



# THE TRUTH ABOUT TESTOSTERONE

**Testosterone fuels everything from your muscle growth and sexual performance to your mental focus, but many men are unaware of their declining hormone levels. So how can you test yourself? And can natural dietary and lifestyle upgrades keep you on track?**

Words Mark Bailey

Testosterone has acquired a dark reputation. You read about it in the news whenever an athlete like sprinter Justin Gatlin or cyclist Lance Armstrong is caught taking illegal steroids, which mimic the performance-boosting effects of natural testosterone. You see TV reports about drug abuse in gyms, with a 600% surge in the use of testosterone-aping steroids in some parts of the country. Even medical reports tend to have a negative slant: researchers have linked abnormally high levels of testosterone with everything from infidelity to aggression. The primary male sex hormone has unhelpfully become synonymous with toxic behaviour – the sinister hormonal force behind every reprehensible act committed by a male, from misogyny to sexual assault.

But testosterone – which is produced in the testes and regulated by the hypothalamus and pituitary gland – is as natural and functional as the skin on your face, the bones in your legs, the rhythmic beating of your heart, and the muscles in your arms. Indeed, it plays a vital role in all those body parts and more. The illegal use of testosterone-mirroring drugs, rare cases of supra-physiological (higher than normal) levels of testosterone, and wanton criminal or antisocial behaviour should never blind anyone to the truth that this hormone is essential to the active and emotional life of every man on Earth.

“The headline function of testosterone is in the growth of the testes and prostate and in the development of the primary sexual characteristics of men,” explains Dr



Clive Morrison, a specialist in genitourinary medicine, sexual health and diabetes at the Centre For Men's Health. "It also has anabolic [tissue-building] effects on muscle mass and strength, as well as on bone mass and strength. It affects the vitality of the penis and testes and secondary sexual characteristics such as voice and body hair."

But it's not just about muscles and sex. "With low testosterone, you can suffer from poor cholesterol, high blood pressure and abdominal obesity; physical problems like sleep disturbances; and psychological effects like irritability, low mood, poor self-esteem and poor concentration. I haven't found an organ that hasn't got some connection to testosterone. The biggest organ in the body is the skin and with low testosterone you can even get dry skin around the face."

As testosterone is involved in every aspect of a man's existence, low testosterone is an important medical issue but one that's often overlooked. The British Society for Sexual Medicine (BSSM) says symptoms can range from erectile dysfunction to depression, loss of verbal memory and a higher risk of osteoporosis. The NHS also highlights the growth of "man-boobs" (gynaecomastia). "It can even be a cause of anaemia," says Morrison. "Everyone assumes it is down to a vitamin deficiency or low iron but some cases can be down to low testosterone because, in a convoluted way, it stimulates the bone marrow to make blood cells. And there is a clear link to insulin resistance: low testosterone affects about 5% of men but for men with diabetes it is 40%. We think it's because the testosterone and insulin receptors develop a similar resistance."

### LIFE ITSELF

Testosterone levels can even influence longevity. A ten-year Australian study showed that normal testosterone ranges are associated with lower all-cause mortality. Dr Daniel Kelly, an endocrinologist and lecturer in biochemistry at Sheffield Hallam University, researches how testosterone influences cardiovascular disease and diabetes. "There are testosterone receptors all over the body so it has many different functions," he says. "We know that testosterone can influence obesity, type 2 diabetes and cardiovascular disease, so much so that low testosterone is now considered an independent risk factor for heart disease and related conditions."



**Testosterone's anabolic properties mean it's key to building muscle mass**

We have shown in our research that testosterone significantly affects the way sugars and fats are used within the body, and that these metabolic benefits can reduce the risk of developing atherosclerosis – the underlying cause of heart disease."

Testosterone is especially important for athletic men who depend on strength and stamina. The BSSM's guidelines identify decreased muscle mass and reduced spatial performance as symptoms of low testosterone – obvious problems for athletes. "Testosterone is an anabolic hormone which means that it is able to construct molecules from smaller units by activating a set of metabolic pathways," says Kelly. "This is particularly important with regard to building muscle in athletes."

Dr Emil Hodzovic of the consumer blood-testing service Medicecks is a practising emergency doctor who also

works as a sports and nutrition coach, trains as a competitive bodybuilder, and competes in MMA and strongman events. "Healthy levels of testosterone support muscle gain, fat loss and increased strength, which are obviously desirable traits in athletes and gym-goers," he says. "Testosterone also promotes red blood cell production, which can aid in endurance performance. Low testosterone can also leave your recovery impaired which will affect training intensity and frequency." This means frequent exercisers may notice the effects of dwindling testosterone levels sooner than men who don't train – when they feel tired earlier than usual during a gym session, for example, or if it takes them longer to recover.

### LOW PROFILE

The number of men suffering from low testosterone levels – which is usually

caused by a problem in the testes, hypothalamus or pituitary gland – is thought to be only 2-5%. According to the European Male Ageing Study (EMAS), 2.1% of men suffer testosterone levels below the accepted medical norm. However, research published in the *Journal Of Clinical Endocrinology And Metabolism* suggests that as many as one in four men now have low testosterone levels – although only 5% experience the symptoms linked to the deficiency.

Three trends are now becoming clear. First, testosterone levels are dropping. A major US study published in the *Journal Of Clinical Endocrinology And Metabolism* in 2007 indicated there had been a 17% decline since the 1980s, and predicted a 38% increase in low testosterone rates by 2025. Explanations range from the decline in manual labour (physical activity

**17%**

**Decline in testosterone levels in men between the 1980s and 2007, according to a US study**

**38%**

**Predicted increase in cases of low testosterone rates from 2007 to 2025**

is proven to raise testosterone levels) to tighter underwear, testosterone-wrecking pesticides and rising obesity levels.

Second, while testosterone levels drop naturally and harmlessly as you age, it is now accepted that it is not natural for those levels to dip below the accepted norms. According to the NHS, "the decline is steady at less than 2% a year from around the age of 30 to 40, and this is unlikely to cause any problems in itself." Around 75% of men maintain normal testosterone levels into old age. But if your levels dip below the normal range, it's a genuine medical issue, not the inevitable result of age.

And third, normal testosterone levels are directly associated with good general health. In one study, 30% of overweight men had low testosterone, compared with only 6.4% of those with normal weight. Kelly says a decline "is often considered a factor of ageing, but it may also be caused by obesity and comorbidities [related conditions] as these problems also increase with age. Staying fit and healthy will retard the decline in testosterone."

### FLIRT WITH SUCCESS

For most men, the right lifestyle, exercise and diet will allow you to maintain healthy testosterone levels throughout your life. Research has revealed some unexpected ideas. Flirting seems to help: one study found that when heterosexual men enjoyed a five-minute conversation with an attractive woman, it caused their testosterone to jump by 300%. On the other hand, eating liquorice has been shown to lower testosterone levels.

There are smarter ways to boost your testosterone. "The important thing is not to be overweight," says Morrison. "There is also evidence that overconsumption of carbs will store fat in the liver which increases insulin and testosterone resistance." Kelly agrees weight is a major factor. "Fat contains an enzyme which can convert testosterone into the female sex hormone, oestrogen, reducing circulating levels of testosterone."

A study published by the Endocrine Society found that when 900 overweight men shed fat, the rates of low testosterone dropped by 50%. But a balanced dietary approach is always best. "Any extremes in diet can impair testosterone production," says Hodzovic. "This includes chronic under- or overeating, for example in severe prolonged calorie restriction or being overweight or obese."

Hodzovic suggests some key dietary upgrades. "Certain vitamins and minerals are essential for healthy testosterone levels. These include magnesium, found in green leafy veg, nuts, legumes and fortified cereals; and zinc, found in red meat, poultry, oysters, nuts and grains." Research published in the journal *Nutrition*





Photography Corey Jenkins, Getty, iStock

found that zinc restriction was associated with a significant decrease in testosterone. "Also vitamin D, which is mainly found in fatty fish but also beef, liver, cheese, egg yolks and certain mushrooms," says Hodzovic. A study in *Hormone And Metabolic Research* showed that vitamin D supplementation can positively boost testosterone levels. Cruciferous vegetables like broccoli and cauliflower also contain the phytonutrient indole-3-carbinol (I3C), which helps the body eliminate estradiol, a testosterone-damaging oestrogen.

"Avoiding diets high in nutrients that may cause inflammation, such as those with a high glycaemic index and high trans fat content, while choosing those associated with reducing inflammation – like fruits, vegetables, legumes, and grains – may help," says Hodzovic. "And not only does alcohol disrupt sleep, it can also independently drop testosterone levels."

Weightlifting is one of the most powerful natural ways to boost testosterone. According to the University

**Vitamin D deficiency is linked to low testosterone, so top yours up by getting outside in the middle of the day**

of Connecticut, lifting heavy weights at 80–85% of your one-rep max is best. Compound movements like squats, snatches, deadlifts and chin-ups are the most effective testosterone triggers, according to Pennsylvania State University research. A study published in the *Journal Of Strength And Conditioning Research* suggested shorter rest intervals of around 60 seconds can help provide a bigger hormonal kick. And high-intensity interval training (HIIT) also delivers a testosterone spike, according to the *European Journal Of Applied Physiology*.

"Sleep is probably one of the most underrated testosterone boosters – getting less than seven to nine hours each night will have a negative impact on testosterone levels in as little as a week," adds Dr Hodzovic. A University of Chicago study found that men who averaged five hours of sleep experienced a 10–15% drop in testosterone the following day. It is also worth checking the labels on your plastic containers, drinks bottles and moisturisers

**'COMPOUND MOVEMENTS LIKE SQUATS, SNATCHES AND DEADLIFTS ARE GOOD TESTOSTERONE TRIGGERS'**

for phthalates – a chemical that has been shown to reduce testosterone levels.

### TESTES TEST

For anyone concerned about their testosterone levels, tests and treatments are available. According to the NHS, late-onset hypogonadism – when the testes don't produce enough hormones – is "an uncommon and specific medical condition that's not a normal part of ageing". The official advice is that if you experience symptoms such as mood swings, fat gain or poor concentration, visit your doctor. You can also gauge your symptoms using online tests: the Centre for Men's Health's has an online questionnaire about testosterone deficiency syndrome, while the Sexual Advice Association has a ten-question ADAM (androgen deficiency in the ageing male) test on its website.

If you suspect you could have low testosterone, your GP can order an NHS blood test. "Blood testing is the only way to be sure of what your testosterone

levels are," says Hodzovic. "This test can be done with your GP, though there can sometimes be some resistance and usually the test will only be performed if you are obviously symptomatic of low testosterone." Morrison says doctors are not always knowledgeable about testosterone. "Testosterone has only been examined for 20 years which in medical terms is a blink of the eye," he explains. "Generally, if your test comes back as over 12 nmol/L, they will say it is normal as they are not comfortable starting testosterone treatment. If it is under 12, you will see a consultant. But even if your testosterone is below six you might be dismissed."

What represents a "normal" level is open to debate. In general, a normal testosterone level for men under 40 is 12–38nmol/L and for men over 40 it is 8–24nmol/L. According to current BSSM guidelines, anything over 12 is normal, but anything lower than eight might require treatment. "This can be a controversial area in the UK and the guidelines could be considered restrictive, leaving symptomatic individuals with borderline levels untreated," says Hodzovic. "In cases like these, your GP may refer you to a specialist or you may need to seek a second opinion."

Consumer tests are now available through companies like Medicecks and can be ordered online or bought from stores like Boots. You simply take a finger prick of blood and send it off to the lab for analysis. Medicecks offer a basic Testosterone Test (£29) as well as a broader Male Hormone Check (£59), which also tests for "free" testosterone and related sex hormones. "Free testosterone is the active, bioavailable testosterone that is free to bind and act

on the receptors," explains Hodzovic. "If a large amount of your testosterone is bound to carrier proteins, you could have a normal total testosterone level but actually have very little available to your cells."

The Centre For Men's Health also offers advanced blood tests as part of its comprehensive men's screening package (£215), which also checks free testosterone levels. "It would cost thousands of pounds to test for that, so we do a special calculation using sex hormone binding globulin and other factors to assess your free testosterone level," says Morrison. "It is also good to see any changes: if you are at 13nmol/L but used to be at 26, your level has halved, so that is still a possible problem for you, which is why many men now visit private practices."

For anyone found to have low testosterone, treatments are available in the form of tablets, patches, gels or injections. "Testosterone therapy is a legal therapy in the UK under prescription from GPs and clinical endocrinologists," says Kelly. "Currently, testosterone is primarily used to treat testosterone deficiency and hypogonadism, where a patient has low testosterone levels and symptoms of low testosterone." According to a summary by the BSSM of the latest research, this treatment is effective at improving issues such as depression, high cholesterol, high blood pressure, lean muscle development, sexual desire, erectile function and bone density.

### RUN THE RISK

Morrison points out that respectable medical providers will only ever seek a return to normal levels of testosterone – never higher. Illegal testosterone use or steroid abuse is potentially catastrophic. "The danger of using your own methods and going to supra-physiological levels include high blood pressure, blood clots, an increased risk of stroke and heart attacks, artery damage and higher cholesterol levels, as well as psychiatric effects such as aggression," he says. Anabolic steroids even shut down secretions from the pituitary gland, which ironically decreases the testosterone produced naturally in the testes.

The truth about testosterone is much more nuanced and positive than public discussion often allows. While some medical quacks falsely promote it as the magic bullet for every male crisis, from poor sex drive to depression, at the other end of the spectrum many men with low testosterone levels have been unfairly ignored and still suffer in silence. Now a healthier and more balanced awareness is growing. For most men, a healthy diet and training regime will help keep their testosterone levels flying high. For the unlucky few, help is available.

**'FOR MOST MEN, A HEALTHY DIET AND TRAINING REGIME WILL HELP KEEP THEIR LEVELS HIGH'**