

WHICH SUPPLEMENTS REALLY WORK?

With so many supplements promising performance gains, sorting the proven from the mere placebo is baffling at best. Nutritionist *Anita Bean* shines a light on the evidence base



The sports nutrition market is awash with tablets, powders and potions promising performance gains. Some of them are very eye-catching; a nutritional improvement, if it works, is a relatively easy gain – no extra work required, just a small financial outlay. But most of us also realise that many, if not most, supplements over-promise and under-deliver. There’s no replacement for a varied, well-balanced diet and strategic nutrient timing around training. Nonetheless, sports supplements are widely used by cyclists at every level of the sport.

According to a recent consensus statement by the International Olympic Committee, the majority of these products have little evidence to back them up. At best, they are unnecessary and, at worst, are harmful or prohibited. That said, there are a few products that are supported by robust research and may offer performance or health benefits. Here, I’ve sifted through some of the most popular supplements for cyclists and put them into three categories:

SUPPLEMENTS SUPPORTED BY SOLID EVIDENCE

Vitamin D

BENEFITS: BONE HEALTH, MUSCLE FUNCTION, IMMUNITY

Vitamin D is important for muscle function, bone health and immunity. A study of 50 competitive male road cyclists found the majority had low levels of vitamin D, putting them at greater risk of injury and respiratory infection. In tests on a group of footballers who were given either a vitamin D supplement or a placebo, researchers found that, after eight weeks of training, the supplemented group showed significant performance improvements compared to the placebo group.

However, taking vitamin D if you are not deficient will not boost performance. Your GP should be able to test your

vitamin D levels, or you could buy a test kit from a private provider such as Medicecks (medicecks.com); if yours is less than 50nmol/L, then you will benefit from supplements (100mcg or 4,000IU per day is the upper limit). Sports endocrinologist Dr Nicky Keay recommends athletes maintain levels of at least 90nmol/L. If testing is not available to you, Public Health England recommends taking a daily 10mcg supplement during autumn and winter – and it won’t do any harm all year round.

Caffeine

BENEFITS: ALERTNESS, REDUCED FATIGUE

Caffeine has been studied for 100 years. It is a stimulant that acts on the brain, blocking the action of a brain chemical called adenosine, which normally makes you feel tired. Caffeine therefore increases alertness and concentration and lowers perceived exertion, making exercise feel easier.

Studies show caffeine enhances endurance performance, shaving an average 3.2 per cent off finish times, as well as sprint and power-based events. You only need 1–3mg/kg to get a performance-boosting effect, which is less than previously believed (6–9mg/kg). For a 70kg cyclist, this would be 70–210mg, equivalent to a double espresso, two to four caffeine gels or a can or two of energy drink. Consume it 30 to 60 minutes before you want the desired effect, before a ride or towards the end of one when you need an energy boost.

Caffeine stays in your bloodstream a long time – its half-life is five to six hours, the time taken to clear half of it out of your system. Individual responses vary, and not everyone performs better with caffeine. Experiment in training, not on race day, to find out the dose and timing that works for you.



Nitrate and beetroot juice

BENEFIT: IMPROVED BLOOD FLOW

There’s a solid base of evidence to suggest beetroot juice – a rich source of nitrate – can improve endurance performance in events lasting 12 to 40 minutes, as well as in repeated sprint performance. It increases levels of nitric oxide in the body, which helps to dilate blood vessels, and reduces the oxygen cost of submaximal exercise to such an extent that endurance rises by up to 15 per cent (equivalent to a one per cent improvement in a time trial performance). Cyclists who were given 500ml beetroot juice 2.5 hours before a time trial improved their performance by 2.8 per cent in a 4km race and 2.7 per cent in a 16.1km race.

The ideal dose is 300–600mg nitrate, equivalent to one or two 70ml beetroot ‘shots’, taken two to three hours before exercise. But a three-to-seven-day ‘beetroot loading’ phase may be needed to produce an ergogenic effect in more highly trained cyclists, according to a recent Danish study. Alternatively, you may prefer to consume nitrate-rich foods such as rocket, spinach and lettuce. Avoid using antibacterial mouthwash, as this removes beneficial bacteria in the mouth that converts some of the nitrate to nitrite, and thus reduces the benefits of beetroot juice. As for side effects, there’s a harmless, temporary, pink colouration of urine and stools.

Beta-alanine

BENEFIT: SPRINT TOLERANCE

Beta-alanine is an amino acid that may enhance sprinting and benefit performance in events ranging from 30 seconds to 10 minutes, or those involving repeated sprints. Taking supplements increases carnosine concentrations in the muscles, which increases buffering capacity and helps offset metabolite

build-up during high-intensity exercise.

The optimal dose is 65mg per kilo of bodyweight per day, or 3.2–6.4g per day, but is best taken in several smaller doses, e.g. 0.8–1.6g every three to four hours, over a 10-to-12-week loading period to minimise side effects, which can include paraesthesia (skin tingling).

Iron

BENEFIT: OXYGEN-CARRYING CAPACITY OF BLOOD (IF PREVIOUSLY IRON-DEFICIENT)

If you have been diagnosed with iron deficiency, then you'll benefit from iron supplements.

Symptoms of deficiency include tiredness, fatigue, abnormal breathlessness during exercise and loss of endurance and power. Your doctor can carry out a blood test (to measure ferritin, haemoglobin, iron and haematocrit) and will prescribe supplements if you need them.

If you're not deficient, you should not take supplements above the recommended dietary allowance (RDA), as high doses cause side effects such as constipation.



Vitamin B12

BENEFIT: PREVENTS ANAEMIA

Vitamin B12 deficiency is a particular risk for vegans, as it isn't found in plant sources. Lack of B12 can result in anaemia and impact adversely on endurance. The Vegan Society recommends taking a supplement containing 10mcg of B12, or including vitamin B12-fortified non-dairy milk alternatives, yeast extract or breakfast cereal. Non-vegans can find B12 in eggs and dairy products.

Creatine

BENEFIT: IMPROVED RECOVERY FROM MAX EFFORTS

Boosting creatine levels enables you to sustain effort for longer and recover faster. It's favoured by track sprint cyclists – no studies have demonstrated a significant benefit for endurance cyclists.

Beyond cycling, a review of 22 studies concluded creatine increases maximum strength by an average of eight per cent, and endurance strength by 14 per cent. There are several forms of creatine, but creatine monohydrate is the most effective and well-researched form. It can

be taken over a five-day loading dose (5g four times per day) or 2–3g per day for four weeks, followed by a maintenance dose of 2g per day. Sadly, it can cause some weight gain.

SUPPLEMENTS THAT MAY BE WORTH CONSIDERING

Cherry juice

POSSIBLE BENEFITS: REDUCED INFLAMMATION, IMPROVED BLOOD FLOW

A Northumbria University study found cyclists who consumed 30ml Montmorency tart cherry juice concentrate twice daily for five days before a 109-minute road race, and continued drinking it for three days afterwards, experienced less muscle damage and inflammation.

A meta-analysis of 10 studies, published this year, concluded it may enhance endurance performance when taken between 1.5 hours and seven days before an event. These benefits are attributed to its high content of anthocyanins – powerful vasodilators, antioxidants and anti-inflammatory agents.

Blackcurrant extract

POSSIBLE BENEFIT: IMPROVED BLOOD FLOW

Blackcurrant anthocyanins have similar benefits to those found in cherries. A University of Chichester study found seven days of supplementation with 300mg New Zealand blackcurrant extract improved 16.1km time trial performance by an average of 2.4 per cent, and increased fat oxidation by 27 per cent during moderate-effort cycling.

Collagen

POSSIBLE BENEFIT: ENHANCED INJURY RECOVERY

Collagen is the main protein in tendons, bones, ligaments and cartilage. Scientists are investigating if collagen

DON'T ACCIDENTALLY DOPE

'Always look for the Informed Sport logo'

Supplements are the biggest cause of inadvertent doping in the UK. Unlike prescription medicines, there is no systematic regulation of supplements, which means there's no official check on safety, quality or if they are free from prohibited substances.

British Cycling has a policy of strict liability, which means you take supplements at your own risk – you cannot retrospectively claim you didn't know what you were taking.



Not only could you risk failing a doping test, but also doing serious harm to your health.

You can cut this risk by making sure your supplement comes from a reputable company that has strict

manufacturing controls and provides a certificate to prove it has been batch-tested for banned contaminants by a recognised anti-doping lab. Look for the Informed Sport logo on the label and cross-reference the batch number at: informed-choice.org.



Interest is growing in the repair-boosting potential of collagen

supplementation can prevent or treat musculoskeletal injuries. A joint US-Australian study showed taking 15g vitamin C-enriched gelatine (a food form of collagen) one hour before high-intensity exercise (skipping) increased collagen manufacture.

However, this is early stage research; the functional benefits and effects on injury recovery in athletes are unknown.

Turmeric/curcumin

POSSIBLE BENEFIT: REDUCED INFLAMMATION

Curcumin is the bioactive ingredient in turmeric root that gives the spice its yellow colour. It has been shown in lab tests to have anti-inflammatory properties. A 2015 New Zealand study showed taking 5g curcumin a day for 2.5 days prior to and following muscle-damaging exercise reduced pain associated with DOMS and lowered muscle damage. More research is needed to back up these findings, though.

Greens powders

POSSIBLE BENEFIT: EXTRA PLANT-DERIVED NUTRIENTS

Greens powders contain various blends of plant



extracts, vitamins and minerals. Although it's tempting to believe that the powdered form of vegetables are just as good as the real thing, you're better off eating the actual fresh whole foods if you can. Powders lack the fibre and water abundant in vegetables that are so important for satiety. When it comes to vitamins and minerals, more isn't necessarily better and – unless you eat whole foods too – you risk getting too much of one vitamin and not enough of others. There's no published evidence that greens powders enhance performance, but they may be a useful addition to your diet if you struggle to eat sufficient fruit and vegetables.

SUPPLEMENTS WITH LIMITED OR NO PROVEN BENEFIT

Branched chain amino acids (BCAAs)

CLAIMED BENEFIT: IMPROVED MUSCLE SYNTHESIS

Theoretically, BCAAs may help prevent protein breakdown during fasted training. But, according to a 2017 study at the universities of

Exeter and Stirling, if sufficient protein is being consumed in the diet, then there appears little benefit in taking BCAAs.

Cannabidiol (CBD)

CLAIMED BENEFIT: REDUCED PAIN AND INFLAMMATION

CBD is a cannabinoid produced by the cannabis plant, which some brands claim has pain-relieving and anti-inflammatory benefits. These claims are supported only by anecdotal evidence. Although it is not currently a banned substance, CBD carries a high risk of inadvertent doping due to contamination with tetrahydrocannabinol (THC), the illegal psychoactive compound.



Nootropics

CLAIMED BENEFIT: SHARPENED MENTAL FOCUS

Nootropics, or 'smart drugs', are supplements that can potentially boost mental performance. They include both natural (e.g. herbal extracts) and synthetic substances.

Nootropics marketed as pre-workout boosters claim to improve energy and focus; as yet, the evidence is thin.

Some small studies show some nootropic supplements can affect the brain. But there is a lack of evidence from large studies to show these supplements work and are completely safe.

