



NUTRITION FOR SPORT



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“To eat is a necessity, but to eat intelligently is an art.”
-François de La Rochefoucauld

Athletes and coaches are more aware today than ever before of the importance and benefits of good nutrition, in relation to health and athletic performance. It is well established that what an athlete eats can affect his/her ability to train, recover and compete as well as their general health.

Improving your daily diet is the initial step to good health, supporting regular exercise and enhancing athletic performance. It is an essential ingredient in maximising your ability to train and perform. It may make the difference between winning and losing.

Food is an easily accessible and enjoyable ergogenic (performance enhancing) aid. You need to eat and drink so, why not do it in such a way that it will help your performance?

The need for energy (calories) for most athletes is high, especially when your training load is high. We get energy from four nutrients; fat, carbohydrates, protein and alcohol. The most important nutrient for exercising muscles is carbohydrates. Even highly trained athletes will only have enough stores to last up to 70 minutes of medium intensity exercise. Therefore intake of this nutrient via food and drinks is essential to maintain stores.

Fat is another essential nutrient but, unlike carbohydrates, most of us, even the leanest of athletes, have adequate stores of it and therefore pose less of a risk of depleting our stores. Protein can give us calories, however its most important function is growth and repair of the body and it is the most significant structural part of muscle.

Alcohol will contribute to calorie intake and quite often contributes to the increase in fat stores. Intake of alcohol, especially excessive intake, is at odds with long

term health and certainly will have a negative effect on recovery and rehydration strategies.

Vitamins and minerals do not themselves provide us with energy, but they are essential to release the energy from foods and drinks and also have a number of other important functions; such as producing healthy blood (iron), bones (calcium and vitamin D) and potentially protecting our long term health. They protect us in the long term from heart disease and cancers (nutrients such as vitamin C, riboflavin, selenium and beta-carotene). Antioxidants (nutrients such as vitamin C, E, riboflavin, selenium and beta carotene and phytochemicals, flavonoids and phytoestrogens) may reduce the damage that every day life can cause.

The key issue for athletes is to develop easy to follow eating and drinking plans that will:

- Suit your training requirements
- Meet your requirements for all nutrients
- Take account of your individual needs such as weight gain or loss
- Suit your lifestyle
- Promote good health.

For most athletes the key to success is following a routine that does not change either in training or competition, or while travelling away from home.

WHY IS FOOD IMPORTANT?

Your body's systems require nutrients to function and you obtain these nutrients from the foods you eat. Most foods are made up of a number of nutrients (for example milk usually will have protein, fat and carbohydrates along with vitamins and minerals, whereas meat tends to be predominately composed of protein with some fat, depending on how lean the meat is, along with vitamins and minerals).

As most athletes need to sustain large training loads compared to the general population, they generally have greater requirements for most nutrients; especially calories in the form of carbohydrates. To meet these increased requirements athletes require greater amounts of foods. If an athlete does not eat enough to sustain these increased requirements, they are more

likely to become tired, may not recover well, may lose weight or have difficulty gaining muscle, and, ultimately, their performance may be affected.

Carbohydrates

There have been hundreds of scientific studies available to show how adequate carbohydrate intake can significantly improve an athlete's performance across a range of sports, when they are consumed in the correct quantities at the right times.

Glucose, which is stored as glycogen in the muscle and liver, is the main fuel for exercising muscles and the higher the exercise intensity; the greater amounts of glycogen will be used. When glycogen stores are depleted, performance will be affected. Unlike our stores of fat and protein we have only limited stores of carbohydrate and sustaining a good level is often difficult for athletes.

Some food choices to provide approximately 50g carbohydrates:

- 2 medium pieces of fruit or 1 large banana
- 60g of raisins
- 410g tin of fruit salad
- 150g baked beans* (small can of baked beans is 200g)
- 1 corn on the cob or small tin of sweet corn
- 1 bowl of homemade vegetable soup
- 1 medium baked potato
- 1 round of sandwiches (meat/chicken/fish/cheese/egg plus salad *)
- 2 slices of bread
- 1 bagel with spoon of honey/jam/peanut butter*
- 60g breakfast cereal with 150mls of low fat milk*
- 2 medium pancakes
- ½ pint of flavoured milkshake* or smoothie
- 300mls of drinking yoghurt *
- 250g of rice pudding* (some ready to buy pots contain about 40g)
- 1 ice pop (solero, starburst, twister)
- ½ pint of diluted squash
- ½ pint of pure fruit juice
- 700mls of sports drink.

*Also a source of protein.

The amount of carbohydrates needed depends on the size of the athlete. The aim for elite athletes is to consume between 6 to 10g per kg per day. This should be split into meals and small snacks throughout the day.

On training days the focus of eating and drinking should be around training. It is recommended that carbohydrate intake to aid recovery should be approximately 1g per kg body weight immediately after training.

Protein

Despite the research that is available on the importance of carbohydrates for exercise, concentration and good health, athletes often still believe that protein rather than carbohydrates is the most important nutrient to achieve athletic success.

The guidelines for protein intake for athletes range are: (see table below)

Most athletes consume enough protein and some will often consume too much, which can have a negative impact on the amount of carbohydrate that is eaten. Usually when the overall amount of food eaten increases the protein intake will also increase. The higher protein recommendations for athletes are based on a number of factors:

- Athletes tend to have a higher lean muscle mass and they need more protein to sustain this
- Athletes tend to lose small amounts of protein in their urine (higher intensity and longer duration increases protein urea)
- Athletes use small amounts of protein as a calorie source during physical activity
- Extra protein is required for recovery from muscle damage that occurs during training.

Although most athletes have no difficulty in consuming enough protein there are some athletes who should monitor their intake:

- Young athletes
- Weight category athletes
- Vegetarian athletes who may also not eat dairy foods and/or eggs.

Although we get calories from protein, they are not an efficient fuel during exercise. Proteins are more important in their role of building and maintaining muscles and tissue and producing hormones and enzymes. An inadequate intake of energy (calories) will force athletes to use protein for energy and they will then have less protein available to them for the other functions.

Athletes should remember that carbohydrates are protein sparing. This means that if athletes have enough carbohydrate in their system to use for fuel, then protein will be used for more important functions such as repairing muscle damage and producing hormones.

TABLE 1

Group	General population	Serious resistance athletes: early phase of training	Serious resistance athlete: well established programme	Serious endurance athlete	Adolescent athlete
Estimated Protein Requirements (g/kg body weight/day)	0.8 - 1.0	1.5 - 1.7	1.0 - 1.2	1.2 - 1.6	1.5 - 2.0

(Lemon, 2000; Tarnoplsky, 2006)

INCREASING MUSCLE MASS

There is a popular belief that extra protein alone will support extra muscle gains for athletes and this is the main reason many athletes consume large protein intakes, often through supplements. The most important nutritional factor for supporting increases in muscle mass is overall intake of extra calories, of which some of these calories should be from protein.

The usual increases in calorie intake for an athlete in training are between 500 to 1000 calories per day, depending on current weight. Eating regular meals and snacks on all days of the week will help athletes achieve this intake. It is also important that the athlete stimulate muscle growth with an appropriate strength programme, otherwise the extra calories may be stored as fat rather than extra muscle weight.

An increasing amount of evidence supports the theory that adding protein to carbohydrate post-exercise will

help muscle recovery. Add 0.1g protein per kg of body weight along with 1.2g of carbohydrate per kg of body weight. For an athlete weighing 75kg they would need a recovery drink containing 7.5g of protein and 90g of carbohydrate.

TIMING

Timing of nutrient intake is crucial for sports performance. Pre and post-exercise food and fluid intake will help athletes achieve better training outcomes and also aid with quicker recovery, refuelling and adaptations. This, in turn, will further enhance training and competition and also promote good health.

Athletes should practice nutritional strategies in training and competition that are simple and practical to follow. It is also important that athletes eat/drink foods that suit them, as some athletes may not tolerate carbohydrate if it is consumed too close to exercise (within 60 minutes). The reason why some athletes cannot tolerate

carbohydrate close to exercise is not well understood, but one suggestion is that the Glycaemic Index (GI) of the carbohydrates is too high.

Some sports have early morning starts (swimming, marathon starts) and only leave a small time frame prior to starting exercise so a pre-event meal/snack 2 to 4 hours prior is not always practical. In these situations athletes need to practice smaller intakes of foods, meal replacements and fluids pre, during and post training/event.

Pre Competition Strategies

- Use the evening before competition to meet requirements, especially if the event starts early (marathon events, swimming competitions, boxing tournaments)
- Consume foods and fluids that will not cause discomfort during competition
- Aim to meet some of your requirements for the day for all nutrients, as a lack of time may be a problem.

During Competition Strategies

- The addition of fuel during competition is only necessary if the event time is greater than 90 minutes, or if the athlete has not started well fuelled
- Athletes should practice their nutritional plans during training and minor competition
- Use half times, time outs and gaps in play to top up glycogen stores
- Liquids may offer athletes an easier option for topping up stores.

Post Competition Strategies

- Immediate intake of carbohydrate will optimise recovery
- Aim for 1g carbohydrate per kg of body weight within the first hour
- Overall intake of 6 to 10g per kg in the full 24-hour period
- Focus on foods with a high GI during early recovery
- The addition of 10 to 20g of protein to the carbohydrates following exercise will aid recovery.

TYPE OF FOOD

The foods that should be eaten before training/competition should be low in fat and fibre, have a little protein and be high in carbohydrate (i.e. high GI foods).

These are less likely to cause stomach upsets and will provide you with the fuel required. High GI foods are broken down and absorbed more quickly than low GI foods. Low GI foods deliver glucose to the body at a slower rate and may be useful for athletes 2 to 4 hours prior to exercise.

Practical Tips:

- Always carry snacks in your kit bag; dried powders, gels and cereal bars are easy to carry
- Try to eat or drink within 30 to 60 minutes post-exercise
- Milkshakes and smoothies offer you an easy way of pre-fuelling before training or competition, especially for athletes who get too nervous to eat solid foods
- Busy athletes should cook in bulk; freeze extra portions of pasta, lasagne, cottage/fish pie or stew, they can be defrosted quickly after training
- Have plenty of tinned and frozen foods that you can depend on for meals and snacks:
 - Tinned tuna in brine
 - Frozen vegetables
 - Tinned ratatouille
 - Pitta bread or tortilla wrap bread
 - Tinned and frozen fruit
 - Breakfast cereals
 - Tinned and frozen sweetcorn
 - Pots of custard and rice
 - Fruit juices
 - Fruit loaf
 - Baked beans
 - Low fat noodles
 - Raisins and other dried fruit
 - Rice cakes.
- Graze - eat little and often
- Never miss breakfast
- Eat a snack high in carbohydrate immediately after exercise
- Watch the fat content of your food - start reading the labels

- Ensure you are well hydrated - always carry a fluid bottle
- Hygiene of your fluid bottles is vital - don't pass bottle around the team
- Dental hygiene is very important if you eat refined carbohydrates and/or sip sports drinks, brush your teeth using a fluoride toothpaste and visit your dentist on a regular basis
- Organisation and planning are essential if you are to eat and cook healthy!
- Fresh fruit or fruit juice (which will also count as one of your five a day)
- Large bowl of wholegrain cereal/lowfat/skimmed milk, fresh fruits and sugar (if desired) white or wholemeal bread and low fat spread, jam/honey or marmalade
- Tea or coffee/low fat milk and sugar (if desired)
- Porridge with honey or golden syrup
- Pancakes with maple syrup
- Warm rolls or muffins with sliced banana, honey, marmite, jam, peanut butter
- Poached egg on thick sliced toast
- Grilled tomatoes with thick sliced wholemeal toast
- Try making your own fruit smoothie with fresh fruit of your choice, milk and low fat yoghurt
- Baked beans on toast with mushrooms
- Tea, coffee, water or sports drink or fruit juice
- Banana or cereal bar
- Fresh fruit or scone or bread/rolls with low fat spread and jam/honey or marmalade or biscuits/cereal bar (low in fat)
- Pasta dishes with sauce are great, but try to avoid creamy sauces and mayonnaise as this will only increase the fat content of your diet
- Sandwiches are quick, easy and nutritious when you are on the go. Always choose thickly sliced bread as opposed to thin slices as they will contain more carbohydrate
- Baked potatoes with low fat fillings (beans/chicken/tuna). Try adding some cheese, which is high in calcium which is essential for bone health
- Beans on toast
- Toast with banana and honey or a light sprinkling of sugar
- Couscous (quick and easy just add hot water) try

adding some herbs/spices and some roasted vegetables adding to your 5 a day

- Quick cooking noodles/rice/pasta
- Risotto made with tuna, lean ham or chicken
- Leek and potato soup
- Instant soups: which you just add water to, are handy on the go and are great with sandwiches.
- Deep pan pizza (thick crust will contain more carbohydrate), just remember to go for healthy toppings rather than meat and cheese options
- Rice/pasta with low fat meat and vegetable sauce
- Stir fry with your choice of meat and lots of vegetables – add your favourite herbs and spices
- Baked/poached fish with jacket potatoes and vegetables
- Roast chicken with jacket potato and steamed vegetables
- Grilled chicken breast with mashed potato/sweet potato or boiled rice
- Macaroni cheese
- Tea, coffee, water, sports drink or fruit juice
- Sandwich with lean meat and salad filling or scone or biscuits/cereal bar (low in fat)
- Toast with yeast extract spread/jam/honey
- Try cereal such as weetabix, shredded wheat, cornflakes or muesli with low fat milk add dried fruits, nuts, honey or sugar for an extra carbohydrate boost.

DENTAL HEALTH

It is important to be aware of your teeth! Many of the foods that provide athletes with suitable amounts of carbohydrates that can be eaten/drunk close to exercise are also high in refined sugars. This will cause dental decay if you don't take care of your teeth. Brush and floss regularly and use water to flush out your mouth after eating them. Sugar free gum will also help reduce the acidity of your mouth.

Tips for your Teeth

- Brush and floss your teeth regularly
- Chew sugar free gum
- Use a squeeze bottle or drink from a straw
- Drinks should be slightly chilled
- Rinse mouth with water after eating and drinking.

It is important that elite athletes have individualised plans, which address their own needs. When developing a nutrition strategy, consideration of the following needs to be given:

- Different sports and athletes
- Eating for long term good health
- Nutrient requirements during different phases of training and the off season
- The amount of food to be eaten
- The timing of food and drink
- Food sources, especially important for athletes who may need to restrict the overall intake of food and fluids to make weight; they need to pick foods which will give them a wide range of different nutrients.