

Getting a good night's sleep should be as important to a triathlete's training as the swim, bike and run



Power Napping

Sleep is paramount to a triathlete's recovery and, as **Emma-Kate Lidbury** explains, you should never underestimate its importance



Emma-Kate Lidbury is a journalist and age-group athlete who recently won bronze at the World Tri Champs (25-29)

We spend up to a third of our lives doing it and in any triathlete's training programme it should be considered as important as swimming, cycling and running.

But sleeping – that vital time when our bodies adapt, rest and recover from the training we put it through – is often the first thing to suffer in our hectic daily lives.

Balancing training with work and family commitments means something has to give and that can often be sleep. But how many of us would be so willing to have a string of late

nights if we really knew the impact it was having on our training and performance?

According to the English Institute of Sport's physiologist Charlie Pedlar, sleep is a complex physiological process that scientists are only just beginning to understand.

He says its importance shouldn't be underestimated, particularly for the endurance athlete when the key to successful training and performance is a balance between physical work and subsequent recovery.

"We do know that when you're asleep, there is a clear alteration in the activity of the brain," adds Pedlar. "There are also changes in the levels of some hormones. For example, growth hormone is released during the deeper stages of sleep. It is a highly restorative process."

The body needs this time to repair and recover from the training demands of the

day. But how much sleep is enough to maximise your exertions?

Academics at Loughborough University's Sleep Research Centre recently undertook a study involving 400 men and women, aged 20 to 70, which found that women generally slept an average of seven-and-a-half hours daily – about 15mins longer than men.

Experts deem this amount of sleep adequate, but studies also show that it's possible for the average adult to have six hours' sleep a night without suffering any long-term significant psychological or physiological damage as a result.

Binge sleeping

Professor Jim Horne, Director of the Sleep Research Centre, has a "core and optional" sleep hypothesis, which states that much like food intake, there's a critical value of sleep that we need to survive. However, much like

“Much like food intake, there is a critical value of sleep which we need to survive”

overeating, we can indulge ourselves in more sleep than is necessary – a Sunday morning lie-in just because you can, for example.

The amount of core sleep that we each have will obviously be determined by lifestyle. Those with rushed, hectic lives might consider themselves lucky to have seven hours' sleep a night. Indeed, when Margaret Thatcher was Prime Minister, she reportedly got by on four hours a night, which a triathlete in training could not.

Experts argue about the optimum amount of shut-eye an athlete needs, with figures varying from eight up to 14 hours a night, but most agree on sleeping until you're 'slept out'; that is, sleeping until you awaken in the morning feeling refreshed and as though you couldn't sleep any longer.

A triathlete obviously places far greater demands on his or her body than the average adult and so, as a result, he or she will clearly need more sleep.

Mid-afternoon regeneration

Pedlar, who has worked with a number of athletes to improve their sleep, says: “We know exercise has a profound impact upon sleep. Up to a point, the more you ask your body to do in the day, the more sleep is required to recover. This is why endurance athletes in particular generally need more sleep. However, excessive exercise can actually disrupt sleep, so it's important to strike a balance.”

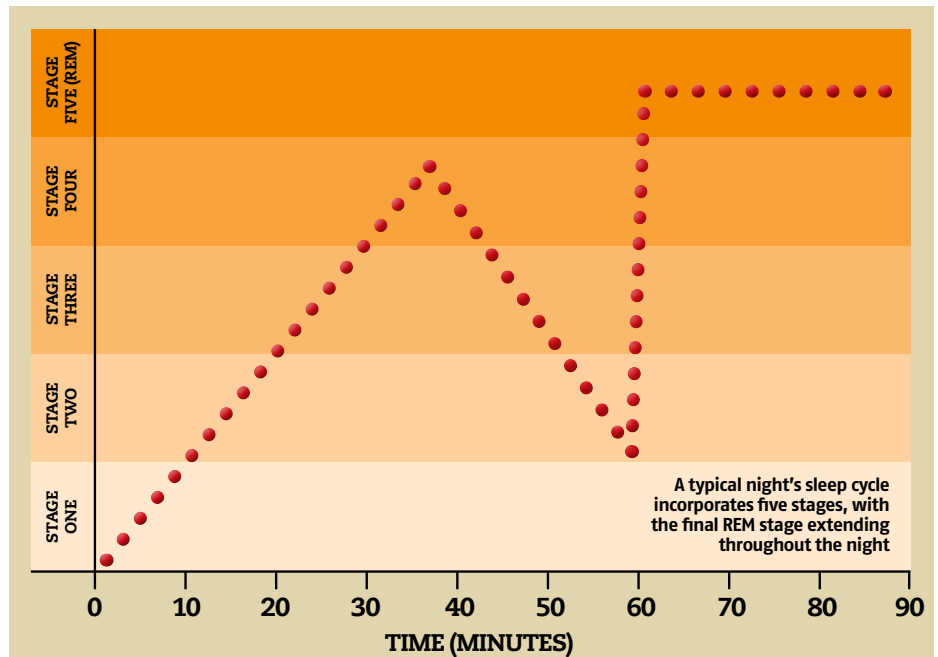
Horne says humans are designed for two sleeps a day – the main one at night and a nap in the afternoon.

He continues: “This explains why people in warmer parts of the world have an afternoon siesta, and why the rest of us are likely to be sleepy at this time. People who increase their nighttime sleep find that this afternoon ‘dip’ disappears. However, a 10min nap at lunchtime is just as effective.”

Double Olympian triathlete Michelle Dillon says she builds power naps into her daily routine. “I have power naps every day. They can be anything from an hour upwards depending on what time I got up and which phase of training I'm in.”

Dillon aims to sleep for about eight hours a night but usually only gets between six to seven. “I find sleep makes a big difference to my performance in training and races. If I'm not feeling alert mentally, I'm not responding as I would like to physically.”

Paula Radcliffe is known to sleep up to 14 hours a night in a bid to ensure she is



Stages of sleep

There are five recurring stages to the sleep process.

During stage-one sleep, the eyes are closed, but if disturbed from it, a person may feel as if he or she has not slept. This can last for five to 10mins.

Stage two is a period of light sleep when the heart rate slows and body temperature decreases. The body is now preparing to enter deep sleep.

Stages three and four are the deep-sleep stages, with stage four being more intense than three. Stages one to four are known as periods of non-

REM (Rapid Eye Movement) sleep. Together the stages last up to 90mins, with each stage taking five to 15mins to complete.

Stages two and three repeat backwards before the fifth stage, REM, begins, which means a normal sleep cycle would take this pattern: stage one, two, three, four, three, two, REM.

REM brings changes in the body's physiological state including, as the name suggests, rapid eye movements. Heart rate and respiration speed up and become erratic while the face,

fingers and legs may twitch. Intense dreaming occurs as a result of heightened brain activity. The first period of REM typically lasts 10mins, with each recurring REM stage lengthening and the final one lasting an hour.

The five stages of sleep, including their repetition, occur cyclically. The first cycle, which ends after the completion of the first REM stage, usually lasts for 100mins. Each subsequent cycle lasts longer, as its respective REM stage extends. So a person may complete five cycles in a night's sleep.

fully recovered and rested from one day to the next. With an athlete of Radcliffe's calibre sleeping so much, it's clearly of interest to know what happens to our bodies overnight.

Sleep science

While awake, the body burns oxygen and food to provide energy, at which time more energy is spent than conserved. In this state, stimulating hormones, such as adrenaline and natural corticosteroids, are dominant.

However, when we sleep we move into a different state in which energy conservation, repair and growth take over. Levels of adrenaline and corticosteroids drop and the body starts to produce human growth hormone (HGH).

HGH, the muscle-building hormone that plays the biggest role in rebuilding tissue after exercise, requires sleep for full

Jargon Buster

Human growth hormone A protein hormone that stimulates growth and cell reproduction.

Adrenaline The 'fight or flight' hormone which boosts the supply of oxygen and glucose to the brain and muscles.

Corticosteroid A type of steroid hormone.

Cortisol Known as the stress hormone, it increases blood pressure and blood-sugar levels.

Amino acids The building blocks of protein.

Alpha-lactalbumin A natural protein source containing high tryptophan levels.

Tryptophan An essential amino acid that increases brain levels of serotonin and melatonin.

Serotonin A calming neurotransmitter that allows numerous functions in the body, including the control of appetite, sleep and mood.

Melatonin A sleep-inducing hormone.

Placebo A substance containing no medication, given to reinforce a patient's expectation to get well.

activation. It promotes the growth, maintenance and repair of muscles and bones by facilitating the use of amino acids, the essential building blocks of protein. Every tissue in the body is renewed faster during sleep than at any time when awake.

Although you may move up to 35 times a night in your sleep, muscles remain relaxed, thus providing the opportunity for tissues to be repaired and restored. That said, research has shown that muscles might receive just as much relaxation and repair during rest, and that a state of unconsciousness isn't necessarily needed for this to take place.

Lack of sleep slows recovery time from one session to the next; poor sleep night after night will take its toll on the quality and volume of training your body can undertake.

"It has been said that the winning athletes aren't those that train the hardest, but those

who recover the most effectively," says Pedlar. "Training is all about recovery. Each training session causes damage to the body, which must be repaired. Over time, if recovery is inadequate, the body eventually breaks down."

A sleep-deprived athlete may suffer from higher blood pressure, a weaker immune system, delayed reaction times, an impaired ability to use glucose and increased levels in the stress hormone cortisol.

But what if you're a poor sleeper? Is there anything you can do to improve a night's kip?

Experts talk about sleep hygiene when looking at the factors that affect the quality of sleep. This refers to taking certain measures to ensure you do everything you can to have a restful night's sleep. For example, making sure the bedroom is dark and quiet, and

steering away from caffeine and alcohol four to six hours before bedtime.

Alan Wales, a researcher at Loughborough's Sleep Research Centre, says avoiding training up to four hours before sleeping is also good practice, although this might be tough if you need to squeeze in a training session on a weeknight after work. And despite the many reported benefits of power naps, he says they should last no longer than 15mins.

"After this time you enter the deeper stages of sleep and this impacts on your nocturnal sleep need," he says.

Avoiding large meals before retiring for the night is also recommended because when we sleep the digestive system slows down to a sluggish pace. Our inactive state will prevent enzymes and stomach acids from converting food to energy, leaving you feeling bloated, which is why many experts suggest eating your main meal at lunchtime if possible.

Sweet dreams

It seems, then, that there are plenty of things to avoid before bedtime, but what about products that will aid sleep and recovery?

Science in Sport (SiS) produces a nighttime drink for athletes called Nocte. It has been designed to improve sleep, aid recovery and boost adaptation following exercise. It claims to be particularly useful in aiding recovery overnight after hard exercise or during periods of intense training.

It contains alpha-lactalbumin, which is a natural protein source with the highest tryptophan levels. Tryptophan is one of the essential amino acid building blocks of protein, which is used directly to synthesise serotonin and the sleep hormone melatonin and bring about a hypnotic effect.

Milk, however, isn't good as a bedtime drink. It has a relatively low tryptophan content and contains large amounts of calcium that can reduce zinc and magnesium uptake, which are important minerals for sleep, growth and recovery.

But, expert advice aside, there are very few of us who will go through life without suffering from some kind of sleep complaint.

Insomnia is widely regarded as the most common sleep disorder, and can be caused by a number of things from anxiety and stress through to caffeine or depression.

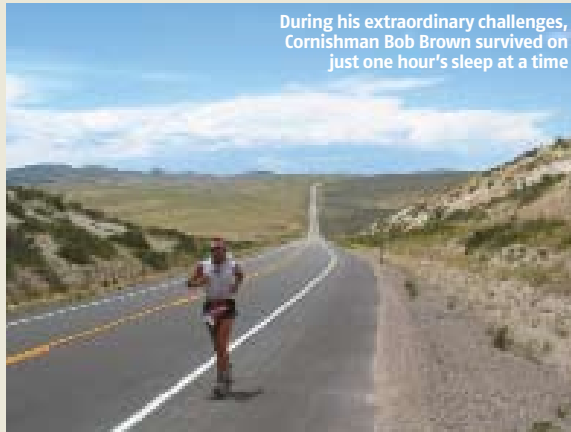
Although intense exercise late at night can cause sleeplessness, it's thought that regular exercise can help improve sleep for insomniacs. Most people with chronic insomnia have increased levels of stress hormones in their blood. The higher your stress hormone levels, the less you sleep.

Exercise initially increases such stress hormones. But several hours afterwards, a rebound effect occurs and stress hormones decrease to a level lower than if you hadn't



Ultra-endurance hallucinations

Bob Brown won the 2004 'Run Across America' (pictured), a 3,100-mile run from California on the East Coast to New York on the West. He also holds the British record for completing the Deca Ironman (10 Ironmans in a row) in a time of eight days, six hours and 14 minutes, but it was a record which saw him break pain barriers he never knew existed. Learning to cope with sleep deprivation was a key part of his preparation.



During his extraordinary challenges, Cornishman Bob Brown survived on just one hour's sleep at a time

Q How much sleep did you have during your exploits?

A I knew the maximum amount of sleep I was going to get in one go during the race would be an hour, so I trained my body to cope with that.

Q How?

A I used to go to bed at night at 10pm and set my alarm for 11pm. When I woke up at 11pm I would then set my alarm for midnight, wake up at midnight and then set my alarm for 1am. I would do this all night until it was time for me to get up. After six weeks I didn't even need an alarm. My body clock had adjusted to sleep for exactly one hour.

Q Did this work in the race?

A My plan had been to have a sleep between 4am and 5am each day during the race but I often found by 2am I could barely keep my eyes open so would stop early for my sleep.

Q Did you suffer as a result of this sleep deprivation?

A Yes, definitely. I started hallucinating towards the end of the race. The trees had faces and I saw William Shakespeare's face in the sky. I remember with 1km to go I passed a telephone box. I called my mum and dad in England. But I was unable to talk. I was too overcome with emotion and felt on the verge of blacking out.

Q Did you ever have to take anything to help you sleep?

A I took a lot of painkillers to help me cope with various complaints – so many, in fact, that my health suffered afterwards.

Q And how were you feeling after the race?

A When I crossed the finish line I just stood there in tears. My mind was fuzzy with a deep-rooted fatigue. I could not think anymore. I could not move anymore. I was eventually carried to my sleeping bag, where I instantly fell into the deepest sleep of my life. It took me a good two years to recover from that feat.

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exercised. The time it takes for stress hormones to decrease following exercise varies depending on the individual and the intensity of the activity. In general, it takes four to six hours after high-intensity exercise before stress hormones decrease. But vigorous exercise during the day and mild exercise at bedtime will not only help you fall asleep and stay asleep more easily, it will also increase the amount of time you spend in the deepest stage of sleep.

Obviously, pre-race nerves can affect a triathlete's sleep, too, but nervous athletes will be relieved to hear Wales' findings: “If you suffer anxiety from a lack of pre-race sleep, it should come as some comfort to realise that lack of satisfactory sleep doesn't

impair your body's ability to perform at its optimum. If an athlete has been prescribed hypnotics to sleep – as many sports people are – these work by reducing anxiety, as well as having an obvious placebo effect.

“Insomniacs are generally self-labelled individuals who suffer from undue stress and worry over quality and quantity of sleep, and complain of fatigue attributable specifically to a lack of nighttime sleep. But keeping a regular routine and following the common-sense principles of sleep hygiene will ensure that you feel suitably refreshed and capable of dealing with the training loads that triathlon demands.” ■

Find out more

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