

# Supplements Guide



**James Fleming,  
MSc, SENr**

**JAMES FLEMING**  
**NUTRITION**

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## **Supplements – Should I supplement?**

Supplements are there to supplement the diet, not substitute bad choices!

*44% of all UK Anti-Doping's positive tested cases in 2012 were caused by prohibited substances in supplements (Informed Sport, 2019).*

### **Before using a supplement;**

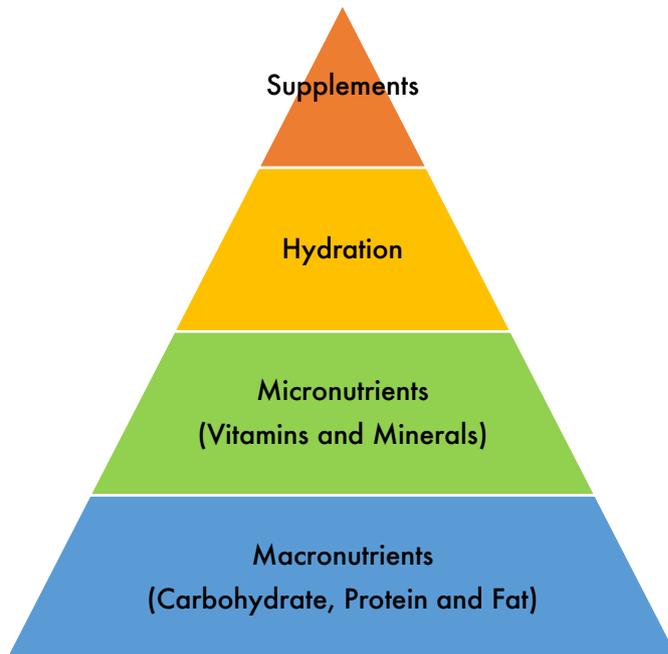
- Is the supplement needed? Can the athlete get the same benefit from their diet?
- Is there clear scientific evidence behind the supplement?
- What are the health risks associated with the supplement?
- Are there any prohibited substances associated with the supplement?

### **Is the supplement needed? Can the athlete get the same benefit from their diet?**

For Young Athletes a good, well balanced diet combined with plenty of rest and recovery between training sessions and competitions should not create a nutritional deficiency and therefore should not have a need to supplement.

Adults have a greater energy intake and may require additional nutrients in order to match the demands of their training and competitions. An athlete should focus on getting their required macronutrients (Fat, Carbohydrate and Protein) from their diet however, there may be occasions where supplements would be useful. For example, using protein powders to help with recovery after a gym session if there is no opportunity to prepare a meal.

Focus on a food first approach, when it comes to performance and health, a well-balanced diet containing good sources of carbohydrate, fat, protein, vitamins and minerals is going to have the biggest impact on exercise performance. Build a strong foundation and build your nutrition from there:



Supplements are there to 'supplement our diet' not to replace meals. Supplements are often viewed as a quick fix. Using certain supplements can increase your risk of consuming a banned substance which can result in a ban from your sport.

Stay hydrated throughout the day, particularly during training will ensure we are able to perform at our best.

Aim to drink at least 2 litres of fluid per day.

Eat at least 5 portions of a mixture of fruit and vegetables every day as part of a balanced and varied diet will ensure that you are getting enough vitamins and minerals that are key for a number of physiological processes in the body

Start here by making sure you are consuming plenty of carbohydrate, protein and fat throughout the day in accordance with training intensity and duration

### ***Is there clear scientific evidence behind the supplement?***

It should be emphasised that there are only a handful of supplements that have been scientifically proven to benefit performance.

Currently the supplements that have a strong scientific support include: creatine (for improving speed as well as building strength and power), caffeine (for increasing mental alertness and prolonging endurance performance), whey protein (for additional protein in order to build muscle and help recover after training).

## What are the risks associated with the supplement?

There are a number of risks associated with supplements:

- Risk of contamination due to;
  - Inadequate cleaning processes between different product production lines may result in ingredients used in one product being added to another product.
  - Poor raw ingredient sourcing, particularly if from overseas
- Counterfeit supplement products, particularly if bought over the internet
- Ingredients can be listed differently to how they appear on the prohibited list

## Are there any prohibited substances associated with the supplement?

Anyone who is a member of a National Governing Body can be drugs tested. Testing can take place anytime, anywhere and on any athlete. An athlete who does test positive for a banned substance, whether that be intentional or not, can result in a ban from their sport for a *minimum of 2 years!*

## Informed Sport Approval

There is no guarantee any supplement is free from prohibited substances. If there is a need for supplementation, an athlete should make sure their supplement is **Informed Sport approved**. Informed Sport is a quality assurance program for nutrition products and supplements. It certifies that every batch of a product has been tested for banned substances. Supplements that are tested are given a batch number and athletes should ensure they buy the product from the same batch number in order to minimise the chance of consuming prohibited substances.

Athletes can go on the Informed Sport website ([www.informed-sport.com](http://www.informed-sport.com)) to check if their product is approved. Simply enter the name of the product in the search bar and the search function will return either a positive or negative result. If it is a negative result, an alternative company product should be used.



Supplements are the biggest cause of inadvertent doping in the UK (UKAD). Many athletes are influenced by the performance claims of a product but fail to research the science behind the product or consider the risks or consequences of using supplements. An athlete should focus on getting their diet right before considering using supplements. If supplementation is necessary, an athlete should thoroughly research the product and consult a professional nutritionist before using it.

It is not possible to discuss every supplement in detail. This guide will focus on the most common and legal supplements. Any illegal supplements are not listed.

## The A-Z of supplements

### **Antioxidant supplements**

#### *What is it?*

When we exercise, there is an increase in free radical production within the body. Free radicals are molecules that are highly reactive and damage cells, this results in impaired recovery and muscle soreness.

This is known as oxidative stress. Antioxidants can help reduce this stress response by destroying the free radicals. Antioxidants include vitamin C, vitamin E, magnesium, selenium and beta-carotene.



#### *What is the benefit of taking it?*

In theory antioxidant supplements should reduce muscle soreness and improve recovery, however based on the latest research, there is little evidence to show that anti-oxidant supplementation improves performance or improves recovery. There is actually emerging research that shows high antioxidant supplementation can reduce adaptation to training.

#### *Should I take it?*

Antioxidant supplements should not be a substitute for a healthy diet. Antioxidants are found in a range of fruit and vegetables and we should aim to include a mixture of at least 5 portions of fruit and vegetables in our diet each day.

Consuming a balanced diet should ensure you are getting enough antioxidants in your diet and therefore no need to use any supplements.

#### *Are there any side effects?*

High doses of certain antioxidants such as vitamin c can cause side effects such as diarrhoea.

### **BCAA (Branched-chain amino acids)**

#### *What is it?*

There are 20 amino acids which are needed to help build new muscle. However, there are 3 key amino acids that initiate muscle protein synthesis (build muscle). These are leucine, isoleucine and valine which together form Branched Chain Amino Acids (BCAA supplements).



### *What is the benefit of taking it?*

BCAA supplements have become very popular over the past few years. There are a lot of beneficial claims from consuming BCAA supplements including an increase in protein synthesis resulting in an increased muscle mass, improved recovery after exercise, reduced muscles soreness and an improved immune system.

### *Should I take it?*

Most benefits have been shown in cell and animal studies however, despite the potential for BCAA to increase muscle hypertrophy, currently there is little to no evidence to support any of these claims in humans.

BCAA supplements alone do not provide all of the other essential amino acids necessary to maximise protein synthesis (build new muscle). A much more effective strategy is to consume around 25-30g of good quality protein (a natural source of BCAA) every 2 - 3 hours throughout the day.

### *How do I take it?*

If you are going to use this supplement, consume 5g 2 - 3 times per day.

### *Are there any side effects?*

BCAA supplements are fine to consume, however excessive consumption can reduce the absorption of other nutrients.

## **Beta Alanine**

### *What is it?*

Beta Alanine is an amino acid (part of a protein) used to make carnitine. Carnitine is a buffer found within the muscle. It buffers (removes) waste products created by the muscle during high intensity exercise. When there is a build-up of waste products within the muscle, we experience fatigue and we are unable to sustain exercise anymore.



### *What is the benefit of taking it?*

Taking Beta Alanine supplements increase our muscle carnitine levels. This increases the buffering capacity of the muscle so we are able to sustain exercise at a higher intensity and for a longer duration.

### *Should I take it?*

Beta Alanine supplements may be beneficial if you are competing in short duration high intensity events such as swimming, rowing, cycling and running. This may also be beneficial for team sport athletes such as Football or Rugby; any event that involves repeated sprints.

### *How do I take it?*

Research has shown that it takes at least 4 weeks of daily supplementation in order for any benefits to occur. Optimal dosage appears to be around 3-6g per day. If you are going to use this, start with a small amount each day to build up your tolerance.

### *Are there any side effects?*

There have been numerous side effects reported. This includes parathesia (skin tingling) which occurs when using very high doses. There is also the risk of contamination from a banned substance.

## **Caffeine**

### *What is it?*

Caffeine is a stimulant. Caffeine is found in everyday foods such as coffee, tea, fizzy drinks as well as certain sports drinks and gels.



### *What is the benefit of taking it?*

Caffeine acts on our central nervous system, improving our alertness and concentration. Caffeine has been shown to reduce the perception of fatigue meaning we are able to exercise at a higher intensity for a longer duration.

### *Should I take it?*

Based on research, caffeine has been shown to improve performance across a range of sports and types of exercise. This include endurance events (anything that lasts over 60 minutes), High intensity sports (anything that lasts up to an hour) as well as team sports.

### *How do I take it?*

The most effective way to take caffeine is to consume between 2-4 mg (milligrams) per kg body mass 45-60 minutes before exercise. For a 70kg athlete this would equate to between 140-280mg of caffeine before exercise. The table below lists caffeine content of everyday foods.

Product	Caffeine content (mg)	Product	Caffeine content (mg)
Instant coffee	60mg	Coke	40mg
Espresso	45-100mg	Energy gel (1 sachet)	25mg
Filter coffee	60-120mg	Dark chocolate (50g)	40mg
Energy drinks	100mg		

### *Are there any side effects?*

Some side effects are reported with high consumption of caffeine. This includes nausea, headache and tremors. During certain events, high levels of caffeine consumption can impair technique as well as impact our sleep if we are consuming caffeine late in the day.

### **Tart Cherry Juice**

#### *What is it?*

Tart cherry juice has become a very popular post exercise recovery product. Cherries, particularly tart Montmorency cherries contain high levels of plant compounds that provide antioxidant and anti-inflammatory properties.



#### *What is the benefit of taking it?*

Consuming tart cherries after intense exercise has been shown to reduce inflammation, reduce muscle stress and improve muscle recovery after exercise as well as improve sleep quality.

Recovery from training and competitions is vital for athlete performance, particularly when in an intense period of training or competition schedules are intense - multiple matches with very little recovery time. Montmorency cherries are used as part of recovery by a range of athletes from Olympic athletes to Football players.

Sleep is a vital part of an athlete's recovery after exercise which may be difficult to achieve either when travelling a lot or if suffering with sore muscles. Consuming Montmorency cherries an hour before bed could be an effective way to improve sleep quality.

*How do I take it?*

Consume 30 ml of Montmorency cherry juice with 300 ml water. Make sure you use Montmorency cherries as other forms of cherry do not have the same beneficial effect on recovery.

Consume 30 ml of Montmorency cherry juice twice a day, once in the morning with breakfast and once in the evening before bed for 4-5 days before strenuous exercise in order to reduce muscle soreness after exercise and improve sleep quality.

*Are there any side effects?*

There are currently no side effects associated with this supplement.

## **Collagen**

*What is it?*

Collagen is a protein (made up of a series of amino acids) that is used in the body to form tendons, ligaments and bone structure.



*What is the benefit of taking it?*

Soft tissue injuries (an injury that affects muscles, tendons or ligaments) are extremely common across all types and levels of sport.

Adding more collagen to these tissues will help make the structure stronger and reduce the injury and recovery time. In addition to collagen, adding vitamin c to this supplement activates key enzymes that are used to form new collagen and body structures.

A number of studies have demonstrated that collagen supplementation has led to effective rehabilitation and reduced recovery time from both ACL and patella reconstruction as well as reducing muscle pain and soreness.

*How do I take it?*

Based on the latest research, the most effective strategy is to consume 15-20g collagen with vitamin c around 60 minutes before exercise or rehabilitation sessions.

## **Creatine**

### *What is it?*

Within our muscles, they contain phosphocreatine. This is high energy source that can generate a lot of energy very quickly. However, we only have small stores of phosphocreatine within the muscle.



### *What is the benefit of taking it?*

Using creatine supplementation can increase our phosphocreatine stores within the muscle. An increase in our phosphocreatine stores can increase our ability to sustain all-out effort for longer as well as recover quicker between repetitions. Creatine supplementation leads to an increase in muscle hypertrophy and reduction in muscle acidity resulting in greater strength and an improved ability to sustain performance during repeated sets

### *Should I take it?*

Creatine supplementation may be beneficial for any athlete who competes in a sport or event that involves high intensity repeated movements such as sprints, jumps or throws.

### *How do I take it?*

There is no benefit from taking creatine once. There are 2 common dosing strategies. The first is to consume 3 - 5g per day for 30g days. The second strategy is a 'loading' phase of 20g per day ( 4 x 5g throughout the day) for 5 days followed by a 'maintenance' dose of 2 - 3g afterwards for 30 days. It can take 5 - 8 weeks for muscle creatine concentrations to return to base levels therefore you may wish to supplement in cycles before starting again.

### *Are there any side effects?*

Some side effects reported from creatine supplementation include increased cramping, risk of contamination which can result in a failed drugs test and lengthy ban. Creatine is stored in the muscle with water, creatine supplementation is likely to lead to an increase in body weight due to an increase in water retention within the muscle. This can be an issue for anyone competing in a weight category sport.

## **Electrolytes**

### *What are they?*

Electrolytes are a group of chemicals that are vital for a range of physiological functions such as muscle contraction and nerve impulses. They include sodium, chloride, potassium and magnesium. Too few electrolytes can cause the body to cramp which can have a huge negative impact on performance.



### *What is the benefit of taking it?*

When we exercise, particularly for long periods of time we sweat in order to cool us down. When we sweat we lose both fluid and electrolytes. The two key electrolytes are sodium and potassium. Sodium is important for encouraging us to drink more, increasing fluid retention. Potassium is important for maintaining electrolyte balance and maintain muscle contraction during exercise. A loss of electrolytes during exercise can substantially impair sporting performance.

Consuming electrolytes via tablets or powders before during and after exercise helps maintain optimal electrolyte levels to help maximise performance.

### *Should I take it?*

If you are a heavy or salty sweater when exercising, using sports drinks such Lucozade Sport or electrolyte tablets before, during and after exercise should help replace electrolyte loss for exercise.

If using electrolyte tablets, follow the instructions on the packaging. Most tablets will recommend mixing 1 tablet with around 500 ml water.

### *Are there any side effects?*

Excessive sport drink consumption can lead to stomach issues and gastrointestinal distress. Due to the sugar content of sports drinks, this may also affect dental health.

## Energy gels

### What are they?

Energy gels are small squeeze sachets that contain quick release carbohydrates in the form of a jelly like texture.

An energy gel contains around 25g carbohydrate per sachet.



### What is the benefit of taking it?

Research has shown that consuming between 30-60g carbohydrate per hour improves exercise performance. Consuming energy gels are a convenient way of consuming carbohydrate during exercise.

### Should I take it?

Research has shown that consuming energy gels in both endurance exercise (anything over an hour) as well as team sport performance can improve performance.

### How do I take it?

For an endurance event that lasts over an hour, after 45 minutes of exercise consume your first gel and then consume another gel every 20 minutes for the duration of your exercise.

For team sport events such as rugby or football, consuming an energy gel at half time is a convenient way to consume carbohydrate to help maintain performance for the second half.

### Are there any side effects?

Consuming too much carbohydrate in one go while exercising can lead to an increased risk of an upset stomach. It is really important to practice using energy gels in training so that your body gets used to them.

## Dietary Nitrate

### What is it?

Dietary Nitrate is found in a range of leafy green vegetables such as spinach and kale as well as beetroot.

### What is the benefit of taking it?

Nitrate, when consumed in the body, is broken down into Nitric Oxide. Nitric Oxide is a vasodilator which helps the blood vessels widen. Therefore, there is an increased blood flow and as a result, an increase in oxygen delivered to the



muscle. Due to the increased blood flow, the muscle is able to recover quicker as it is able to remove the muscle waste products quicker. Essentially Nitrate helps delay the onset of muscle fatigue and as a result you are able to exercise for longer and at a higher intensity.

#### *Should I take it?*

Using beetroot juice has been shown to improve performance in both endurance exercise and team sport performance.

#### *How do I take it?*

Dietary Nitrate can be consumed in juice form; either as a glass of juice or a concentrated 70 ml shot. In terms of use the research shows having 2 shots per day for 6 days prior to an event is optimal. Having one in the morning and one in the late afternoon/evening is ideal to increase the amount of Nitric Oxide in your body as much as possible.

It takes the body around 2-3 hours to process the nitrate and break it down therefore on the day of the competition, consume your final shot around 2 hours before your competition.

#### *Are there any side effects?*

A common side effect is pink urine and stools. This is usually reported when consuming high amounts on a regular basis. This is only temporary and perfectly safe.

### **Probiotics**

#### *What is it?*

Probiotics are live micro-organisms or bacteria that are found in the gut. They are important for maintaining our intestinal health, digestion and immune function. Probiotic supplements work by overpowering and remove disease causing bacteria. Probiotics are found in food such as yoghurt or kimchi.



#### *What is the benefit of taking it?*

It has been demonstrated that intense training sessions can place significant strain on our immune system which can increase our risk of becoming ill and picking up Upper Respiratory Tract Infections (URTI) such as coughs, colds or a sore throat.

Evidence shows that probiotic supplementation can reduce the chances of an athlete picking up a URTI and may help reduce the chances of gastrointestinal distress occurring during long duration exercise.

*Should I take it?*

During intense periods of training, probiotic supplementation may reduce the occurrence of URTI.

It is advised to consume a daily dose of probiotic containing Lactobacillus and or Bifidobacterium every morning as part of breakfast. Probiotics need to be taken for at least several weeks before any positive benefits may be seen.

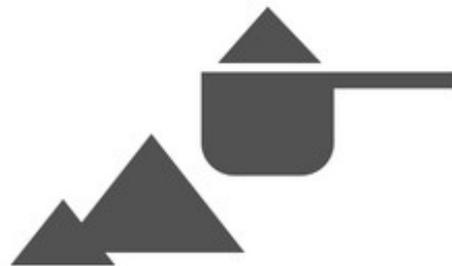
*Are there any side effects?*

No side effects are currently reported from probiotic supplements.

### **Protein Supplements**

*What is it?*

Our muscles and body structures are made up of a series of amino acids that we get from protein. In order for our muscles to grow and repair, it's really important to include plenty of protein in our diet. Protein supplements can be taken in the form of either protein powders, ready to drink shakes or high protein bars.



There are a number of types of protein including; whey, casein and soy.

**Whey protein**, derived from milk contains high levels of essential amino acids that are quick to digest and absorbed for the body to use

**Casein protein**, also derived from milk is slower to digest but also contains high levels of amino acids.

**Soy protein**, derived from soybeans is a plant based protein that is suitable for vegans or vegetarians.

*What is the benefit of taking it?*

Protein supplements offer a quick and convenient way to meet your protein demands. This may be beneficial if you have high protein needs or struggle to consume enough protein through food.

### *Should I take it?*

Depending on our training goals, it is recommended we consume between 1.2-2g protein per kg body mass per day. For an 80kg athlete, this would be 96g – 160g protein per day.

Further research has also shown that our body can only process around 0.3g of protein per kg body mass per meal or around 25g. Adding additional protein, either through food or supplements is unlikely to result in any further benefit.

Therefore, split your daily protein intake into smaller chunks by consuming a balanced diet each day and making sure you consume a good source of protein every 2-3 hours to ensure you get enough protein in your diet.

Excellent protein sources include meats (chicken, turkey, beef, lamb), fish and dairy products. For those that may be vegetarian, protein sources could be tofu, beans, lentils and nuts.

### *How do I take it?*

Check the product label for recommended way to consume.

### *Are there any side effects?*

Make sure you choose informed sport products to minimise the risk of a banned substance. Our bodies can only process a certain amount of protein in one go therefore any excess amounts of protein that the body can't process will be excreted.

Protein supplements can work out to be quite expensive as well:

As an example, a 2.5kg tub of whey protein may cost around £50 and contain 100 servings (1 scoop is usually around 25g powder and will contain around 20g protein). This would mean each scoop costs around 50p. Most supplement companies will recommend taking 1 scoop per day after training. It is quite common for someone to read the packaging and think "1 scoop is good, 2 scoops must be better". This means that a protein shake with 2 scoops now costs £1 and instead of your 2.5kg tub lasting you for 100 days, it will now last you 50 days.

A pint of semi skimmed milk post exercise is a great recovery option – a great source of protein and carbohydrate. A pint of milk also costs around 50p making a much cheaper option as well.

Just because a product has 'protein' in its name doesn't mean it is beneficial. As mentioned above, the optimal protein intake strategy should be 20-25g protein

every 2-3 hours. There has been a huge increase in 'high protein' products in recent years such as cereals, chocolate bars and flavoured milks, yet many of these do not meet these protein requirements. In most cases the protein version of a product only has slightly more protein in it than the normal product. In terms of other ingredients, these products may contain huge amounts of sugar and calories and be a lot more expensive. In this case, you may as well consume the normal product.

### **Sodium Bicarbonate**

#### *What is it?*

Sodium bicarbonate is found in baking powder. It is often referred to as a 'pH buffer'.



#### *What is the benefit of taking it?*

During exercise hydrogen ions are produced in the muscle which after a while, start to accumulate and result in fatigue. Bicarbonate supplementation increases the bicarbonate concentration within the blood which allows the hydrogen ions to pass easier into the blood where they can be disposed of in the form of carbon dioxide. This allows us to exercise at a high intensity but for a longer duration.

#### *Should I take it?*

Athletes who may benefit from bicarbonate supplementation are those that compete in events that last between 1 and 7 minutes; anything up to a 1500m running event, up to 400 m swimming event as well as any team sports that involve a lot of high intensity repeated sprints.

#### *How do I take it?*

The most effective supplement strategy is to consume 0.2-0.3g of sodium bicarbonate per kg body mass 90 minutes before an interval training session. For an 80kg athlete, this would be 16g- 24g.

#### *Are there any side effects?*

A number of side effects have been reported when using sodium bicarbonate. This includes nausea, diarrhoea and vomiting.

## Vitamin D

### What is it?

Vitamin D is vital for a number of functions; to help regulate and absorb calcium into the body in order to maintain strong bones and teeth, maintain muscle function and maintain immune function.



### What is the benefit of taking it?

There is still a lot of research to be done around Vitamin D but it is well established that being Vitamin D deficient due to lack of sun exposure (likely during winter) can impair muscle regeneration and the other functions mentioned above.

### Should I take it?

Vitamin D is mainly obtained through sunlight (5 – 30 minutes per day) and a very small amount from our diet. Vitamin D is found in foods such as oily fish, eggs, cereals and yoghurt. Vitamin D supplements are also available.

### How do I take it?

Plenty of exposure to the sun during the summer will help maximise Vitamin D levels. Always ensure to cover up and protect your skin if out in the sun for long periods of time. If you are going to Vitamin D supplements, they will usually be consumed orally. A daily dose of 10 micrograms should be more than enough.

### Are there any side effects?

Consuming too much Vitamin D can result in certain conditions such as Hypercalcaemia (a build-up of calcium in the body which can weaken bones as well as damage the heart and kidneys).

## ZMA

### What is it?

ZMA (Zinc monomethionine aspartate and magnesium aspartate) is a supplement that combines zinc, magnesium, vitamin B and aspartate. ZMA is marketed to strength-based athletes as a testosterone booster.



### What is the benefit of taking it?

It is claimed that taking ZMA can boost testosterone resulting in an increase in muscle size and strength as well as improved recovery after exercise.

However, there is currently very little research on ZMA supplementation. In studies that have examined ZMA supplementation, there is very little evidence to support the benefits. In one study, 8 weeks of ZMA supplementation did not improve testosterone levels, muscle strength, mass or endurance compared to a placebo.

A more effective way to ensure we are getting plenty of zinc is to focus on consuming a balanced and varied diet. Ensure you include plenty of wholegrains such as wholemeal bread, nuts, beans and lentils. Magnesium can also be found in wholegrains, vegetables, fruit as well as milk.

*Should I take it?*

Zinc or Magnesium deficiencies has been shown to impair exercise performance.

*Are there any side effects?*

Do not exceed the safe upper limit for zinc of 25mg each day or 400mg for magnesium per day. High levels of zinc can interfere with the absorption of certain minerals.

“Some is good, more must be better” is a very common conception when it comes to any supplements. Supplements are there to ‘supplement’ any deficiencies in our diet. Focus on consuming a healthy balanced diet to ensure you are getting plenty of energy, nutrients, vitamins and minerals.



## About James

James is Sport and Exercise Nutritionist. He has a BSc in Sport Science and an MSc in Sport and Exercise Nutrition from Loughborough University. James is currently listed on Sport and Exercise Nutrition register (SENr).

For more information check out:

[www.jflemingnutrition.co.uk](http://www.jflemingnutrition.co.uk)

Instagram: [jf\\_nutritionist](#)

Facebook: [JamesFlemingNutrition](#)

Contact James at [jflemingnutrition@gmail.com](mailto:jflemingnutrition@gmail.com) or call on 07938687363

**JAMES FLEMING**  
NUTRITION