



# Eating for Optimal Performance – The Key Ingredients

## A Variety of Nutritious Foods and Drinks

In cosmopolitan Singapore, we enjoy a wide variety of foods influenced by our ethnic diversity. A host of Asian, Western and even fusion cuisine is almost always easily available around us. But even so, no single ‘magic’ food exists that contains all of the nutrients we need in the correct proportions. Therefore, in order to meet our daily nutritional requirements, it is important that our diets include a mix of foods from each of the following major food groups:

- Rice and other cereal products
- Fruits
- Vegetables
- Meats and alternatives, including dairy foods

It is also useful to note that even within each group, different foods will vary in the amount of each nutrient they provide. For example, in the ‘Meats and alternatives’ group, whereas red meat is an excellent source of iron, oysters is a far superior source of zinc. For this reason, some nutrition authorities have even suggested that we consume at least 40 types of foods in a week!

## Energy and Macronutrient Balance

We need to consume sufficient calories for the amount of energy we expend - this is true for all of us, regardless of our different lifestyles. When energy consumption is insufficient to match that expended, our bodies begin to burn muscles to sustain us, reversing much of our training efforts. When we fail to meet our nutritional requirements, we fall short of the essential nutrients necessary for optimal sport performance and good health.

A guideline on the nutrient composition of our daily diet is given below, in terms of percentage of energy distribution among carbohydrates, proteins and fats.

<b>Carbohydrates</b>	55 – 60% total energy
<b>Proteins</b>	10 – 15% total energy
<b>Fats</b>	25 – 30% total energy

The above guideline is suitable for the general population and the athlete who is not involved in a high-intensity sport. The athlete participating in high-intensity sport may need to adjust carbohydrate and protein intakes upwards, while lowering fat intake.

## Carbohydrates – The Ideal Fuel

The body uses both carbohydrates and fats as sources of energy. But as intensity of the activity increases, so too does the need for carbohydrates. In fact, during high-intensity exercises like running or football games, we obtain our energy almost exclusively from carbohydrates.

While even the leanest athlete will never be able to deplete his or her fat stores, carbohydrate reserves in the muscles can run low after just a few hours of exercise. Focusing on a carbohydrate-rich diet can help us build our fuel supplies, delay fatigue and enhance recovery between training sessions.

While a good number of athletes appreciate the value of a carbohydrate-rich diet, few understand their absolute carbohydrate needs and how to go about meeting them. Our carbohydrate requirements, based on training intensity and body mass, may be estimated using the guidelines below:

Exercise Intensity	Duration	Carbohydrate Requirement (g/kg body mass/day)
Light	<1hr	4 – 4.5
Light / Moderate	1hr	4.5 – 5
Moderate	1 – 2hrs	5.5 – 6.5
Moderate / Heavy	2 – 4hrs	6.5 – 7.5
Heavy	4 – 5hrs	7.5 – 8.5

Many carbohydrate-rich foods are dense in nutrients, and can contribute greatly to our daily vitamin, mineral and fibre requirements. This category of foods should form the basis of our meal plans, as reflected in many of our recipes. Among the many tips scattered throughout this cookbook, you will find valuable advice on planning a high-carbohydrate diet.



*“To aid in the recovery process after strength training we advise the athletes to eat some carbohydrate rich food (and some protein) within 1 hour of finishing training to aid in replenishing their energy levels for the next day.”*

**Todd Vladich,**  
Head Coach, Strength & Conditioning Unit, SMSS, SSC



## The Low-Down on Fats

Dietary fats are possibly the most commonly-discussed yet poorly-understood nutrient. Supplying approximately twice the energy of carbohydrates or proteins gram for gram, fats are a very concentrated source of energy.

Fats play a vital role in our well-being. Fatty acids & fat-soluble vitamins are essential for maintaining health. Fats can also enhance the flavour and texture of many foods and simplify the cooking process. So why does this nutrient get all the bad press?

Simply, most of us consume too much fats! A high fat intake can lead to conditions like heart disease and certain types of cancers. And of course, a low-fat diet should be an integral part of the athlete's lifestyle.

Some of the tips found in this cookbook will help us keep our meals light in fats. By following these tips during our meal preparation, we can enjoy our favourite dishes without having to worry about the fat content. However, remember that a small amount of fats in the diet is essential - the key is low-fat, not no-fat!

## Pumping Up on Proteins

Proteins occur naturally in our daily diet, and can come from animal or plant sources. Plant foods generally provide about half of our total daily protein intake.

It used to be a common belief that proteins are the major fuel used during exercise. But knowledge of exercise and nutrition has progressed over the years, and we now know that carbohydrates and fats are our main sources of energy. However, there is no doubt about the importance of proteins in our diets, and inadequate intake may result in muscle loss, slow recovery and serious health problems.

Each protein is made up of different combinations of amino acids. There are twenty different amino acids that make up all the proteins in our body. Eight of these amino acids are essential, meaning our body cannot make them, so they must come from the food that we consume. Whereas animal proteins contain all the essential amino acids (and are therefore known as 'complete proteins'), plant proteins do not.

*"It is training that lifts athletes to the competitive level and that diet will play an important role in helping athlete along the pathway to maximum improvement."*

**Suria Murthi,**

*National Under 16 Football Coach, former National Football Player (1978 - 1982)*

Eating a variety of protein-rich foods ensures that we obtain adequate amounts of essential amino acids. For the vegetarian, use of ingredients like tofu, legumes and nuts will help boost the amount of dietary protein. Our protein requirements may be estimated using the following guidelines:

Group	Recommended Intake (g/kg body mass/day)
General Population	0.8
Endurance	1.2 – 1.4
Strength	1.6 – 1.7

Strength and endurance athletes need more proteins for muscle-building, and to fuel the muscles during endurance exercise. However, most athletes should not need to worry about inadequate protein intake. According to our surveys, only a few athletes are at risk of eating too little proteins. These include fussy eaters and ill-informed individuals. Generally, it is safe to assume that a balanced diet which meets our total energy need will naturally meet our protein requirement.

## Exercising in the Heat – Fluid Requirements

Exercising in a tropical climate requires us to stay well-hydrated. An athlete can lose up to 2 litres of perspiration per hour when training hard! Therefore, maintaining fluid balance and avoiding dehydration must be one of our top priorities if we are serious about peak performance.

Many of us are at a lost when it comes to matching fluid intake with sweat rate. Even without considering the water loss from exercising, most of us need about 2 litres of fluid per day. Sweating is the body's most important method of reducing excess body heat. Our sweat rates increase with temperature and amount of exertion. Failure to match fluid intake with sweat rate may result in dehydration, reduced performance and skill co-ordination, and an increased risk of heat-illness. As little as a 1 kg weight loss during a session can affect performance negatively.

Ideally, fluids consumed during exercise should have a carbohydrate content of 6-8%, and a palatable flavour to encourage greater intake. The presence of a small amount of electrolytes will assist in fluid absorption. As far as possible, caffeine and alcohol should be avoided during exercise, as they have a diuretic effect on the body, causing an increase in urine production.



*"Being aware of your own sweat rates certainly helps to plan fluid intake."*

**Ronald Susilo,**

*Badminton*



### Tips on Keeping Well-Hydrated:

- Replenish fluid-loss from the previous exercise session before starting the next session .
- Don't rely on thirst as a guide for fluid intake. Dehydration would probably have set in by the time we feel thirst. Most athletes replace only 50% of sweat losses when drinking according to thirst.
- Start drinking early and at regular intervals during the exercise session.
- Drink at every opportunity during a game, for example, during quarter- and half- times, injury breaks and time-outs.
- Always have a bottle of drink at hand during exercise/training sessions.
- For intense sessions of more than an hour, make use of sports drinks to meet fluid and carbohydrate needs simultaneously.

The athlete attempting to bulk up can make use of energy-dense drinks like smoothies, juices and milk to increase total energy intake. Check out some of our drink recipes from Pg 80 for a refreshing and nutritious hydration boost.

The following table is a guide on different types of drinks and their suitability for consumption during exercise:

Description	Amount Providing 50g Carbohydrate	When To Use	Comments
Water	–	Exercise lasting less than 30 minutes	<ul style="list-style-type: none"> <li>• Does not stimulate fluid intake to the same extent as sports drinks – drinking to a plan is therefore crucial</li> <li>• Does not provide energy, but may be taken in addition to sports drinks or solid food to make up the total fluid requirement.</li> </ul>
Sport Drinks (5-8% CHO and electrolytes)	600 – 1000ml	Exercise lasting 30 - 60 minutes or more	<ul style="list-style-type: none"> <li>• Best option for meeting fluid- and carbohydrate-requirements simultaneously</li> <li>• Palatable flavour</li> <li>• Provide small amounts of electrolytes.</li> </ul>
Soft Drinks (11% CHO)	500ml	May be used as a recovery drink	<ul style="list-style-type: none"> <li>• Slow absorption due to carbohydrate content</li> <li>• May not promote adequate fluid intake and may cause gastric discomfort during exercise, due to the gas present</li> <li>• Negligible source of electrolytes.</li> </ul>
Fruit Juices (8-12% CHO)	500ml	May be used as a recovery drink or for boosting calorie intake	<ul style="list-style-type: none"> <li>• Slow absorption due to carbohydrate content</li> <li>• Negligible source of electrolytes</li> <li>• Possible risk of gastrointestinal upset if juice is high in fructose.</li> </ul>
Energy-Dense Drinks e.g. Smoothies, Milk-based Drink (70-80% CHO)	200 – 300ml	May be used as a recovery drink or for boosting calorie intake	<ul style="list-style-type: none"> <li>• Good option for the athlete attempting to bulk up</li> <li>• May contain significant amounts of proteins.</li> </ul>

### Vitamins & Minerals

Vitamins and minerals are essential nutrients found in many foods. They play important roles in metabolism and general biological functions. Although vitamin and mineral supplements are used by many athletes hoping to enhance performance, the well-trained athlete on a balanced diet is unlikely to need these supplements. As long as we are on a healthy eating plan, we are probably getting more than enough essential nutrients. Here are a few important nutrients that we should pay special attention to:

#### B-Complex Vitamins

The B-complex vitamins are a group of eight vitamins which include thiamine (B1), riboflavin (B2), niacin (B3), pyridoxine (B6), folic acid (B9), cyanocobalamin (B12), pantothenic acid and biotin. These vitamins participate in muscle-contraction and energy-production processes and therefore are important to the athlete.

B-complex vitamins can be found in foods such as dairy products, lean meat, green leafy vegetables, liver, oatmeal, wheatgerm, beans and nuts.

#### Free Radicals and Antioxidants

We come into contact with free radicals every day of our lives. They may come from environmental pollutants, UV light, radiation, carcinogens or exercise. These molecules can cause damage to our bodies, and are believed to be a trigger of some diseases.

Because free radicals are generated during exercise, scientists have been conducting studies in this area, especially in relation to the ergogenic potential of antioxidant supplements for athletes.

Antioxidants are substances that help in minimising the damage caused by free radicals. There are three types of antioxidants:

- Intracellular Antioxidants Enzymes
- Nutritional Antioxidants – they act as antioxidants but also have other roles in the body (eg. vitamins A, C and E)
- Non-Nutritional Antioxidants – functioning solely as antioxidants, these substances are present in our diets normally (eg. phytochemicals, bioflavonoids found in fruits, vegetables, red wine and tea)

That increased oxygen uptake during exercise results in an increase in free radical production is an inevitable part of regular training. Although free radicals



have been reported to affect the muscle contraction process and alter aerobic energy production, there is still a lack of data to support the idea that popping antioxidant supplements will help improve athletic performance.

It is worthwhile noting that regular training enhances the body's production of primary intracellular antioxidant enzymes. A balanced diet will also provide many different antioxidants that can help in combating the damaging effects of free radicals. Some of these antioxidants include:

<b>Vitamin A</b>	Found in liver, dairy products, dark green leafy vegetables, yellow and orange fruit or vegetables.
<b>Vitamin C</b>	Found in citrus and other fruits like strawberry, rock melon, papaya and kiwi, leafy vegetables and tomato.
<b>Vitamin E</b>	Found primarily in fatty foods such as nuts and seeds, oily fish (eg. salmon), avocado and oils (especially extra virgin olive, cottonseed and safflower oils). These are highly-nutritious foods that we should include in our diets on a regular basis, albeit in small quantities only.



### Iron

Iron plays a key role in sports performance as it carries oxygen to all parts of the body. Failure to meet iron requirements may result in a condition known as Iron Deficiency Anaemia. Symptoms of this condition may include tiredness and lethargy, as a result of decreased oxygen-carrying capacity. Females, especially those on restrictive or low-calorie diets, are vulnerable to anaemia. Athletes involved in endurance sports should also pay attention to their iron-intake, as anaemia is likely to have a negative effect on performance.

To help prevent anaemia, we need to include iron-rich foods in our meals. Two forms of iron are found in our diets: haem- and non-haem iron.

Sources of haem-iron include red meat, offal (animal organs such as liver and kidney), shellfish and the darker cuts of poultry and fish. The richer the redness of the flesh, the higher the haem-iron content. Haem-iron is easily absorbed by the body. Foods rich in haem-iron can be conveniently incorporated into our meals throughout the week to meet the overall iron requirement. For instance, we can include a small serving of lean red meat into a noodle dish, or accompany rice with a lean chicken thigh kebab.



Non-haem iron is present in foods like eggs, wholegrain cereals (especially iron-fortified breakfast cereals and breads), legumes, tofu, nuts and green leafy vegetables. While the absorption of non-haem iron by the body is low in itself, it may be increased by simultaneous ingestion of vitamin C-rich foods. For example, we can have fruit juice with our breakfast cereal. Meat, seafood and poultry also contain a factor which enhances non-haem iron absorption. By eating brown rice and vegetables with meat, we can increase non-haem iron absorption.

Many of the dishes featured in Chapter 3 are rich in iron and can be included in your meal plan a few times a week.

### Calcium

A combination of high calcium intake and regular weight-bearing activity while we are young can help us achieve maximum bone mass, thus reducing the risk of osteoporosis (or weak bones) in our later years. In females, hormonal balance is also a factor that can affect bone health.

The best dietary sources of calcium are dairy foods. Low- and reduced- fat varieties of dairy products are readily available in supermarkets. Those who do not take dairy products may obtain their calcium from foods like calcium-enriched soymilk, fish that are eaten with bones (eg. ikan bilis, canned salmon and sardines), tofu, almonds and green leafy vegetables.

*“Smart and sensible sports nutrition – one stone you should never leave unturned in the pursuit of sports excellence.”*

**Stanley Tan,**  
*Lasar Radial Sailor*



*“Train like you want to compete and compete like you have trained.”*

**Rashid Aziz,**  
Head Exercise Physiologist,  
SMSS, SSC

In Singapore, we can find calcium-fortified foods in the form of cracker biscuits, noodles and bread, to name a few examples. To ensure that the item carries that extra calcium boost, we can check the ingredients list on the food packaging. There are a few milk-based drink recipes featured in this cookbook - be sure to try them for a nutritious and tasty snack packed with loads of calcium.

Finally, self-prescribing vitamin and mineral supplements should be avoided as the supplements may not address other potential dietary inadequacies. There's also a risk of toxicity if too much of these are taken. For safety reasons, it is advisable to consult your sport dietitian or physician before using supplements.

Hence, as long as we are on a balanced diet and consume adequate fruits and vegetables daily, we are most likely keeping ourselves in tip-top shape for optimal performance!

#### References:

- Burke L. *The Complete Guide to Food for Sports Performance*. Allen and Unwin, St Leonards Australia, 1995
- Burke L, Deakin V. *Clinical Sports Nutrition*. Second edition, McGraw Hill, Australia, 2000
- Bernardot D. *Nutrition for Serious Athletes*. Human Kinetics, USA, 2000

## How to use this book

The recipes in this book are formulated with a balanced and nutritious eating plan in mind. Each recipe is accompanied by a nutrition analysis chart which provides information on:

- Energy value, in calories (kcal) per serving
- Carbohydrate content, in grams (g) per serving
- Protein content, in grams (g) per serving
- Fat content, in grams (g) per serving
- Calcium content, in milligram (mg) per serving
- Iron content, in milligram (mg) per serving

#### Helpful cooking hints:

- Using a non-stick pan for stir frying will reduce the amount of oil needed.
- To reduce preparation time, commercially-prepared sauces, chilli pastes, curry powder mixtures and broths may be used.
- To reduce the salt content of the dish, excess marinade sauces may be omitted from the cooking.
- Seeds of chillies may be removed to make the dish less spicy.
- Rinsing cooked kway teow, beehoon, egg noodles and pasta with running tap water will prevent the strands from sticking together.



#### Medal Logo

Some recipes in this cookbook are marked with a medal logo. These dishes are low in fat, moderate in protein, high in carbohydrate, and contain significant amounts of calcium or iron.

