

## Nutrition for soccer players

**Nutrition for soccer players: How soccer players can overcome the second-half slump.**

Although soccer is the most popular sport in the world, with over 120 million amateur players worldwide, scientific research concerning the nutritional needs of soccer players has been scant. Fortunately, new investigations are being conducted, and the up-to-date research suggests that soccer players should eat and drink like marathon runners!

The link between soccer players and long-distance endurance athletes seems odd at first glance, since soccer is a game involving sudden sprints and bursts of energy rather than continuous moderate-intensity running, but the connection doesn't seem so extraordinary when one considers what happens during an actual soccer match. In a typical contest, soccer players run for a total of 10-11 kilometres at fairly modest speed, sprint for about 800-1200 metres, accelerate 40-60 different times, and change direction every five seconds or so.

Although soccer players don't cover a full marathon distance (42 kilometres) during a game, the alternating fast and slow running which they utilize can easily deplete their leg-muscle glycogen stores. For example, just six seconds of all-out sprinting can trim muscle glycogen by 15 per cent, and only 30 seconds of upscale running can reduce glycogen concentrations by 30 per cent! The high average intensity of soccer play (studies show that topnotch players spend over two-thirds of a typical match at 85 per cent of maximal heart rate) accelerates glycogen depletion. Plus, the time duration of a soccer match, 90 minutes, is more than enough to empty leg muscles of most of their glycogen. In fact, research has shown that soccer players sometimes deplete 90 per cent of their muscle glycogen during a match, more than enough to heighten fatigue and dramatically reduce running speeds.

## Under-Eating

Unfortunately, many soccer players don't seem to be aware of the importance of dietary carbohydrate. Studies show that large numbers of players eat only 1200 calories of carbohydrate per day, far below the optimal level of 2400-3000 carbohydrate calories. As a result, many players BEGIN their competitions with glycogen levels which are sub-par. Players who start a match with low glycogen usually have little carbohydrate left in their muscles by the time the second half starts.

That leads to bad performances during the second half. Glycogen-poor soccer players usually run more slowly - sometimes by as much as 50 percent - during the second halves of matches, compared to the first. In addition, total distance covered during the second half is often reduced by 25 per cent or more in players who have low glycogen, indicating that overall quality of play deteriorates as glycogen levels head south. Compared to competitors with normal glycogen, low-glycogen players spend more time walking and less time sprinting as play proceeds.

That's why taking in carbohydrate DURING competition can pay big dividends. In recent research carried out with an English soccer team, players consumed a glucose-containing sports drink during 10 of their matches but swallowed only an artificially flavoured, coloured-water placebo during 10 other competitions. When the players used the glucose drink, the team allowed fewer goals and scored significantly more times, especially in the second half. When the placebo was ingested, players were less active and reduced their contacts with the ball by 20-50 per cent during the final 30 minutes of their games. A separate study showed that swilling a glucose solution before games and at half-times led to a 30-per cent increase in the amount of distance covered at high speed during the second half of a match.

However, just sipping a sports drink at random before matches and at half-time probably won't do much good, because soccer players must be sure they take in ENOUGH carbohydrate to really make a difference to their muscles. An excellent strategy is to drink about 12-14 ounces of sports drink, which usually provides about 30 grams of carbohydrate, 10-15

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minutes before a match begins. The same amount should be consumed at half-time, although players may rebel at both intake patterns because of perceptions of stomach fullness. The important thing to remember is that through experience - trying out these drinking strategies on several different occasions during practices - the intake plans will gradually become comfortable and they will help reduce the risk of carbohydrate depletion.

### **Tapering is important, too**

Soccer players should also eat a small meal containing at least 600 calories of carbohydrate about two hours before competition. 600 calories is the approximate amount of carbohydrate in three bananas and four slices of bread (eaten together). Players should also try to 'taper' for a few days before matches, reducing their intensity and quantity of training in order to avoid carbohydrate depletion. During the taper and during all periods of heavy training, soccer players should attempt to ingest 9-10 grams of carbohydrate per kilogram of body weight ( 16-18 calories per pound of body weight) each day. 'Grazing' - eating two to four daily high-carbohydrate snacks in addition to three regular meals - can help players carry out this high-carbo plan successfully. However, carbohydrate is not the only nutritional concern for soccer players. Fluid intake is also critically important. Various studies have shown that soccer players lose - through their sweat glands - from two to five litres of fluid per game. Even the lower figure could raise heart rate and body temperature during a match and might reduce running performance by about 4-5 per cent for a typical player. Fortunately, the sports-drink-intake plan described above - coupled with sips of sports drink during injury time-outs - can help to reduce the impact of dehydration. Although water and carbohydrate must be taken onboard, soccer players don't need to worry about replacing electrolytes during play. Sweat is a dilute fluid with low concentrations of electrolytes, and most players can obtain enough electrolytes - including salt - from their normal diets. However, the presence of salt in a sports drink can enhance the absorption of water and glucose. Most commercial drinks have about the right concentration of sodium; if you're making your own beverage, you should be sure to mix about one-third tea spoon of salt and five to six tablespoons of sugar with each quart of water that you're going to be using.

After all matches, players should attempt to ingest enough carbohydrate-containing sports drink to replace all the fluid they've lost during competition. After strenuous workouts, water should also be replaced, and soccer athletes need to eat at least 500 calories of carbohydrate during the two hours following practice in order to maximize their rates of glycogen storage. ('Carbohydrate, Fluid, and Electrolyte Requirements of the Soccer Player: A Review,' International Journal of Sport Nutrition, vol. 4, pp. 221-236, 1994)

## Soccer Nutrition - Introduction

If you want to be a professional soccer player (and a good one, at that) every small detail that could improve your performance should be taken into consideration. Nutrition, as a whole, is not a small detail in soccer, actually it's extremely important to a player, but in turn, it's made up of several smaller parts that will require your attention: macronutrients, micronutrients, diets and hydration.

It's these subjects that we'll be covering in this soccer nutrition section, but before we go deeper in explaining them, let me give you a short preview of what you'll be able to read in the detailed articles.

### Soccer Hydration - When & What to Drink

Long research carried out by myself into hydration which concluded that athletes' performance, to some extent, directly related to their level of hydration or **dehydration**. The better the body is hydrated, the better they will be able to keep their **performance** at a high level and **fatigue** will also settle in harder than with a person who is suffering from mild or acute dehydration.

Obviously, this is not the only factor that affects performance, but it's one of those small details that make up a whole. And as a **soccer** player, you'll want to take care of each detail in order to ensure that the whole, your performance, is intact by the time the ref blows his starting whistle.

I noticed that a lot of soccer player (especially younger ones) tend to put an equality sign between dehydration and thirst. Although both concepts face the same bodily requirement to replace fluids, thirst is a momentary situation that you can solve with a single drink, whereas dehydration is a chronic state. For example, you're lacking certain vitamins from your body and you're hungry. Eating a plateful of **chicken wings** may settle your hunger, but that doesn't mean that your vitamin problem will be solved.

### What should you drink?

There's such a large gamma of **sports drinks** out there that it's quite hard to choose the "right" one for yourself, or for your team if you're a coach. A good sports drink is one that offers a high amount of carbohydrates and water, but that doesn't mean that good old H<sub>2</sub>O can't be good for proper hydration just by itself.

Sports drinks do have some advantages though: they're better tasting so they can be drank in larger quantities, they have carbs that can't be found in simple water and they have glucose which helps with reducing fatigue and muscle tiredness.

Obviously, juices and sodas aren't the best choice. Anything that has carbonation in it can cause you an aching stomach and that's the worst you could get in a soccer match. Milk is way too heavy on the stomach and can also cause an upset belly, so it's best if you think of milk as a source of macronutrients rather than a means of proper hydration.

### When should I drink it?

In order to keep your self well hydrated, you need to drink well at least 16 hours before **the match**, several times during the match and a few hours after it's over. You can start by drinking plain water a few days prior to the match, at set intervals, even when you're not particularly thirsty.

You don't need to hydrate yourself using sports drinks that early on, since the extra carbohydrates you get from them will go to waste. However, it's a good idea to use a sports drink in your light pre game meal as a source of carb fuel for the upcoming effort.

If the game allows it, try drinking **sips** of a sports drink during the match as well. Don't drink too much, or you'll get a full belly that can hinder you from running or being as mobile. However, short sips can replenish your carbohydrate storage and fluids, keeping you at 100% performance at all times.

After the game, you can hydrate yourself using an inverse method to the one used before it. Right after the match has ended, drinking some carb rich fluid will help you relax and replenish your energies faster, so you won't feel as tired as you would otherwise. It will also help relax your muscles so you'll be ready to jump right back into training the next day or the day after.

After you feel you've refreshed yourself enough using the carb rich sports drink, you can switch to plain water again, drinking it at set intervals for a couple more days, again, even when you're not thirsty.

### **The Hydration Chart -**

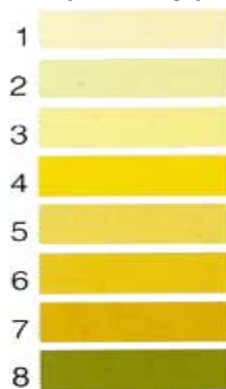
## Find out if you're well hydrated or dehydrated with a simple hydration test

The symptoms of dehydration are harder to spot and even when you do, you'll probably attribute them to tiredness, your diet and so forth. However, there is a simple method of determining whether or not you are dehydrated, using a hydration test and your urine.

Look for the chart on the page, having 8 rectangles of different colors and numbers 1-8 next to them. You'll notice that the deeper the chart goes down, the darker the colors. It's these colored rectangles that the chart will have you comparing your urine against.

What you need to do is get a clean jar and early in the morning, collect a sample of your urine in it. Pack it up and fill another jar after training, or at the end of a day in which you had to perform physical effort. Now compare the two jars with the chart colors. If your urine is light (1 to 3), then you are well hydrated and don't really need to worry about this issue for now. The darker your urine color gets, the more dehydrated you are and if you're in the 6-8 range, you should seriously think about a hydration plan.

Since you took a sample before and after physical effort, you can see the approximate amount of dehydration occurring during practice or a soccer match and you can work towards hydrating yourself back up accordingly.



### Soccer Diet - Pre/Post Game Meals

#### Soccer Diet - Introduction

A soccer player will constantly look after improving his or her body, increasing its maximum potential and forcing it over the natural "limit" that the average human body possesses. This is done through hard training and professional athletes spend most of their careers improving themselves, training out at some extent almost every day of the year. With that much effort comes an equally high energy consumption and that's where a diet will come in.

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Unfortunately, it's not just a case of "work more, eat more". In order to keep your body healthy and keep yourself in optimal shape for soccer, you'll want to hit two important points with your soccer diet: high energy and healthy nutrients.

High energy can be obtained through a diet which is rich on carbohydrates. Carbohydrates are the main fuel and energy source of the body and you'll need loads of them if you want to keep up with that heavy rhythm of soccer training and matches that you're likely to be involved in. But like I said, you can't simply solve this issue by eating more, since you'll also have to be **very careful** on what you eat.

Eating foods rich in healthy nutrients will be a problem, because there's a lack of options when it comes to food that is also very healthy and contains a good amount of carbohydrates. You'll also want a soccer diet containing good amounts of proteins. Proteins help with muscle growth and with strength becoming an increasingly important issue in soccer, you'll probably want to get your muscle mass to a reasonable level.

Unfortunately you'll stumble upon an issue regarding proteins as well: the problem is that most foods that contain proteins (different types meat or animal products for the most part) also have a large quantity of fats. Some of these fats are useful and even essential for the body, but others can be problematic.

Animal fat for example, clogs up arteries and hinders blood flow, which not only lowers your performance, but may also cause you serious problems later on, including a higher risk of heart diseases. Again, getting a balanced protein/fat diet is **essential** for a soccer player and for any other type of athlete for that matter.

### Soccer Diet - Pre Game Meals

Although the general dietary rules above will work well around the week, you'll be much better off following specific diets prior and after playing a match.

Eating a normal course just before a match will have several disadvantages. You don't want to feel "full" before a match or before practice, since it will hinder your ability to run, your agility, jumping and so forth. Not eating at all before a match or practice is not a good idea either. Going into a match without eating will have you playing in a weakened state and won't allow you to perform at your maximum potential.



So what you need to do is find something to eat that is light but can still provide you with a good source of energy to cope with the upcoming effort. These pre-match snacks can contain fruits or vegetables or some light bread product. Not all fruits and vegetables are ideal though. You'll also want to pick up those that are rich in carbohydrates, in order to **charge yourself** up with energy before the match.

Some of the most carb-rich fruits out there include apples, peaches, oranges, and grapefruits. Breads are usually harder on the stomach, but they also offer you a rich carbohydrate base. So a slice of toast or some crackers could be beneficial.

You'll also want to pay attention in your soccer diet to the GI value of the food you eat in your pre game meal. The GI is short for Glycemic Index and it's a scale of how much a certain type of food raises the level of blood sugar in comparison to pure glucose. Before matches, it's recommended that the food you eat contains as low GI value as possible because low GI foods help conserve energy during effort. You'll find a list of foods with GI of 55 or less at the bottom of the this soccer diet article.

### **Soccer Diet - Post Game Meals**

A good post game meal is equally important as the pre game one. Pre match, your food had to be light and full of carbs to give you the energy and mobility to put off the best performance, but after the match the purpose of the meal will be entirely different. Your post match diet will have to cover all the nutrients you lost in your recent effort and get your muscles in shape again.

Post match diets are usually fluid-heavy but a good stream of carbohydrates in the plate will also help you **recover easier** and high GI carbs work best in this situation. High GI food helps you replenish carbohydrate stores quicker after a match, since they get depleted after extensive effort.

So basically, high GI food is the best for refueling yourself after the game, getting your energy levels back on track in the same day. High GI foods include rice, potatoes and bread, but you can find a more extensive list of low and high GI food below.

### Soccer Diet - GI Foods List

Low GI Foods		Medium GI Foods		High GI Foods	
Cabbage	10	White Rice	56	Golden Grahams	71
Mushrooms	10	Pita Bread	57	Bagel	72
Chillies	10	Wild Rice	57	Corn Chips	72
Onions	10	Banana	58	Watermelon	72
Artichoke	15	Blueberry Muffin	59	Honey	73
Asparagus	15	Cheese Pizza	60	Kaiser Roll	73
Avocado	15	Papaya	60	Mashed Potatoes	73
Broccoli	15	Baked Potatoes	61	Cheerios	74
Cauliflower	15	Couscous	61	Cream of Wheat, Instant	74
Celery	15	Hamburger Bun	61	Graham Crackers	74
Cucumber	15	Icecream	62	Doughnuts	75
Eggplant	15	Macaroni & Cheese	64	French Fries	76
Green Beans	15	Raisins	64	Frozen Waffles	76
Lettuce	15	Instant Oatmeal	66	Total Cereal	76
Low Fat Yogurt	15	Pineapple	66	Jelly Beans	80
Peanuts	15	Angel Food Cake	67	Pretzels	81
Spinach	15	American Rye Bread	68	Rice Cake	82
Zucchini	15	Taco Shells	68	Cornflakes	84
Tomatoes	15	Whole Wheat Bread	69	Baked Potatoes	85
Cherries	22	Melba Toast	70	French Baguette	95
Plum	24	White Bread	70	Dates	103
Grapefruit	25				
Peach	28				
Wheat Tortilla	30				
Dried Apricots	31				

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Whole Milk	31				
Fat Free Milk	32				
Fettuccine	32				
Spaghetti	32				
Sweetened Yoghurt	33				
Nutella	33				
Apple	36				
Butter Beans	36				
Pear	36				
Tomato Soup	38				
Carrots, Cooked	39				
Meat Ravioli	39				
Natural Muesli	40				
Canned Chickpeas	42				
Custard	43				
Grapes	43				
Orange	43				
Macaroni	45				
Banana Bread	47				
Instant Noodles	47				
Long Grain Rice	47				
Green Peas	48				
All Bran	50				
Brown Rice	50				
Cheese Tortellini	50				
Rolled Oats	51				
Kiwifruit	52				
Special K	54				
Canned Fruit Cocktail	55				
Linguine	55				
Oatmeal	55				

Popcorn	55				
Sweet Corn	55				

### Macronutrients - Introduction

Macronutrients, as the name suggests, are nutrients that the body requires in larger quantities. Macronutrients include **chemical elements** that the body needs in order to function properly and at the highest parameters, such as carbon, hydrogen, nitrogen, oxygen and phosphorus. They also include what **medicine** tags as chemical compounds: carbohydrates, proteins and fats, which for the most part are inserted into our body through food.

Last but not least, macronutrients include the so called macrominerals, namely calcium, magnesium, potassium and salt, without which the body cannot function at its maximum potential. The article will discuss how all these elements affect the body from the perspective of a **soccer player** (but in general it's the same for any athlete) and what you need to be careful with when creating a perfect diet.

As you're probably aware, in order to function properly, **your body** requires several **chemical elements** and composites. Although all are essential, some elements are required in smaller quantities, in which case they are labeled micronutrients. The ones that are needed in larger amounts are macronutrients and it's this group of elements that I'll cover in the following section.

The "Macro" family can be **split up** in 4 groups of chemical elements or composites: **minerals**, **proteins (amino acids)**, **carbohydrates** and fat. I'll try to keep this as simple as possible, but if you feel like you're in chemistry or biology class reading these elements' **functions**, it's a good idea to roll with the terms since they're used in every nutrition or medical book, so it can make your life easier in the future if you do so. So let's start with the mineral macronutrients functions.

### Macronutrients - Minerals

*What are they?* - You'll find that some books will count the number of minerals needed by the body in large amounts to 6, while others will add a seventh element to the list. The main 6 mineral macronutrients (we'll call them macrominerals from now on) are calcium, phosphorus, sodium, chlorine, magnesium and potassium, with the seventh being sulfur, although some scientists suggest it shouldn't be included as a macronutrient

since it's not equally essential as the others, but we'll leave that issue to them to fight over.

*What do they do?* - Macrominerals have several functions in the body, including the transportation of oxygen to cells, strengthening and functioning of the skeletal system, nerve conduction, muscle contraction, "manufacturing" proteins and regulating a person's bodily temperature.

More specifically, calcium is extremely important in a person's growth (which is why it's even more crucial for young soccer players to get the right amount of calcium in their bodies), magnesium balances heart rhythm and potassium is responsible for muscle and nerve reactions.

You might not have realized it, but whenever you sprint out for a through ball, jump for a header or execute a sliding tackle, it's these minerals that make your skeleton, muscles and nerves work together like you want them to. Obviously, lacking any of these minerals affects the same areas negatively.

### Macronutrients - Proteins

*What are they?* - Proteins are strings of amino acids, which act like small workers in the factory that is each and every one of your cells. I could name some of the most important proteins our bodies require, but as a soccer player that doesn't matter as much. What matters is that you get a constant stream of "general" protein in your bodies from your diet.

*What do they do?* - First of all, you should know that proteins help with some of the most important macronutrient functions in the body. Basically they participate in almost all processes that a cell undertakes, from growth to repairing damaged tissue and so forth. So every time you scratch your thigh in a tackle or get a cut in training, these proteins will work hard in helping the cell regenerate and stitch the tissue back.

New cells are also created with the help of proteins, so if you want to increase your muscular mass, you'll need them in larger amounts (physical work-out simply acts as a back-push for proteins to increase the muscle tissue).

### Macronutrients - Carbohydrates

*What are they?* - Carbohydrates are equally important when it comes to macronutrient functions as proteins. They're usually split up into several sub groups, namely soluble and insoluble fibers and sugars. Soluble fibers can

generally be acquired from fruits (fruit pulp) whereas insoluble fibers can be obtained from wheat, corn, celery, potatoes and beans.

Sugars can also be obtained from natural foods but it can also be created artificially and there's quite a large amount of artificial sugar substitutes out there that are FDA approved.

*What do they do?* - The main function of carbohydrate macronutrients is "fueling" your body with energy. For every one of your actions, ranging from lifting your hand to scratch your left ear, to sprinting a full length of the pitch, carbohydrates are responsible for providing you with the energy that powers your movement. Carbohydrates also control blood glucose and balance your gastric system.

### Macronutrients - Fats

*What are they?* - It's funny how "slim fast" diets always focus on low-fat foods to make you lose weight. In fact, fats are actually an essential component of the body and without them we wouldn't be able to function properly. Gaining weight is not caused by eating too much "fat", it's caused by eating the wrong kind of fat in most cases. Contrary to popular belief, not all fats come from animal meat, since vegetables also contain fat.

*What do they do?* - Fats are responsible for the well being and functioning of our brain and nervous system as well as fueling our bodies with energy. Just like with carbohydrates, fats will act as an **energy source** and can be stored for future use. Actually the **body fat** that we refer to in every day (adipose tissue as a medic would call it) is nothing but stored energy.

Eating more carbohydrates than the body needs will make your body split up the intake, use the amount needed then turn everything in excess into the storage tissue that modern society hates so much.

### Macronutrients - Conclusion

That was a pretty long list of essential elements, wasn't it? Take in mind that these can be further split into sub-groups so you have several hundred elements that your body needs in large or very large amounts to function properly.

As a soccer player, you simply cannot miss out on many of these macronutrients if you want to be able to perform and train well and you will also need these macronutrients in larger amounts, since you will also burn more energy than the average person each day in training or in a match.

Getting a diet that contains all of these macronutrients in the right amounts is not the easiest of tasks and it's usually best if you see a **nutritionist** for such a diet instead of picking up nutritional fact labels off foods to compare them in the store.

### Micronutrients - Introduction

Just like macronutrients, micronutrients are elements that a body needs in order to function properly, however in this case smaller quantities are usually required.

The main chemical elements in the list of micronutrients includes: boron, cobalt, copper, iron, manganese, zinc, chlorine and molybdenum and although a deficiency in any of these won't affect your body as much as a macronutrient deficiency would, they're definitely needed if you want to maximize your body's potential (and as a soccer player, you should always look after getting your body to maximum parameters at all times).

This article will cover all of these elements and vitamins, explain the roles they play in your body's well being and we'll also see how a micronutrient deficiency can affect the performance of a soccer player.

Whenever we eat, drink or breathe, hundreds of **chemical elements** and composites enter our body and interact with us on several different levels. Our body is a car that needs constant fueling, but being a complex one it requires several types of fuels. For example, we get oxygen from breathing, blood and oxygen are transported throughout the body by the water that we drink and most of the other **essential elements** are obtained through eating.

Some of these elements that we need to eat are essential, but some are essential in large quantities, called macronutrients, whereas some can get their job done with less intake: micronutrients. It's this last category that I'll try to cover and explain in the following article and I'll also try to keep it as simple and non-scientific as possible.

### Micronutrients - Vitamins

There are 6 types of vitamin classes out there: A, B, C, D, E and K. **Vitamin B** has 8 sub-versions, each with its own specific trait but I won't go deeper into what each does since it's not as important for a **soccer** player's point of view.

What's important to know is that **vitamins** are responsible for dozens of essential body functions and processes. They carry nutrients into cells, help produce chemical reactions in the body, catalyze blood flow and blood clotting and so forth. Each vitamin has its specific (and important) role in the body and two of the biggest problems surrounding them are deficiency and overdose.

**Vitamin deficiency** can make you weak, it can make you more vulnerable to disease, cause you to regenerate wounds harder and so forth. As a soccer player, your body functions are taken to the extreme and a vitamin deficiency can be a severe draw back.

Deficiencies are however quite rare, since our daily diets are rich in vitamins, even if you don't work towards eating specific foods. As a **general guide**, fruits are amongst the most important sources of vitamins and they're essential in a soccer player's diet. Vegetables are also vitamin rich so eating your greens each day is pretty important for an athlete.

If you're suffering from a specific vitamin deficiency (vitamin A, C and D deficiencies are more common) you can either opt for diets containing fruits or vegetables rich in those vitamins that you lack, or take **nutritional supplements** containing the vitamins that you need.

Make sure you don't go over what the doctor prescribes. Cases of overdose are generally caused by the "if one vitamin pill makes me stronger, 10 will make me ten times stronger" mentality. Obviously, that's not a good idea when you're playing with the basic structure of life.

### Micronutrients - Minerals

If you've read the macronutrients article on the site, you'll remember that the body requires a large number of minerals to function, some of them in big quantities (calcium, potassium, etc) while with others it will do with smaller doses. These microminerals are Boron, Cobalt, Copper, Chloride, Chromium, Iron, Fluoride, Iodine, Manganese, Molybdenum, Selenium and Zinc and each has a specific and important role.

For example, Boron is responsible for transporting carbohydrates, maintaining healthy and strong bones and regulating metabolism. Cobalt helps produce vitamins and activate enzymes in the body. Copper aids in growth, function of the nervous system, tissue regeneration and bone health.



Overall, getting the right amount of these microminerals into your body will help it **function properly** and at maximum potential. Although required in small amounts, it's actually quite easy to gain deficiencies in these minerals, since our normal diets may not include them.

As a soccer player who puts up a lot of effort each week and is also looking to getting the best out of their bodies, you will want to carefully check if your diet includes these elements. Although visiting a nutritionist to set up a balanced diet for yourself is probably your best option, I took the liberty of creating a list of foods that contain each of these microminerals, which you should try to include into your meals:

### Minerals

Mineral	Good for ?	Foods
Boron	Maintaining healthy and strong bones, regulating metabolism	apples, pears, grapes, avocados, nuts, legumes, wine
Copper	Formation of hemoglobin, strong bones & joints, heart health	nuts, raisins, prunes, beans, <b>leafy green vegetables</b> , oysters, shellfish, mushrooms, grapes
Chloride	Maintains <b>fluid and electrolyte</b>	salt, soy sauce, milk, eggs, meats
Chromium	Required for the release of energy from glucose	whole grains, nuts, cheese, liver, meat, peas, beans
Fluoride	Strong teeth	water, tea, seafood
Iodine	Help regulate growth, development and metabolic rate	shrimp, lobster & other shellfish, seaweed, salt, bread, milk, cheese
Iron	Production of hemoglobin in blood. carries oxygen throughout body's cells	artichoke, parsley, fish, eggs, spinach, broccoli, green beans, tomato, juice, tofu, clams, shrimp, red meat, whole grains, corn.
Manganese	Bone & cartilage development	blueberries, green vegetables, nuts, olives, avocados, bananas.
Molybdenum	Facilitates cell processes	beans, peanuts, cashews, almonds, milk

Selenium	Protect body from oxidation	red meat, white meat turkey & chicken, tuna, eggs, oatmeal
Zinc	Wound healing, sperm production and liver function.	spinach, broccoli, green peas, green beans, tomato juice, lentils, oysters, shrimp, crab, red meat, plain yogurt, Swiss cheese, tofu, ricotta cheese, liver, eggs.