



## SLEEP WELL TO SUPPORT YOUR FITNESS GOALS - Matt Lovell

Nutrition, lifestyle and behaviour for a good night's sleep

### Why lose sleep over sleep?

Sleep is essential in process of **recovery**. Whether from exercise or the stresses and strains of the day. For this reason, good sleep is as important as good nutrition for supporting your exercise performance and achieving your goals.

Rather inconveniently however, sleep deprivation is a frequent problem amongst athletes (Samuels, 2009).

### Sleep and performance

You're probably aware that adequate sleep is essential to maintaining good cognitive function and concentration. How many times have you read and re-read the same paragraph at work after a poor night's sleep?

Poor sleep can quickly affect physical and athletic performance. A study carried out by the UK Sports Council on 10 elite rugby players found that reducing sleep to 3–5 hours a night significantly affected accuracy in tests of sporting skill (Cook, Crewther et al. 2011). Another study at Eskisehir Osmangazi University in Turkey on runners and volleyball players found that sleep loss significantly reduced time to exhaustion during exercise (Azboy & Kaygisiz, 2009). Anaerobic (high-power, short-duration) performance can also be affected by sleep deprivation (Souissi, et al., 2008).

### Sleep and long-term health

Sleep is necessary for more than just day-to-day concentration and performance. Lack of sleep can cause long-term problems for our health too, including:

- Increased blood pressure
- Impaired appetite control and overeating, leading to weight gain/obesity
- Impaired carbohydrate metabolism / blood sugar control – inducing a state similar to diabetes
- Inflammation
- Lowered immune function
- Heart disease
- Loss of muscle mass and reduced muscle recovery
- Lower levels of anabolic hormones, including growth hormone and testosterone.

(Datillo M et al, 2011; Hui Xie et al, 2009; Mullington et al, 2009; Samuels, 2009; Spiegel K et al, 1999; Taheri, Lin et al. 2004).



As well as the long-term implications for your health, this also shows that poor sleep can undermine all your efforts to improve your body composition, strength and fitness too!

### **Are you sleeping well?**

Take this quick test to assess your sleep quality. If you answer yes to two or more of these, you may need to work on improving your sleep.

- Do you have trouble falling asleep?
- Do you find it difficult to wake up, or wake up feeling tired?
- Do you sleep less than 8 hours on a regular basis?
- Do you wake once or more during the night, and find it difficult to get back to sleep?
- Do you sleep in a room with light or noise?
- Do you wake up with an alarm?
- Do you go to bed later than 11pm?
- Do you get up earlier than 6am?
- Do you depend on caffeine to get you through the day?
- Do you feel sleepy when driving or at other points during the day?
- Do you use medication or alcohol to get to sleep?

### **Sleep support overview**

We'll look at how each of the following strategies can help you achieve an optimal night's sleep.

#### **Lifestyle, behaviour and sleep**

- Stress management / relaxation
- Light, dark and the circadian rhythm
- Sleep patterns and duration
- Preparing for sleep
- Creating the right sleep environment
- Exercise and sleep
- Waking up

#### **Nutrition for optimal sleep**

- Eating to balance blood sugar and energy
- Supporting neurotransmitter synthesis
- Nutrition for the nervous system: magnesium and zinc
- Eating patterns – eating at the right time
- The effects of stimulants and alcohol
- The importance of hydration



## Lifestyle, behaviour and sleep

### 1. Stress management / relaxation

One of the primary causes of poor sleep or insomnia is anxiety or stress. For this reason, balancing and reducing your stress levels is a fundamental step towards better sleep. This could be through meditation, breathing exercises or relaxing exercise such as yoga or stretching, at any time of the day or specifically as part of a 'down-time' ritual before bed. Check out in particular the 'HeartMath' Quick Coherence technique, an easy breathing/meditation technique that can be done in as little as three minutes.

(<http://www.heartmath.com/quick-coherence-technique/>)

Other practices that can help, include walking, spending time in nature, 'grounding' the body by walking outside barefoot, or taking Epsom salt baths. See also the section on 'Preparing for sleep' below for further tips and more details on Epsom salt baths.

Not only does stress affect our sleep, but lack of sleep increases our stress hormones (Spiegel, Leproult et al. 1999), causing a vicious cycle. We need to break the cycle!

### 2. Light, dark and circadian rhythm

Another important factor in good sleep is getting appropriate exposure to light over the day. This means maximizing your light exposure early in the day and reducing your exposure in the evening.

#### Getting enough daylight

Light exposure early in the day increases serotonin production, to help us feel more alert and energetic in the daytime and helps to switch off melatonin production – the hormone that makes us feel sleepy at night. This synchronizes the circadian rhythm, and so getting enough light during the day actually helps to increase melatonin production at night, an effect that is proven in clinical trials (Obayashi K et al, 2012).

To maximize your daylight exposure:

- Open the curtains or blinds as soon as you get up to let in natural light.



- Walk at least part of the way to work or take a walk outside in the early morning so that you are in full daylight for at least 15–20 minutes. Maximise your time outside during the daylight hours – for example taking a 15-minute walk during a work break or at lunchtime, and eating your lunch outside, if you can.
- If you work indoors, try to work as near to a window as possible. A study of 49 workers found that those who worked in windowless environments had poorer sleep and more sleep disturbances compared to those who had good daylight exposure at work (Boubekri M et al, 2014).

If you can't get enough natural daylight, then bright light therapy (a light box) may help. Light boxes emit a blue light that mimics the effect of daylight, and they are used to help people with circadian rhythm sleep disorders and insomnia, as well as mood disorders such as seasonal affective disorder (Shirani & St. Louis, 2009). Look for a light box that emits 10,000 lux of light, equivalent to full daylight. They are available from Amazon.

### **Reducing light exposure in the evening and at night**

Thanks to the advent of electric lights – as well as electronic devices such as televisions, computers, tablets and smartphones – we have more exposure to bright light in the evenings than we should. Electronic devices could be particularly disruptive as they produce more blue light, which is similar to daylight and has a greater effect on suppressing melatonin production.

To combat this effect:

- Use low-level lighting in your home in the evening.
- Avoid using your electronic devices in the last 1.5 to 2 hours before going to bed. If you use a tablet for reading, then use a dim light setting or a black background. Or if you need to use these devices in the late evening, then:
- Download free software from the website [f.lux](https://www.f.lux.com) for your computer – this makes your computer emit a warmer light in the evening, with the aim of minimizing disruption to your melatonin production.
- You can also download blue light filter apps for some smartphones and tablets, for example 'Blue Light Filter' for Android.
- Buy a pair of blue-light blocking sunglasses, which can be useful for watching TV or for using a computer, smartphone and so on (again, available from Amazon).
- Make your bedroom as dark as you can: avoid alarm clocks that have a bright display or any other bright lights on electronic devices (or cover them), and if your room is bright in the mornings, invest in black-out curtains, or try a sleep mask.



- If you have to get up in the night, use a dim night-light or torch or low-level lighting instead of switching on a normal light.

### 3. Sleep patterns and duration

The US National Sleep Foundation recommends that the optimal amount of sleep for adults is **7–9 hours**. In fact, it's been found that getting less than 6 hours sleep or greater than 10 hours is associated with greater risk of obesity, heart disease, stroke and diabetes (Liu Y et al, 2013). So, most of us need to aim for at least 7 hours sleep a night: this means planning your bedtime and getting ready for bed well in advance of the time you need to actually be falling asleep. See the section below on 'Preparing for sleep' for more on this.

It's also thought that **consistency** of sleep times and wake times helps with optimal sleep – this means going to bed and getting up at the same time each day. Consistency helps to regulate our circadian rhythm so that melatonin is secreted at the right time. This can be hard to keep to on your days off, but if you are sleeping optimally throughout the week, then you shouldn't have a problem waking up at the same time every day!

Lastly, **what time should you go to bed?** There is a theory that our quality of sleep before midnight is better than after and so we should aim to be asleep by 11pm. Some researchers, however, say this is false and we should simply calculate when we need to be asleep to get our 7 or 8 hours and wake up on time (e.g. if we need 7 hours, and need to be up by 6.30am, then we need to be asleep by 11.30pm).

(<http://www.wsj.com/articles/whats-the-best-time-to-go-to-bed-1412031660>) However, if you are experiencing chronic stress or fatigue, Dr James Wilson – a renowned expert on adrenal fatigue – advises making sure you are in bed and asleep before your 'second wind' of energy hits about 11pm (Wilson J, 2001). This advice could also apply to overtraining syndrome.

### 4. Preparing for sleep

As well as avoiding use of electronic devices before going to bed, the following practices can help prepare you for a good night of sleep.

**The 'brain dump'**. This is especially important if you tend to be a worrier, or if 'buzzing thoughts' keep you awake at night. Worrying in bed can impact subjective assessments of sleep quality (how well people *feel* they sleep) as well as physical measurements such as



heart rate (Weise et al, 2013). Before you go to bed, write down anything that is going through your head – whether it be tomorrow’s to-do list, things you have to remember to take to work in the morning, or just any concerns or thoughts that might be bothering you. This will help clear the mind and aid relaxation.

**Wind down.** Whether stressed/worried or not, taking at least half an hour to wind down before going to bed may be important. This may involve a relaxing activity such as reading or having a bath or shower (see next point).

**Soak your troubles away.** Having a hot bath or shower before bed may help to relax you and improve your sleep. This has been investigated in clinical studies, with one study on nine female volunteers finding that those who had a warm bath or foot bath had shorter sleep onset latency (time taken to fall asleep), reduced body movements during the first 30 minutes of sleep, and participants reported better sleep compared to those who had no bath (Sung & Tochihara, 2000).

Putting Epsom salts (magnesium sulphate) or magnesium chloride flakes into your bath may be especially helpful. Magnesium is a key nutrient for calming the nervous system and for sleep. It’s also essential for blood sugar management, for energy production, for normal muscle function and for electrolyte balance in our cells. Magnesium absorbs well through the skin, and although individual responses to magnesium supplementation and baths vary massively (some people’s serum levels simply do not respond), we have had success with many athletes following magnesium supplementation. Pour 400g of Epsom salts or magnesium flakes into a hot bath and soak for 20-40 minutes. Repeat twice each week.

## 5. Creating the right sleep environment

We’ve seen how keeping your bedroom dark can help you to sleep better. The following are also recommended for improving your sleeping environment.

- Check your room temperature. Either too hot or too cold can affect your sleep. The optimal temperature is between 18–22°C, but it’s whatever feels most comfortable to you. (<http://www.webmd.com/sleep-disorders/features/cant-sleep-adjust-the-temperature>)



- Keep your bed just for sleep (and sex, and potentially reading, if you find it relaxing). Working in bed, watching TV, sending emails, and so on, takes away from the association of your bed with sleep.
- Address noise levels. Being in a noisy environment is one of the most common factors causing sleep disturbances, as any of us with a partner who snores can testify! Do what you can to block or limit noise – use ear plugs or try putting on ‘white noise’ which can be a fan or air conditioning, for example.

## 6. Exercise and sleep

It is important to be active if you want to sleep properly. Physical activity during the day tires you out and makes it more likely your eyes will be closing by the time your head hits the pillow. The US National Sleep Foundation 2013 ‘Sleep in America Poll’ found that people doing any exercise at all were more likely to report having ‘fairly good’ or ‘very good’ sleep compared to those who were doing no exercise (83% vs 56%). Those who did *vigorous* exercise (e.g. running, cycling, swimming or competitive sports) reported having the best sleep.

Specifically, it’s thought that exercise may help sleep by increasing serotonin levels (Melancon et al, 2014), and may also help by affecting body temperature regulation (Atkinson & Davenne, 2007).

### HOWEVER:

- **For some people, exercising too vigorously, too late at night, can negatively affect sleep.** This may be through raising heart rate and body temperature, as well as the stress hormone cortisol. It is best to plan your hardest workouts for earlier in the day, allowing at least 3-4 hours before you hit the sack.
- If your exercise-induced pain and lack of recovery is preventing sleep, then (I can’t believe I’m saying this!) stop intense sessions and try to choose easy, relaxing, non-competitive forms of exercise.

Gentler exercise or stress-relieving exercise can include:

- Walking with friends – talking will also help you get 'out of your own head'
- A light-jog or slow cycle is another great way to get fresh air
- Fishing is not very stressful... (unless you're the fish!)



- Yoga and Tai Chi are commonly cited as being good for stress and having a calming, grounding effect on the mind and body.

## 7. Waking up

How you *wake up* is also important to how rested and restored you feel after a good night's sleep.

Using a standard alarm clock can wake you up in a phase of *deep* sleep. This makes you feel tired and groggy when you wake, and more likely to need a coffee or two to get you going in the morning. We all know that feeling! An alternative is to use an '**intelligent**' **alarm** that wakes you up at an optimal point – your lightest sleep – over a window of time that you set, say 30 minutes. You can buy a wristband for this, but a cheaper alternative is to download a smartphone app such as Sleep Cycle or Sleep Bot on Android or iPhone.

Many people also find a **dawn simulation light** or **alarm clock** helpful. A recent study at University College London found that participants using a dawn simulation light starting 30 minutes prior to waking rated their sleep quality as better and showed improved cognitive and physical performance compared to the control group (Thompson A et al, 2014).

## Nutrition for optimal sleep

### 1. Eating to balance blood sugar and energy

Ensuring a steady supply of energy to your cells prevents blood sugar dips. If your blood sugar drops too low during the night – often as a reaction to too many sugary or refined foods, not eating protein with every meal, or skipping meals – then this causes a release of stress hormones such as adrenaline and cortisol, and this can wake you up.

Keeping your blood sugar on an even keel can also help with:

- Balancing your energy throughout the day
- Preventing cravings for sugary foods or other unhealthy foods (when your blood glucose dips, your body wants a quick sugar fix to push the glucose up again!)
- Coping with or reducing stress levels
- Supporting brain function, concentration and productivity – the brain in particular needs a steady supply of glucose to function optimally
- Supporting proper release of other hormones, including testosterone





- Preventing unwanted weight (fat) gain
- Regulating mood

### **Step 1: Eat protein with each meal**

Protein foods slow the absorption of carbohydrate into the bloodstream, ensuring a steady supply. This is especially important with breakfast. Scrambled eggs on wholemeal toast, good-quality bacon and a handful of wilted spinach is an excellent breakfast.

### **Step 2: Avoid sugary foods, refined carbohydrates and junk foods, and eat mainly unrefined or 'complex' carbs**

Sugary foods and refined carbs such as white bread, pasta and white rice are quickly broken down and absorbed into your blood as glucose. As your blood glucose shoots up, your body releases lots of insulin. The insulin quickly takes glucose into your cells and can leave too little in your blood. This is when your blood sugar dips, causing you to reach for more sugary foods, and causing a release of stress hormones that can wake you up at night.

Unrefined carbs, on the other hand, release their (glucose) more slowly, supporting blood sugar balance and a gradual supply of energy to cells and tissues, to support repair and restful sleep.

These foods include:

- Whole rolled oats (avoid 'instant' oat cereals) and oat bran
- Breads made with whole grains (preferably wheat-free, but avoid packaged 'gluten-free' breads, which are often made from refined flours)
- Root vegetables including sweet potatoes
- Brown rice or other wholegrain rice such as Camargue (red) or wild rice
- Quinoa
- Whole grain pasta – including spelt pasta

**Step 3: Eat regularly.** Skipping meals leads to blood sugar crashes in many people.

Because they cut cravings for sugary and junk foods, eating regular healthy meals can also be a better strategy for fat loss than skipping meals.

## **2. Nutrition for neurotransmitter synthesis**

### **Serotonin**

Serotonin is a neurotransmitter involved with sleep, as well as mood. It's produced in the brain from the amino acid tryptophan. Serotonin may have several roles in sleep, including converting to melatonin, the hormone that regulates our sleep-wake cycle and induces sleepiness. It's known that getting adequate tryptophan in the diet (or supplementation) stimulates serotonin activity and promotes sleep, whereas tryptophan depletion has negative effects on sleep. (Melancon et al, 2014)



Protein is of course made up of amino acids, one of them being tryptophan. But some protein foods are richer in tryptophan than others. Here are some of the best ones:

- Chicken and turkey
- Pork
- Beef
- Lamb
- Game meats
- Fish
- Cheeses – especially mozzarella, parmesan and Swiss cheese
- Seeds: sesame seeds (and tahini), pumpkin seeds and chia seeds

These foods do not need to be eaten in the evening – they can be eaten throughout the day to build up your tryptophan stores. Contrary to popular belief, bananas are not high in tryptophan, but they may help sleep because of the carbohydrates and vitamin B6 they contain.

### **Carbohydrates and Serotonin**

Carbohydrates – such as those found in bananas – make tryptophan more available to the brain. The release of insulin stimulated by the carbohydrate intake removes other amino acids from the blood, so they don't compete with tryptophan to enter the brain (Halson, 2014). So, to support the best sleep, make sure you have *some* carbohydrates (preferably the slow-releasing ones, as described above, to prevent blood sugar spikes and dips) with your protein foods, especially in the evening.

### **Co-factors for production of serotonin**

We also need several vitamins and minerals for serotonin production. These include vitamin B6 folate (folic acid), vitamin C, magnesium, zinc and iron. These nutrients act as 'co-factors' for the enzymes that convert tryptophan to 5-hydroxytryptophan and then to serotonin. Vitamin B6 may be especially important; supplementing vitamin B6 increases blood serotonin levels (Coleman et al, 1979). Foods containing higher amounts of vitamin B6 include potatoes, liver, tuna, turkey, beef, sunflower seeds, pistachio nuts, fish and bananas.

### **Melatonin**

Melatonin is found in small amounts in specific foods. These include walnuts, and especially tart Montmerency cherries. In a recent trial on 15 people with insomnia, tart cherry juice was found to support sleep, producing significant reductions in insomnia severity compared to the placebo drink (Pigeon, 2010). Other studies have shown melatonin-rich dietary supplementation, from foods including tart cherries, to increase melatonin levels and improve sleep (Garrido et al, 2010; McCune et al, 2011)



Melatonin combined with zinc and magnesium has been seen to improve sleep (Rondanelli, et al, 2011), and then support concentration throughout the day!

### **Another important amino acid: Glycine**

Glycine is an amino acid that acts directly as an *inhibitory* neurotransmitter. This means that it stops your nerve cells over-firing and counteracts the action of stimulating neurotransmitters, giving a calming and balancing effect. Glycine has been shown to improve sleep. A trial carried out in Japan on volunteers with poor sleep found that taking 3 grams of glycine before bed improved subjective sleep quality and reduced sleepiness during the day (Yamadera et al, 2007). According to a study on rats, glycine may also increase levels of serotonin (Bannai et al, 2011).

## **3. Nutrition for the nervous system: magnesium and zinc**

### **Magnesium**

Magnesium is one of the most important nutrients for nervous system function. As we saw above, it's also essential for blood sugar management, energy production, normal muscle function and electrolyte balance in our cells. It is also one of the cofactors for serotonin production from tryptophan. It's known that physical exercise can deplete magnesium; and that magnesium intake in a standard diet is often less than optimal (Bohl et al, 2002).

As well as its general role in nervous system support, magnesium may have direct benefits for sleep. It's thought that magnesium can stimulate inhibitory (i.e. calming) neurotransmitter systems such as GABA, and adequate levels may be necessary for proper function of the pineal gland, which secretes melatonin (Barker, 2004). Studies in mice and rats have found that higher levels of magnesium in the brain promotes sleep quality (Chollet et al, 2000) and that a magnesium-deficient diet is correlated with disorganised, light sleep (Deepoortere et al, 1993).

Magnesium-rich foods include pumpkin, sesame and sunflower seeds; green leafy vegetables such as spinach and chard; quinoa and buckwheat (which are gluten-free 'pseudo-grains'); and dark chocolate!

Taking magnesium supplements in a dosage of 200–300mg in the evening may help to improve sleep quality too (Barker, 2004).

### **Zinc**

Like magnesium, zinc is a co-factor for serotonin production; and it has been found to support melatonin production too. A study on rats found that those given zinc



supplements had higher plasma melatonin levels, and those that were fed a zinc-deficient diet had a decrease in melatonin (Bediz et al, 2003).

Zinc supplementation may also effectively treat muscle-cramps, possibly by regulating nervous activity (Kugelmas 2000).

Zinc-rich foods include oysters, liver, sesame and pumpkin seeds, beef, lamb and prawns.

#### **4. Eating patterns – *when* to eat**

This may be obvious to some, but it's worth mentioning anyway. Eating a big meal just before bed is *not* good for your sleep. The first part of digestion in particular requires quite a lot of energy, at a time when the body's energy should be going towards repair and recovery. If you are having a larger meal in the evening, this should be at least three to four hours before you plan to go to bed. Or two hours for a lighter meal. A snack can be eaten later in the evening if you need to get in some extra calories or protein for recovery, or if you find it helps you sleep.

#### **5. The effects of stimulants and alcohol**

This may also be obvious, but alcohol and stimulants such as caffeine can easily affect your sleep. Even if you *think* they don't affect you, and you are sleeping for seven or eight hours, your sleep quality is likely to be sub-optimal if you are over-consuming either of these substances.

When it comes to **caffeine**, it's often recommended not to consume any after about 2pm. However, this is very dependent on the individual, so if you have a cup of coffee after this time and find that you are still sleepy at bedtime, not waking up in the night, and feel rested when you wake, then it may not affect you to a great extent. However, overdoing caffeine can push up your levels of stress hormones, which can impact recovery – so it's not recommended!

**Alcohol** consumption may put you to sleep faster, but your sleep *quality* will be reduced.

A recent review of scientific studies on the effects of alcohol on sleep found that any alcohol consumption causes sleep disruption in the second half of the night and delayed onset of REM sleep; and moderate to high doses of alcohol decrease the percentage of REM sleep over the whole night (Ebrahim et al, 2013). This is significant because REM sleep – together with deep sleep – is one of the more restorative phases of the sleep cycle. To optimize your sleep, we would recommend sticking to one to two drinks and to stop drinking at least 1.5 hours before you go to bed.

#### **6. The importance of hydration**

If you're doing lots of physical activity, you're probably already paying attention to hydration, but it's another factor that's important to mention anyway. Proper hydration is important for bringing oxygen and nutrients to all our cells and for removing waste



products – so it's essential for repair and renewal. Adequate hydration is also necessary for body temperature regulation during sleep. General guidelines for water intake are, of course, 1.5 to 2 litres a day, but this can increase as your exercise or physical activity level increases.

### Supplement: R5 Aminos

**R5 Aminos** is a blend of amino acids, vitamins, minerals and botanicals designed to support regeneration, recovery, restoration, repair and rejuvenation, as well as encourage good sleep. Ingredients include the amino acids glycine and 5-HTP (the 'intermediate' amino acid between tryptophan and serotonin), the all-important minerals zinc and magnesium, and vitamins B6, folic acid and vitamin C. **R5 Aminos** may also help to:

- Support collagen production, to aid tissue repair and rebuilding
- Optimize testosterone release
- Support muscle mass and strength
- Support production of glutathione, a vital antioxidant molecule that neutralizes free radicals produced during exercise, allowing faster recovery times
- Have independent antioxidant activity, and support other antioxidant enzymes
- Support metabolism

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