# A GUIDE TO IMPROVING YOUR SPORTING ENDURANCE PERFORMANCE THROUGH TARGETED NUTRITION

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# EDITO

## WELCOME TO THE WORLD OF SPORTS NUTRITION

Behind every page of our ebook is a dynamic team of experts united by their love of nutrition, sport and performance. Each of these members embodies a genuine commitment to the well-being and success of the sportsperson.

Behind the scenes, our team has worked hand in hand to transform their know-how into a goldmine of practical information. Their aim? To help you exploit your sporting potential to the full, thanks to a perfectly adapted diet.

Get ready to dive into a guide designed to accompany you on your journey towards optimal endurance and performance. We look forward to helping you achieve your sporting goals!

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# SUMMARY

# INTRODUCTION

**DO YOU KNOW EXACTLY HOW NUTRITION AFFECTS YOUR SPORTING PERFORMANCE, PARTICULARLY IN ENDURANCE SPORTS?**

Recent studies have shown that a nutritional strategy developed by nutrition experts, compared with a nutritional strategy chosen by the athlete, helps runners to achieve a better marathon time[1] and trained cyclists to finish a time trial more quickly[2].

Dietary strategies to optimise performance require judicious use of macronutrients and hydration specifically adapted to exercise. Taking food supplements can also help improve your performance. Here's some advice on how to take them in the right way.

In this ebook, we'll guide you towards adopting a good eating strategy that will improve your sporting performance. So you can beat your PR (personal best) in your next race! Let's get started!

1

# THE BASICS

The nutritional needs of adults depend on their age, sex, height and level of physical activity and/or sport. In 2001, the National Nutrition and Health Plan (PNNS) was created with the aim of improving the health of the population through nutrition and physical activity[3]. The PNNS provides major recommendations on a balanced diet for a healthy adult. In addition to these recommendations, we are going to add and specify the specific nutritional needs of sportspeople.

# 1.1 THE NUTRITION RECOMMENDATIONS OF THE PNNS[4]

## INCREASE

**FRUIT AND VEGETABLES:**

Eeat at least 5 portions of fruit and vegetables a day, as they are rich in fibre. This can be divided into 3 portions of vegetables and 2 portions of fruit a day. For example: an apple for breakfast, a starter of grated carrots and a ratatouille as a side dish for lunch, a banana for a snack and a pan of courgettes and mushrooms for dinner. You can eat them fresh, frozen or tinned. Vary the pleasures.

**PULSES:**

Eeat at least 2 times a week, for lunch or dinner, as they are rich in fibre. Pulses include lentils (green, coral, etc.), chickpeas, dried beans (red, white), etc.

**NUTS:**

A small handful a day. Almonds, walnuts, hazelnuts (unsalted)... Nuts are riches in unsaturated fatty acids . Walnuts are rich in omega-3.

**"HOME-MADE":**

The PNNS also recommends cooking as much as possible "at home", using raw, local and seasonal produce.

**WHOLEGRAIN STARCH:**

Eat at least 1 wholegrain starch a day, such as wholegrain rice, wholegrain pasta, wholegrain bread, etc. They are naturally rich in fibre.

**FISH:**

Put on the menu twice a week, alternating a fatty fish (sardine, mackerel, salmon...) and a white fish, for example: bass, cod, hake, hake, sea bream, sole...

**RAPESEED, WALNUT AND OLIVE OIL:**

Give preference to these oils. Added fats such as butter or margarine can be eaten every day in small quantities.

**DAIRY PRODUCTS:**

Take 2 portions a day. For example, a plain yoghurt for breakfast and a portion of cheese for lunch.

GO TO

# REDUCE

**ALCOHOL:**

Drink no more than 2 glasses a day, and not every day. Limit consumption to 10 glasses a week to minimise the risks associated with alcohol.

**SUGARY DRINKS:**

Sugary drinks, sweetened and ultra-processed products.

**SALTY PRODUCTS AND SALT:**

The PNNS recommends reducing salt consumption.

**COLD MEATS:**

No more than 150g a week, as these are processed products rich in fat and salt.

**MEAT:**

Pork, beef, veal, mutton, lamb, offal. You can eat up to 500g a week, giving preference to poultry (chicken, turkey).

**THE NUTRI-SCORE:**

Reduce consumption of products with a D and E nutri-score.

**SITTING TIME:**

The PNNS recommends walking a little every 2 hours to limit sedentary behaviour.

# 1.2 THE SPECIFIC NEEDS OF ATHLETES

**To ensure a balanced diet, sportsmen and women - whatever their level - should follow the recommendations of the PNNS. In addition to these, here are the specific dietary requirements for sportspeople:**

- Total energy intake during the day is higher than for a non-sporting adult;
- Increase protein intake due to muscle catabolism[5];
- Eat more carbohydrates, particularly when training;
- A higher water intake;
- Different micronutrient requirements.

The specific needs of the athlete are detailed in the various points below.


# 2 HYDRATION

# 2.1 WHAT ROLE DOES WATER PLAY IN OUR BODIES ?

**Water is our body's primary constituent and is essential for a number of physiological functions: cell activity, cardiovascular system function, body temperature regulation, kidney elimination, etc.**

### HOW MUCH WATER SHOULD I DRINK?

The most important thing is to vary your water: tap water, spring water, mineral water, etc. Drinking water contains small quantities of minerals such as calcium, magnesium and iodine. Some mineral waters can therefore provide additional minerals. In the case of carbonated waters, the presence of bicarbonate can aid digestion. However, they are poorly digested before and during exercise, but can be useful after exercise to compensate for losses caused by perspiration.

# 2.2 HYDRATION FOR ATHLETES

Hydration, like diet, must not be neglected. Endurance sports carry a high risk of dehydration due to perspiration.

***Dehydration of more than 2% of body weight can compromise sporting performance[6]. To ensure a good fluid balance, you need to adjust your hydration before, during and after exercise.***

We recommend drinking at least 2 litres a day, in small sips, throughout the day. This intake should be adapted according to the type of sporting activity and the outside temperature and/or altitude. If you're training in a hot climate, your sporting performance may be compromised[7]. It is therefore recommended to drink 400ml to 600ml of water 2 hours before starting training, then to drink small quantities of water ranging from 150ml to 300ml every 15 to 20 minutes, to avoid dehydration. The volume should be adjusted according to your perspiration rate and digestive tolerance.

When training for up to 90 minutes, water alone in your water bottle will be sufficient. However, during prolonged training, i.e. over 90 minutes, it will be necessary to add a source of carbohydrates to compensate for the oxidation of carbohydrates, as well as sodium to make up for losses due to perspiration. In hot weather, it may be necessary to add potassium.

## BEFORE THE EFFORT

You should drink small quantities of water to maintain a good fluid status, without increasing urination. 150 mL to 200 mL every 30 minutes will be sufficient. The colour of your urine can be a good indicator: the clearer your urine, the better.

During exercise: you should drink at regular intervals of 150ml to 200ml every 15 minutes to limit water loss. Don't forget that thirst is already a sign of dehydration!

For training lasting more than 90 minutes, a sports drink or energy drink containing carbohydrates, vitamins and minerals is recommended. There is no such thing as an exercise drink with a composition suitable for all sports, all athletes and all weather conditions. **It should therefore be tested and validated (in terms of taste, effectiveness and digestive tolerance) during training, well before the competition.**

## AFTER THE EFFORT

Water alone or a recovery drink should be preferred[8]. Ideally, a drink containing sodium. We'll look at other specialised drinks for sportspeople after exercise later on.

## HYDRATION SOLUTIONS

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## DISCOVER

**Sports benefits:** Hydrate & Perform isotonic sports drink helps to compensate for water, energy and electrolyte losses . This carbohydrate and electrolyte drink helps maintain performance during prolonged endurance exercise and increases water absorption.

# 3 MACRONUTRIENTS

## WHAT IS IT ?

Macronutrients are nutrients that our bodies need in large quantities to function properly. There are three categories: proteins, carbohydrates and fats. All three have essential roles in our bodies, which we will explain in detail in this section.

# 3.1 PROTEINS

## THEIR ROLE IN SPORTS

Proteins play essential roles in the body:

- They are involved in the renewal of muscle tissue, hair, nails, hair, the bone matrix, the skin, etc.
- They are involved in many physiological processes (digestive enzymes, haemoglobin, hormones, etc.).

**For endurance sportsmen and women, proteins are particularly sought after to improve recovery and repair tissues damaged by exercise as they play a role in the development and maintenance of muscle mass.**

## PROTEIN REQUIREMENTS FOR ENDURANCE ATHLETES

An intake of good quality protein of between 1.2 g/kg and 1.7 g/kg[9] per day is recommended for endurance athletes. These quantities vary according to the volume and intensity of your training (marathon, trail, ultratrail...). For example, if you weigh 80 kg, you will need to consume between 96 (80x1.2) and 136 (80x1.7) grams of protein per day.

The majority of protein intake should come from food. Then, if you wish and according to your needs, you can add a dietary supplement based on good quality proteins (quality of the raw material, good traceability, etc.).

## WHERE CAN YOU FIND THEM?[10]

Food must provide all the essential amino acids (EAA) (also known as indispensable amino acids, because they are not synthesised by the body). These are lysine, leucine, isoleucine, threonine, tryptophan, methionine, phenylalanine and valine (EAA).

Proteins are found in foods of both animal and plant origin.

**Animal proteins:**

- Dairy products (milk, cheese, yoghurt);
- Meat (chicken, veal, beef, etc.), fish (sea bream, salmon, etc.) and eggs.

**Proteins of plant origin:**

- Cereals and pseudo-cereals (rice, quinoa, pasta, etc.);
- Pulses (green lentils, chickpeas, kidney beans, etc.);
- Oilseeds (walnuts, almonds, hazelnuts...);
- Soya (soya-based products);
- Seaweed (spirulina, nori...).

Animal proteins are of good nutritional quality and are complete. They contain all the essential amino acids. As far as vegetable proteins are concerned: cereals have a limited lysine content and legumes a limited sulphur amino acid content (except soya, whose proteins contain the 9 essential amino acids in satisfactory quantities). It is therefore important, when consuming them, to combine them in sufficient quantities during meals, in order to benefit from a good supply of essential amino acids.

## WHEN SHOULD YOU EAT PROTEIN AS AN ATHLETE?[11]

Proteins should be eaten at every meal, especially before and after exercise.

When ingested before exercise, they limit the mobilisation of proteins in the muscles. You should also think about having a meal rich in carbohydrates, because the more your glycogen reserves are sufficient during exercise, the less your body will need alternative energy resources[12].

The amount consumed depends on the type of exercise and body weight: the longer you train, the more amino acids your body will use as a source of energy, and the more protein you will need to consume.

Optimal protein intake occurs at the end of exercise. This is the time when muscle anabolism (the synthesis of new molecules to build muscle) is very high and muscle catabolism (the breakdown of muscle tissue to provide energy) is high. It is therefore important to consume proteins containing all the essential amino acids within 10 minutes of finishing training. You can also drink a sports recovery drink[13].

Protein intake at the end of exercise should be taken into account in the overall intake for the day.

## WHAT PRODUCTS PROTEIN TO CHOOSE?

**DISCOVER**

**Sports benefits:** Protein bars and protein shakes offer a number of benefits, and even more so when you're a sportsman or sportswoman who's involved in physical activity. Whether you're building muscle mass or simply looking to gain strength through bodybuilding, you need to provide your muscles with the nutrients they need. This is essential if they are to build and rebuild after effort and training. Proteins play a role in the development and maintenance of muscle mass

# 3.2 CARBOHYDRATES

## THEIR ROLE IN SPORTS

**There are 2 families of carbohydrates:**

- Starches (or complex carbohydrates), which are essential to our bodies as they provide energy, particularly for muscle fibres;
- Sugars (also known as simple carbohydrates): glucose, fructose, maltose, lactose, sucrose and galactose.

Carbohydrates are mainly absorbed in the form of glucose and are essential for certain cells, such as nerve cells[14].

For sportsmen and women, it is essential to maintain a good level of glycogen (glucose stored in the liver and muscles). It has been shown to improve performance by 2 to 3% and delay the onset of fatigue by around 20% in endurance events lasting more than 90 minutes[15].

Carbohydrates help meet basic energy needs such as breathing, walking and getting up... After very intense or prolonged exercise, which causes muscle fatigue and a reduction in glycogen reserves, carbohydrates help muscle recovery - the goal of every sportsperson!

## CARBOHYDRATES REQUIREMENTS FOR ENDURANCE ATHLETES

The carbohydrate requirements of an endurance athlete are 5 to 10 g/kg/day.
For example, if you weigh 80 kg, your daily carbohydrate requirements will be between 400 g (5x80) and 800 (10x80) g per day.
These quantities depend on the intensity and duration of your training.

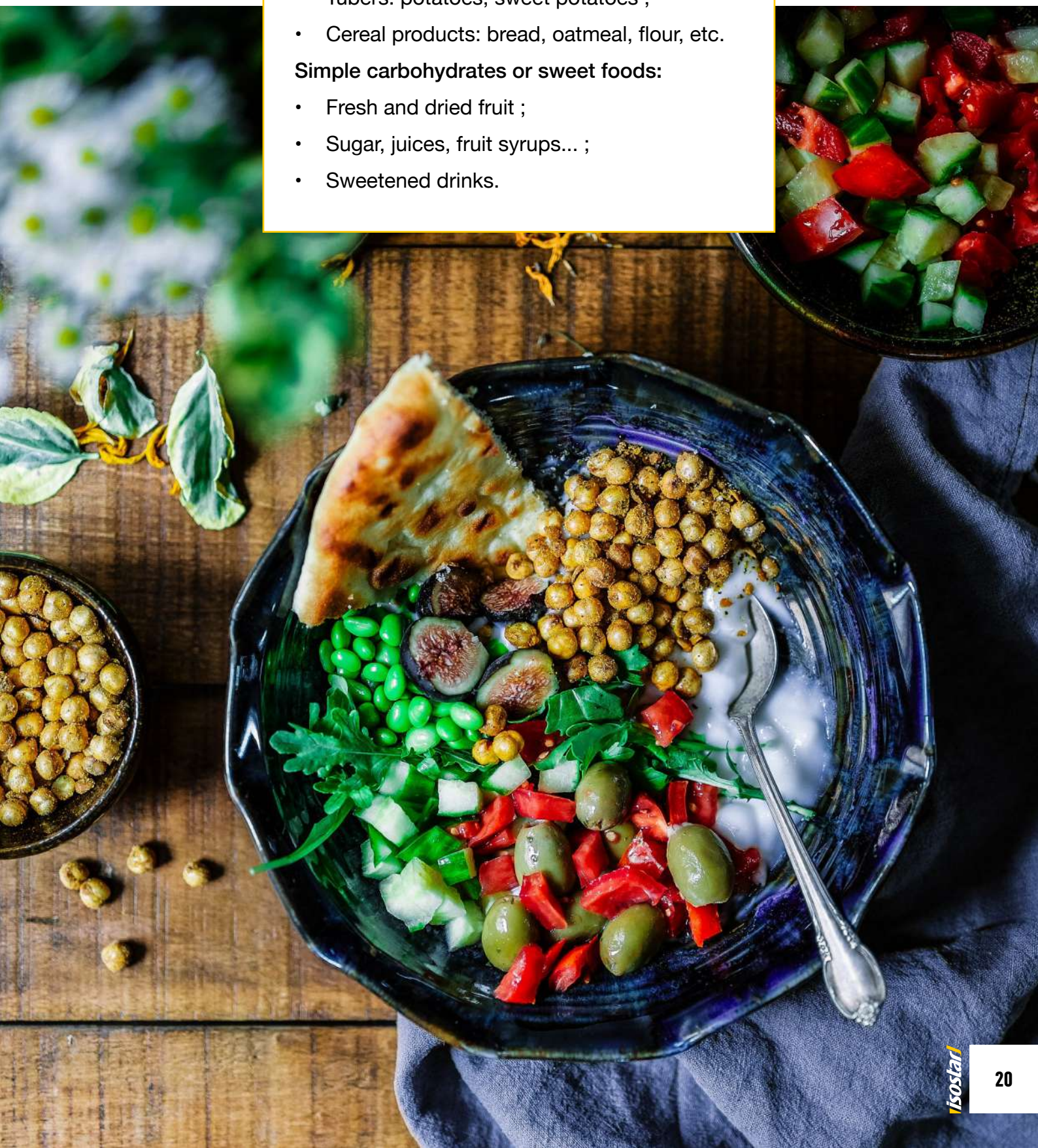
## WHERE CAN YOU FIND THEM?[10]

**Complex carbohydrates or starches:**

- Cereals: pasta, rice, quinoa, bulgur, etc. ;
- Pulses: chickpeas, lentils, kidney beans, etc. ;
- Tubers: potatoes, sweet potatoes ;
- Cereal products: bread, oatmeal, flour, etc.

**Simple carbohydrates or sweet foods:**

- Fresh and dried fruit ;
- Sugar, juices, fruit syrups... ;
- Sweetened drinks.



## WHEN SHOULD YOU EAT CARBOHYDRATES AS AN ATHLETE?[11]

Complex carbohydrates should be preferred on a daily basis and simple carbohydrates, particularly those with a high glycaemic index, around training.

The day before and the days before the event: low-glycaemic index carbohydrates should be eaten to recharge muscle glycogen reserves. The famous pasta party the night before is no legend!

On the day of the event, the meal eaten 3 hours before the event should also contain low-glycaemic index carbohydrates.

During exercise, carbohydrate intake should be adjusted according to intensity. For long-duration sports, 30-60g of carbohydrate per hour is recommended, and intake can be increased to 90g per hour for efforts lasting more than 2 hours[16].

After exercise, the aim is to replenish glycogen stores in the hour following the end of the activity. A moderate or high glycaemic index carbohydrate intake combined with a protein intake is recommended[17].

The glycaemic index (GI) reflects the glycaemic response to a food. It is a measure that classifies foods according to their impact on blood sugar levels. The higher the GI, the more likely it is that the food consumed will cause a rapid rise in blood glucose levels after absorption.

Foods with a low GI are digested and absorbed slowly, leading to a gradual rise in blood sugar levels. Foods with a high GI are digested and absorbed quickly, leading to a rapid rise in blood sugar levels.

The glycaemic index will be particularly useful around the time of training (before, during and after).

**Various factors can affect the glycaemic index:**

- **Cooking:** the GI of pasta cooked al dente is lower than that of well-cooked pasta;
- **Fibre:** fibre reduces the GI of a food. For example, fruit will have a lower GI than fruit juice if the latter contains no fibre;
- **Combining foods:** for a low-GI meal, combine proteins and fats with carbohydrates to reduce carbohydrate absorption.

Carbohydrates are one of the essential nutrients for endurance athletes. You should also remember to stay well hydrated, as water is needed to store glucose in the form of glycogen.

## WHICH PRODUCTS FOR MY ENERGY INTAKE?

**DISCOVER**

**Sports benefits:** A range of products that provide energy and optimal hydration in all forms. The isotonic formulas of these drinks increase water absorption , and compensate for losses of water and mineral salts due to physical effort.

The bars supplement your carbohydrate intake and are formulated to meet the needs of muscular effort, particularly during a competition or prolonged endurance effort.

# 3.3
# LIPIDS OR FATS

## THEIR ROLE IN SPORTS

Lipids, often neglected by the general population, but also by sportsmen and women, are essential for performance and provide energy. Fat is life!

**Lipids are made up of fatty acids, and there are 2 types of fatty acid:**

- Saturated fats or saturated fatty acids: these come mainly from animal fats and should be eaten in small quantities. For example: cold meats, butter, crème fraîche, etc. But they are also found in certain vegetable fats: coconut oil, cocoa butter, coconut oil, certain margarines, etc.
- Unsaturated fats or unsaturated fatty acids: also known as "good fats". These are monounsaturated fats and omega 3 and 6 polyunsaturated fats.

They have a positive impact on health and in particular on the prevention of cardiovascular disease. Replacing saturated fats with unsaturated fats helps to maintain blood cholesterol levels.

For sportspeople, unsaturated fatty acids contribute to good healing in the event of injury.

**They are divided into 2 families:**

- Monounsaturated fatty acids (MUFAs): these are the omega-9s found in olive oil, for example.
- Polyunsaturated fatty acids (PUFAs): also known as essential fatty acids, because they are not synthesised by our bodies. These are fats that absolutely must be provided by the diet.

**They are divided into 2 groups:**

- Omega 3, found in oily fish, rapeseed oil, walnut oil...
- Omega 6s, found in almonds, sunflower oil, etc. They should be consumed in smaller quantities than omega 3s, as they are already consumed in excess in our Western diet and can have a pro-inflammatory impact on athletes.

Adjusting your fat intake provides a good supply of energy, particularly in long-distance events. Studies have shown that when glycogen stocks are depleted, fat oxidation takes over to provide energy[18].

## LIPIDS OR FATS REQUIREMENTS FOR ENDURANCE

Above all, it is important to cover the essential fatty acid requirements of sportsmen and women.

**Particularly omegas 3 and 6:**

- Omega 3: 2 g/day, which corresponds to around 2 tablespoons of rapeseed oil/day + 2 oily fish per week;
- Omega 6: 6 g/day, covered by a daily diet including meat and dairy products.

## WHERE CAN YOU FIND THEM?[10]

**Good fats:**

- Olive oil for everyday cooking;
- Walnut, rapeseed or linseed oils for seasoning only. They are unstable when heated. They can be consumed on a daily basis;
- Oily fish: mackerel, herring, sardines, tuna, salmon, 2 to 3 times a week;
- Nuts: a handful a day.

**Fats to limit:**

- Raw butter: a small amount in the morning;
- Prepared dishes, which often contain hidden fats;
- Coconut: oil, milk, cream - consume in moderation, as it is rich in saturated fatty acids.

## WHEN SHOULD YOU EAT LIPIDS AS AN ATHLETE?[11]

A daily intake of fat is recommended. However, 3 days before the competition, it is recommended that you reduce your fat intake **from 25-30% of your total daily energy intake to 20%.** For example, if your requirements are 2000 kcal per day, 25% of fat requirements is equivalent to 500 calories from fat, which is equivalent to around 55 g of fat per day, as 1 g of fat contains 9 calories.

# 3.4
# ESSENTIAL MICRONUTRIENTS FOR ENDURANCE SPORTS

**Vitamins ensure that the body functions properly. They are substances with no calorific value, but they are essential.** Our bodies cannot synthesise them, but they can store them in small quantities. So we need to provide them regularly through our diet and, if necessary, through food supplements to avoid deficiencies[19].

**There are 13 vitamins, divided into 2 main families:**

### FAT-SOLUBLE VITAMINS

**These are 4 vitamins:** vitamin A, vitamin D, vitamin E and vitamin K.
They dissolve in fat and are easily stored;

### WATER-SOLUBLE VITAMINS

**These are 9 vitamins:** vitamin C, vitamin B1, vitamin B2, vitamin B3, vitamin B5, vitamin B6, vitamin B8, vitamin B9 and vitamin B12. They dissolve in water and our bodies cannot store them.

Vitamin requirements vary according to age, size, sex and sporting activity.

## The most important vitamins for athletes:

**RNP = Nutritional References for the Population*

| VITAMINS | ROLE | CHOICE OF FOOD | RNP |
|---|---|---|---|
| **Vitamin A** | Antioxidant effect in sports | Eggs, milk, butter, liver and coloured vegetables | 800 µg for men and 600 µg for women **VNR: 800 µg/d (INCO)** |
| **Vitamin D** | Role in calcium absorption and bone strength. Contributes to the normal absorption of calcium and the maintenance of normal bone structure | Egg yolk, oily fish, dairy products, fish liver oil | La vitamine D also has an exogenous origin: the sun. 5 µg for men and 10 µg for women **VNR: 5 µg/d** |
| **Vitamin E** | Contributes to normal energy metabolism | Vegetable oils, wholegrain cereals, wheat germ, green vegetables, hazelnuts... | 12 mg for men and 12 mg for women **VNR: 12 mg/d** |
| **Vitamin B1** | Involved in the use of glucose during exercise and in energy production. Contributes to normal energy metabolism | Meat, eggs, pulses, wholegrain cereals, wheat germ... | 1,3 mg for men and 1,1 mg for women **VNR: 1,1 mg/d** |
| **Vitamin B2** | Riboflavin contributes to normal energy metabolism | Dairy products, liver, oilseeds, eggs | 1,6 mg for men and 1,5 mg for women **VNR: 1,4 mg/d** |
| **Vitamin B3 ou PP** | Participate in the energy production | Liver, rabbit, oily fish, wholegrain cereals, brewer's yeast... | 14 mg for men and 11 mg for women **VNR: 16 mg/d** |
| **Vitamin B6** | Contributes to the metabolism of proteins and glycogen and to the normal formation of red blood cells | Salmon, mackerel, cereals, cocoa... | 1,8 mg for men and 1,5 mg for women **VNR: 1,4 mg/d** |
| **Vitamin B9** | Contribute to normal blood formation | Mainly in green vegetables | 330 µg for men and 300 µg for womens **VNR: 200 µg/d** |
| **Vitamin B12** | Contributes to the normal formation of red blood cells and normal energy metabolism | Foods of animal origin only (meat, fish, eggs) | 2,4 µg for men and 2,4 µg for women **VNR: 2,5 µg/d** |
| **Vitamin C** | Helps protect cells against oxidative stress. Vitamin C increases iron absorption. Vitamin C contributes to the normal functioning of the immune system | Fresh fruit and vegetables | 110 mg for men and 110 mg for women **VNR: 80 mg/d** |

Sportsmen and women need to get their dose of vitamins in their daily balanced diet, so it's important to eat a varied and varied diet.

Like vitamins, minerals do not provide calories and are essential to our bodies.

**Minerals are also divided into 2 families:**

**MINERAL SALTS**

Calcium, chlore, phosphore, potassium, magnésium and sodium ;

**TRACE ELEMENTS**

Iron, selenium, iodine, copper, manganese and zinc.

Certain minerals are essential for sporting performance.

# SODIUM

Na 11

This is an essential electrolyte involved in water balance, . Sportspeople who sweat a lot should eat sodium-rich foods to replenish losses. The main dietary sources of sodium are table salt, condiments and sauces, as well as cold meats and cheese.

The NNI for sodium is around 2300 mg per day for a healthy adult (NRV: 2400 mg/d). Sodium requirements for sportspeople are higher and may vary according to the intensity and duration of physical activity, perspiration and climate. The American College of Sports Medicine recommends that sportspeople consume 500 to 700 mg of sodium per hour of intense, prolonged exercise. **However, it is important to adjust your sodium intake carefully as excess sodium can lead to dehydration.**

# IRON

Fe 26

Its essential role is to contribute to the transport of oxygen via haemoglobin. It is therefore involved in the oxygenation of muscle cells.

**Iron[20] is present in the diet in two forms:**

- Haem iron: this is well assimilated, and is found in foods of animal origin such as meat, fish and eggs;
- Non-heme iron: this is less well absorbed by the body.

It is found in pulses, nuts and certain vegetables. It is important to combine them with a food rich in vitamin C, which will help the iron to be absorbed.

The NER for iron is 8 mg per day for adult men and 18 mg per day for adult women (NRV: 14 mg per day). In sportsmen and women, iron requirements are higher and can range from 15 mg to 30 mg per day.

## CALCIUM

## Ca 20

This is the most abundant mineral in our bodies, accounting for around 1 to 2% of body weight. It plays an important role in the mineralisation and structure of the skeleton and in muscle construction, and contributes to normal muscle function. Calcium absorption is positively influenced by vitamin D status, which contributes to its absorption and utilisation.

A reduction in bone mass due to insufficient calcium intake can increase the risk of fractures.

Calcium is found in dairy products, legumes, nuts, cereals, certain vegetables and certain calcium-rich waters.

(NRV: 800 mg/d Calcium intakes of 1500 mg per day are recommended for athletes).

## POTASSIUM

## K 19

Plays a role in muscle contraction, heart function and nerve transmission. It contributes to normal muscle function and the normal functioning of the nervous system. Potassium is also involved in carbohydrate and protein metabolism.

To provide your body with potassium, eat chocolate, bananas, vegetables and dairy products.

The NNI for potassium is 3,500 mg per day (NRV: 2,000 mg per day), but sportspeople's requirements may be higher because of losses through perspiration during exercise.

# MAGNESIUM

Mg 12

The human body contains around 25g of magnesium, of which 50-60% is found in the bones and 25% in the muscles. Magnesium is involved in muscle contraction, stress management and the metabolism of carbohydrates, lipids and proteins. Magnesium contributes to normal muscle function, electrolyte balance and normal protein synthesis.

**It is found in oilseeds, chocolate, coffee, wholegrain cereals, shellfish and certain mineral waters.**

- (NRV: 375 mg/d): The recommended intake for athletes is 6 mg/kg/day[21].

Sports nutrition is specific and different from everyday nutrition. It needs to be adapted, and we'll show you how:

# 4 DIET BEFORE EXERCISE

# 4.1
# IF THE COMPETITION OR TRAINING SESSION IS BEFORE LUNCH

**Breakfast should be taken at least 3 hours before exercise and should consist of:**

**Hot or cold drinks**
Tea, coffee, herbal tea, maté…

**A cereal**
Bread, oatmeal, breakfast cereals…

**Dairy**
Plain yoghurt, fromage frais...

**Cooked fruit**
*(if well tolerated by the digestive system)*
Compote, fruit purée or home-cooked fruit

**A little...**
butter and/or jam, honey...

**If you prefer a savoury breakfast**
Cooked ham, hard cheese

Breakfast before exercise should be made up of foods that you are used to eating, that you digest well and that you have already tried during training.

# 4.2
# IF THE COMPETITION IS AFTER LUNCH

**The latter must be taken at least 3 hours before the start of the competition and may consist of:**

**Lean meat**
Chicken, turkey or rabbit, or lean fish... (avoid dishes with sauce)

**Less complete cereals**
Rice, semolina, potatoes or sweet potatoes...

**Low-fat dairy**
Plan yoghurt, 0% fromage frais...

**Cooked fruit**
*(if well tolerated by the digestive system)*
Compote, fruit purée or home-cooked fruit

Limit consumption of vegetables and avoid raw fruit before exercise, to avoid digestive problems.

# 4.3
# IF THE COMPETITION IS AT THE END OF THE DAY

**In addition to breakfast and lunch, a snack 1 hour before the session is recommended, especially if you need an energy boost:**

**Hot or cold drinks**
Tea, coffee, herbal tea, maté…

**A cereal**
Bread, oatmeal, breakfast cereals…

**Dairy**
Plain yoghurt, fromage frais...

Mastication also plays a role before exercise, so remember to chew well to aid digestion.

You can also take waiting drinks, which have a good carbohydrate composition and provide a source of energy for the effort ahead, as well as helping to maintain good hydration.

You should also make sure you're well hydrated before the competition by drinking enough water.

5

# SPECIFIC NUTRITION DURING EXERCISE

What you eat during exercise will depend on the duration, intensity, weather conditions and type of physical activity you are doing. Here are the main principles to guide you:

# HYDRATION

During exercise, it's important to stay well hydrated. For physical activities lasting more than an hour, you can opt for isotonic sports drinks to support your performance. The advantage of sports drinks is that they can provide you with electrolytes such as sodium, potassium and magnesium.

# CARBOHYDRATES

They are an important source of energy during exercise, especially if the session lasts more than an hour. Carbohydrates in the form of gels, bars or energy drinks can be beneficial.

The exercise drink is an energy drink, and should contain carbohydrates, minerals and vitamins. It replenishes the energy lost during exercise.

# ENERGY PRODUCTS

**During exercise, they promote optimal hydration during exercise, replenish electrolyte losses, particularly sodium, potassium and magnesium, and prevent the depletion of glycogen reserves by providing carbohydrates. These products are formulated to be rapidly absorbed by the body.**

It is advisable to test food and drink during training, to validate them before the competition.

**DIGESTIVE PROBLEMS DURING EXERCISE**

Digestive problems are very common in sportsmen and women, particularly during exercise. This is often characterised by:

- Nausea;
- Diarrhoea;
- Abdominal cramps;
- Frequent and intense bloating.

**BUT WHY DO THESE DISORDERS OCCUR?**

- Impact with the ground when running: impacts generate shock waves throughout the body, particularly in the abdomen. These shocks can weaken the digestive mucosa and cause bleeding after the race[22].
- Intestinal permeability, also known *as leaky gut syndrome*, is the uncontrolled passage of substances through the intestinal barrier. This imbalance promotes inflammation, which can lead to digestive problems.
- Poor meal management: not eating before the start of the competition, or eating too rich a meal, will upset the digestive system. During exercise, the muscles need more energy, the blood supply for digestion is reduced, and if not all the nutrients have been absorbed, this can lead to diarrhoea and/or vomiting. Stagnant food leads to gas and bloating[23].

You also need to choose your exercise drink carefully, to keep digestive problems to a minimum.

## I DISCOVER THE SOLUTION

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# DISCOVER

**During exercise:** the aim is not just to eat, but rather to provide your body with the nutrients it needs to stay at peak performance, especially when the exercise is long and intense, such as an endurance race, running or cycling. The role of sports nutrition products, whether you're cycling, bodybuilding or running, is to support your efforts by providing the necessary elements (water, carbohydrates, proteins) in a practical format that's compatible with your sporting activity.

**For example, you can eat:**


**Energy bars** such as Isostar Energy Sport Bars in a range of flavours, containing a mix of simple and complex carbohydrates. Or an Isostar Cereal Max Bar snack. These solid snacks will give you energy in the form of carbohydrates but also the satisfaction of a tasty snack that will be welcome in the middle of your effort.


**Isotonic drinks** such as Isostar Hydrate & Perform or Poudre ENDURANCE + Energy Sport Drink.

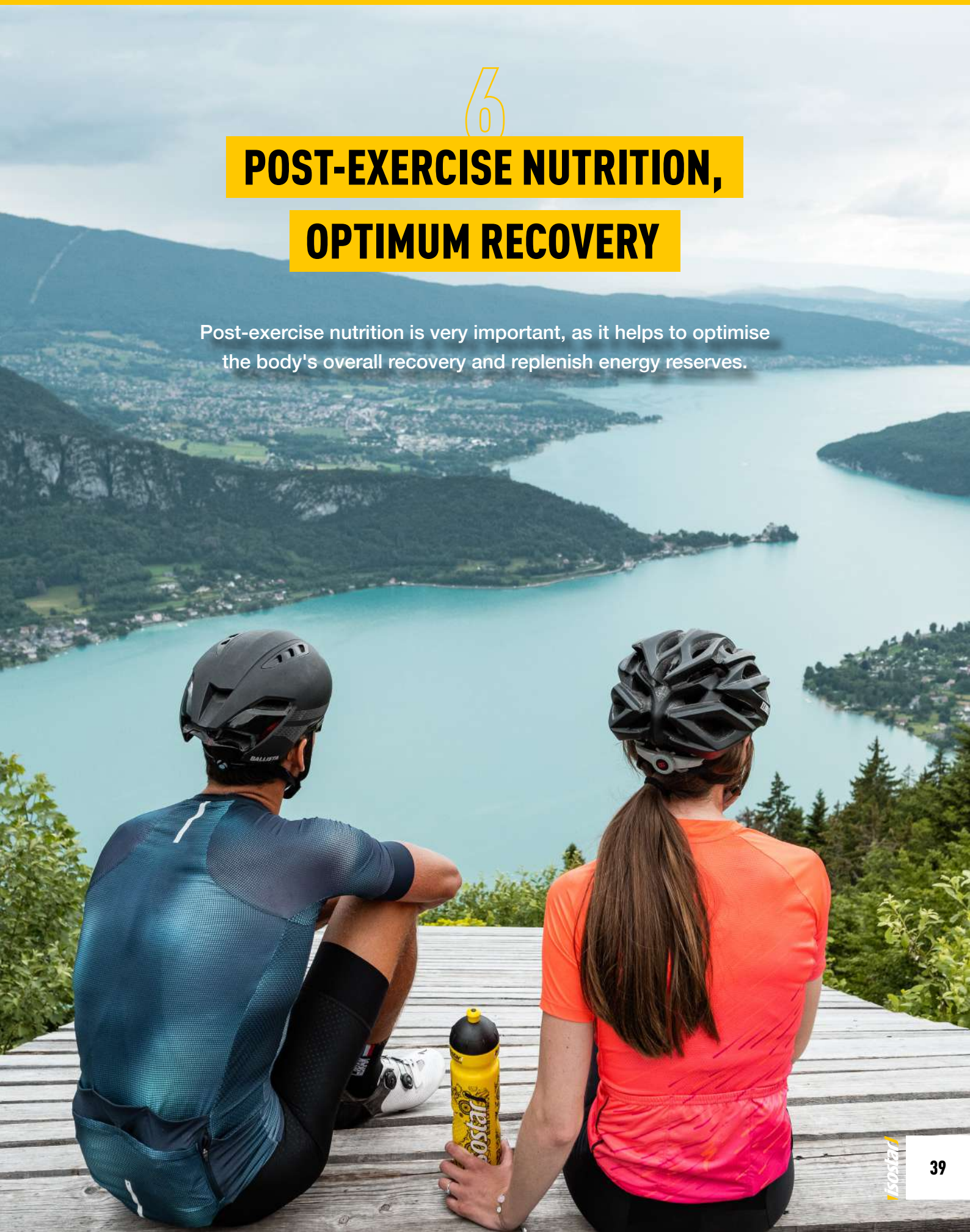

**Energy gels** such as Isostar's Energy Booster + BCAA gel with its delicious red fruit flavour, or Energy Fruit Boost squares, which provide energy and are the perfect complement to your energy intake during exercise.

**All these nutritional products, to be consumed during exercise, will help you to supplement your body's nutritional requirements, whether in terms of hydration for the carbohydrate exercise drinks, or in terms of energy intake for the gels and bars.**

6

# POST-EXERCISE NUTRITION, OPTIMUM RECOVERY

Post-exercise nutrition is very important, as it helps to optimise the body's overall recovery and replenish energy reserves.



# HYDRATION

Good hydration after exercise is essential. It is also important to add sodium and potassium to your drink if the outside temperature was very high during exercise.

# CARBOHYDRATES

They are essential for replenishing the glycogen reserves in your muscles. Choose sources of complex carbohydrates such as wholemeal cereals, pasta, rice, potatoes, but also a source of simple carbohydrates such as fruit in order to restore the antioxidant status disrupted by the effort .

# PROTEINS

They are necessary for muscle repair and construction. Proteins contribute to the development and maintenance of muscle mass. Choose lean proteins such as chicken, turkey, fish, eggs and low-fat dairy products.

**A post-workout snack can also be provided: dried fruit, oilseeds, fruit, cereals and a dairy product. And don't forget to stay hydrated.**

7

# FOOD SUPPLEMENTS: ARE THEY ESSENTIAL?

Food supplements, often used by sportsmen and women, can be incorporated throughout the season and adapted to suit training, weather conditions and specific needs[24].

Here are those recommended for endurance athletes: BCAAs, omega-3s, certain vitamins and minerals. It is essential to test your food supplements during training, before the competition.

8

# EXAMPLE OF A MEAL PLANT

# D-7 TO D+3 FOR AN ENDURANCE COMPETITION

# (10KM, TRAIL, MARATHON...)

# ONE WEEK BEFORE

## FROM D-7 TO D-3, A STANDARD DIET IS MAINTAINED

**Breakfast**

Wholemeal bread, cereal bread, or wholemeal cereal bread with little processing, such as oatmeal and butter, a plain yoghurt and a hot drink.
*You may wish to add an egg.*

**Lunch**

One portion of raw vegetables, one portion of meat or fish, one portion of cooked vegetables and one portion of starchy foods. A dairy product or fruit/compote.

**Snack as required**

A handful of almonds, fromage frais and a piece of fruit.

**Dinner**

One portion of vegetables, meat or fish or a vegetable equivalent, and one portion of starchy foods. A dairy product or fruit *(alternate depending on what you had for lunch).*

## FROM D-3 TO D-1, INCREASE YOUR CARBOHYDRATE INTAKE

**Breakfast**

Bread (increase your bread intake) and butter, a plain yoghurt and a hot drink.

**Snack**

A portion of bread and a portion of jam or other sweet products or hazelnut purée (almonds, peanuts, etc.).

**Lunch**

One portion of raw vegetables, one meat or fish, one portion of starchy foods, one portion of bread. A dairy product or fruit/compote.

**Snack**

A handful of almonds, fromage frais, a cereal such as oatmeal and a piece of fruit.

**Dinner**

A portion of vegetables, meat or fish and a portion of starchy foods. A dairy product or fruit/compote.

# DINNER THE DAY BEFORE THE COMPETITION

Lean meat with non-wholemeal cereals such as pasta, rice or semolina and for dessert a cooked fruit/compote with a low-fat dairy product.

# PRE-RACE BREAKFAST

It must correspond to the one you know and digest well.
**Example of a "normal" breakfast:**

**Normal breakfast**

½ baguette + soft butter + honey or jam + hot drink such as coffee or tea + 1 plain yoghurt + 2 eggs (not fried, rather soft for better protein digestibility).

**Immediately after exercise:** water and a source of carbohydrates (fruit, stewed fruit, fruit juice) and a source of protein if you don't have a meal straight away (dairy products, for example).

**A few hours after exercise:** a meal consisting of carbohydrates such as non-wholemeal pasta and lean meat such as chicken or fish.

# DURING THE RACE

**Stay hydrated:** Drink small amounts of water regularly throughout the race to avoid dehydration ***(2 to 3 sips every 15-20 minutes)***. If the race is long, consider isotonic drinks to replace lost electrolytes.

**Carbohydrates for energy:** Use sources of carbohydrates such as energy gels, energy bars or dried fruit to keep your energy up.

**Moderate your intake by avoiding heavy foods that could upset your stomach during the race.**

**Replenishment along the way:** If the race is long, plan refreshment points to replenish your carbohydrate and water reserves. This could include fruit, energy bars or special sports drinks.

**Avoid consuming any new food or drink during the race, as this could upset your stomach or cause unexpected discomfort.**

**Listen to your body:** If you feel any signs of weakness, excessive fatigue or dehydration, slow down and assess your condition. Take the time to refuel and rest if necessary.

***Everyone reacts differently to food during exercise, so it's important to test your diet and hydration strategy during training to find out what works best for you.***

# THE NEXT DAY AND THE FOLLOWING 3 DAYS

The meal should consist of carbohydrates, lean proteins and cooked vegetables. And don't forget to stay well hydrated.

# CONCLUSION

Targeted nutrition plays a vital role in improving sporting performance. Consuming the nutrients your body needs to function properly will maximise your endurance, muscular strength and energy, as well as ensuring you recover properly.

Optimum nutritional intake before exercise will enable your body to provide the energy required for your sporting activity. Drinking enough fluids and eating the right foods during exercise will help you maintain good hydration and glycogen reserves. And after exercise, it will help you recover so that you can resume training more easily.

**Don't forget that everyone is unique and that nutritional requirements vary according to age and sex, as well as the type, intensity, duration and other factors of your activity.**

The combination of targeted nutrition, appropriate training and good recovery will enable you to maximise your sporting performance.

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