have at least 800-1000 calories before the race. Consume a further bar or gel 20 mins before race start. Practice this strategy in one of your lead up races or longer race simulation training sessions prior to race day to assess tolerance.

Do You Know How Much you Sweat During Exercise?

When developing a fluid intake strategy for training, racing and pre/post exercise, you'll need to know your sweat losses. During our regular T&MC race simulation brick sessions, we encourage all participants to weigh themselves pre and post session. Many of our first time participants at these sessions are alarmed about the amount of weight they have lost when they weigh themselves after the session.

To calculate your sweat loss, you'll need to monitor changes in body weight by weighing yourself pre and post-exercise. Each kilogram of weight loss is approximately equal to one litre of fluid loss. Total sweat loss can be estimated by adding the weight of any food or drinks consumed during exercise to this post session weight change. Dividing the total sweat loss by the duration of exercise will provide an estimation for the rate of loss.

For example:

Pre-exercise weight	55kg
Post-exercise weight	53.5kg
Volume of fluid consumed during Exercise (1 litre)	1kg
Exercise duration	2 hours

Calculations:

Fluid deficit (L) = 55kg – 53.5kg = 1.5kg
Total sweat loss (L) = 1.5kg + 1kg = 2.5kg
Sweat rate (L/h) = 2.5kg/2 hours = 1.25 L/h

Do sweat rates vary for each individual?

Sweat rates and fluid losses vary widely for each individual. Body size, gender, exercise intensity, environmental conditions and individual metabolism all effect sweat losses. The best way to calculate your sweat rates is to actually monitor your losses over a number of sessions under similar conditions.

Effects of Dehydration on Performance

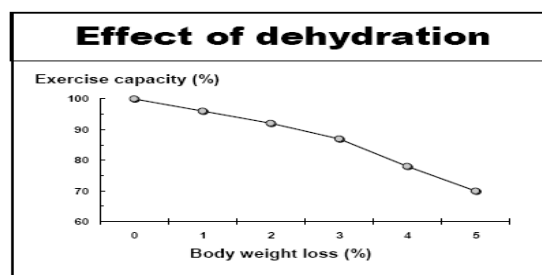
If you fail to consume adequate amounts of appropriate fluid to match your sweat losses, you'll more than likely suffer from the effects of dehydration.

Weight loss during exercise is almost 100% fluid, so don't think you have lost weight/body fat during exercise, as your body won't burn fat without adequate amounts of fluid.

Our bodies comprise of 55% - 75% of fluid. During exercise it is important to replace fluid losses as water allows your body to break down Adenosine Triphosphate (ATP) into Adenosine Diphosphate (ADP), inorganic phosphate and energy. This energy is required for muscle contraction, digestion, nerve transmission, circulation, building new tissue and gland secretion. Without water ATP would not be broken down and these reactions would not take place. Water is also required to maintain body temperature.

Dehydration will affect your performance athletically, reducing muscle strength and endurance, mental alertness, mood and motor skills.

The following table details what the percentage of weight/sweat losses will have on your performance:



The physical effects of dehydration commence at 2% and increase in severity until >5% where you are at risk of heat cramps, heat exhaustion, and in more extreme cases heat stroke and death. The signs of heat illness include irritability, headache, weakness, dizziness, cramps and nausea.

To avoid dehydration, the ideal CHO concentration of fluid being consumed is 6-8%. Fluids with a CHO concentration of over 8% are not recommended, especially in hot conditions as it may cause stomach discomfort and bloating as your ability to absorb them slows for each percentage point above 8%.

So it is timely to remember to avoid the affects of dehydration, the signs include:

- Thirst
- Muscle cramp
- Weakness
- Decreased performance
- Alertness
- Headaches
- Nausea
- Fatigue
- Dizziness

Carbohydrate loading

What is carbohydrate loading and will it improve my performance? These are common questions we have been asked over the years, as it is probably one area that athletes overlook in the lead up to a race, due to their lack of knowledge and understanding of the topic.

Over the years we have attended many carbo loading functions and witnessed many people eating everything they can get their hands on. By the time race day comes around, they've probably put on 4-5 kgs, undoing all the hard work and sacrifices they made in preparing for the race.

The following information on carbohydrate loading should give you an understanding on the purpose and benefits of adequately carbo loading in the lead up to race day.

Carbohydrate loading is a strategy involving changes to training and nutrition that can maximise carbohydrate (muscle glycogen) stores prior to an endurance race. The technique was developed in the 1960's and involved a 3-4 day depletion phase, followed by a 3-4 day loading phase. Ongoing research has refined the method and the depletion stage is no longer required. Today, carbohydrate loading is now more manageable and involves 1-4 days of exercise taper while following a high carbohydrate diet, is sufficient to elevate your muscle glycogen levels.

Carbohydrate loading will benefit anybody exercising for greater than 90 minutes. Carbohydrate loading for exercise of less than 90 minutes is unlikely to provide any benefit as the bodies stores are adequate for exercise of this duration.

Does carbohydrate loading improve performance?

Muscle glycogen levels are normally in the range of 100-120 mmol/kg ww (wet weight). Carbohydrate loading enables levels to be increased to around 150-200 mmol/kg ww. Research has shown that this extra supply has improved endurance exercise performance, by allowing you to maintain your pace for a longer period of time. Carbohydrate loading can improve performance by 2-3%.

What are the common mistakes when carbohydrate loading?

- Carbohydrate loading requires an exercise taper. Some athletes find it difficult to taper training 1-4 days before competition, which results in the benefits of carbohydrate loading being compromised.
- Athletes don't have a good understanding of the amount of food they require to carbohydrate load correctly.

- It will be necessary to cut back fibre and consume compact sources of carbohydrates e.g. sugar, cordial, soft drink, sports drinks, jam, honey, jelly and tinned fruit to name a few. Include too many high fibre foods and you may suffer stomach upset or find the food too bulky to consume.
- Carbohydrate loading will most likely result in weight gains of approximately 2kgs as a result of increases in muscle glycogen and fluid. Some athletes fear gaining weight and this prevents them from carbohydrate loading correctly.
- Carbohydrate loading is not an excuse to eat everything and anything in sight. Consume too many high fat foods and it will be difficult to consume sufficient carbohydrates and may result in body fat gains, so it is important to select high carbohydrate, low-fat foods during this phase.

What Does A Carbohydrate Loading Diet Look Like?

The following diet is suitable for a 70kg Olympic distance triathlete:

Breakfast

3 cups of low-fibre breakfast cereal with 1 ½ cups of reduced fat milk
 1 medium banana
 1 glass (250ml) of orange juice

Snack

Toasted muffin with honey
 500mls of sports drink

Lunch

2 sandwiches (4 slices of white bread) with a generous spread of honey or jam
 200g tub of low-fat fruit yoghurt
 375 ml can of soft drink

Snack

Banana smoothie made with low-fat milk, banana and honey cereal bar

Dinner

1 cup of pasta sauce with 2 cups of cooked pasta
 3 slices of garlic bread
 2 glasses of cordial

Late Snack

Toasted muffin with jam
 500mls of sports drink

The above example provides 14,200 kj, 590g of carbohydrates, 125g of protein and 60g of fat.

Summary

- Consume 1g of carbohydrates and 10 mls of fluid per kg of body weight per hour.
- Make sure your strategy involves eating at least every 15 - 20 mins and drinking every 5-10 mins.
- Sports drinks and water should be consumed in the hour before the race to ensure you start the race well hydrated.
- Practice your race nutrition and hydration strategy in lead up to race at perceived race pace. If change is necessary, only make one change at a time, to determine what does and doesn't work.
- If stomach becomes unsettled, limit carbohydrate intake for a period of time and drink water to dilute the content of your stomach for a short period of time.
- Consistent input of carbohydrates and fluid throughout the race will maintain your energy levels and pace for the entire race.
- Calculate your sweat rates in similar conditions to determine your average sweat rates.

Glossary

- **Carbohydrates (CHO)** - Compounds consisting of Carbon, Hydrogen and Oxygen
- **Hyponatremia** - Water and sodium are both lost from the body, but the sodium loss is greater
- **Meq** = one-thousandth of an equivalent
- **Na** = sodium
- **Mmol** = millimoles
- **Millimoles per litre** = a unit of measure that shows the concentration of a substance in a specific amount of fluid.

Reference material and recommended reading

www.ais.org.au/nutrition

- AIS sports nutrition fact sheet – Triathlon
- AIS sports nutrition fact sheet – Eating before exercise
- AIS sports nutrition fact sheet – Carbohydrate loading
- AIS sports nutrition fact sheet – Sports Water
- AIS sports nutrition fact sheet – Sport Bars
- AIS sports nutrition fact sheet – Sport Gels
- Effects of dehydration on performance by Whitney Morris
- Sports Dieticians Australia fact sheet – Sports drinks

