
THE BOOK OF ERECTIONS

— The Penis: A User's Guide —

*Everything you ever needed to know about erections and
how they work, why they sometimes don't,
and what to do to keep them healthy.*

numan

A BOOK TO KEEP YOU UP AT *night...*

The Book of Erections
is a user's guide to
the male penis.

322 million men worldwide are expected to have experienced erectile dysfunction by 2025 and this educational, taboo-busting guide contains everything you ever needed to know about erections; how they work, why they sometimes don't, and what to do to keep them healthy.

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A PENIS, CONTRARY TO POPULAR BELIEF, IS NOT A MUSCLE, ALTHOUGH IT DOES CONTAIN A UNIQUE MUSCULAR STRUCTURE WHICH PLAYS A KEY ROLE IN THE PROCESS LEADING TO AN ERECTION.



CHAPTER 1

THE ANATOMY OF AN ERECTION

THINK OF A PENIS LIKE A *balloon*.



When it's empty, it's unstructured and floppy. If you fill it with water, it becomes firm and gains structure as the walls stretch and widen out.

Here the similarities end. A penis will not burst or float away, and it is rarely a welcome addition to a party.

A penis, contrary to popular belief, is not a muscle, although it does contain a unique muscular structure which plays a key role in the process leading to an erection.

In this chapter we will examine the anatomy and physiology of an erection in detail and why, when it comes to getting hard, it pays to be relaxed.

AN ERECTION IS LIKE A *reflex*

An unconscious reaction to a gentle touch, a sweet nothing in your ear, an erotic image on your laptop or the power of your imagination.

The muscular tissue in the penis is truly unique, specialised to fill with blood in response to an involuntary pathway, essentially an unconscious action like a reflex. This can be activated by:



Touch



Audio



Visual



Fantasy

Erections happen as a result of relaxation of the arteries and the spongy, muscular tissue in the penis. As these open up, the penis fills with blood which gets trapped there, and it thereby becomes hard.

AN ERECTION HAS MORE IN COMMON WITH A REFLEX, AN INVOLUNTARY RESPONSE, WHICH MAKES IT MUCH HARDER TO CONTROL OR RELY ON.

Compare this to the muscles we can use at will, such as flexing a bicep or giving someone the finger when they cut you up in traffic. An erection has more in common with a reflex, an involuntary response, which makes it much harder to control or rely on.

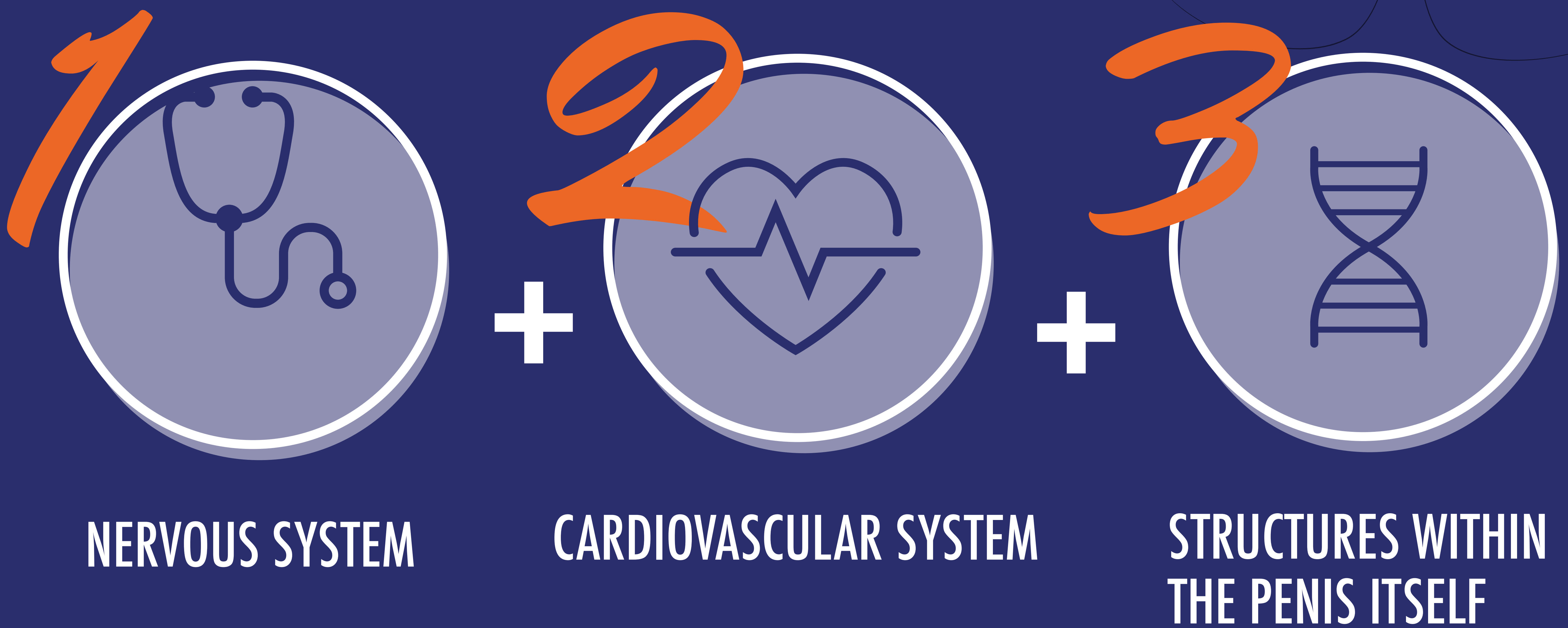
When this process is triggered, a signalling molecule called cGMP is synthesised. It is this molecule which signals to the muscular tissue in the penis to relax and fill with blood, and an erection — whether you wanted one or not — to materialise.

An enzyme called PDE5 is normally around to break it down and, as a result, your erection subsides. Now for the clever bit: medication such as sildenafil (Viagra) and tadalafil (Cialis) blocks this enzymatic reaction - leaving more cGMP intact - making for a harder, longer-lasting erection. These medications are known as PDE5 inhibitors.



THREE MAIN SYSTEMS IN THE BODY

need to coordinate for an erection to happen:



Like a good three-piece band, all players need to be working well and in unity. A drunk drummer or absent bassist can spoil the show. Or, in this context, your bedroom performance may be below your usual standards, or your erection may not turn up at all.

For healthy erectile function all three of these systems — nervous, cardiovascular and the penis itself — must be working effectively and in glorious unity.

In order to understand how things can go wrong, it's best first to understand what these systems do when they're ticking along smoothly.

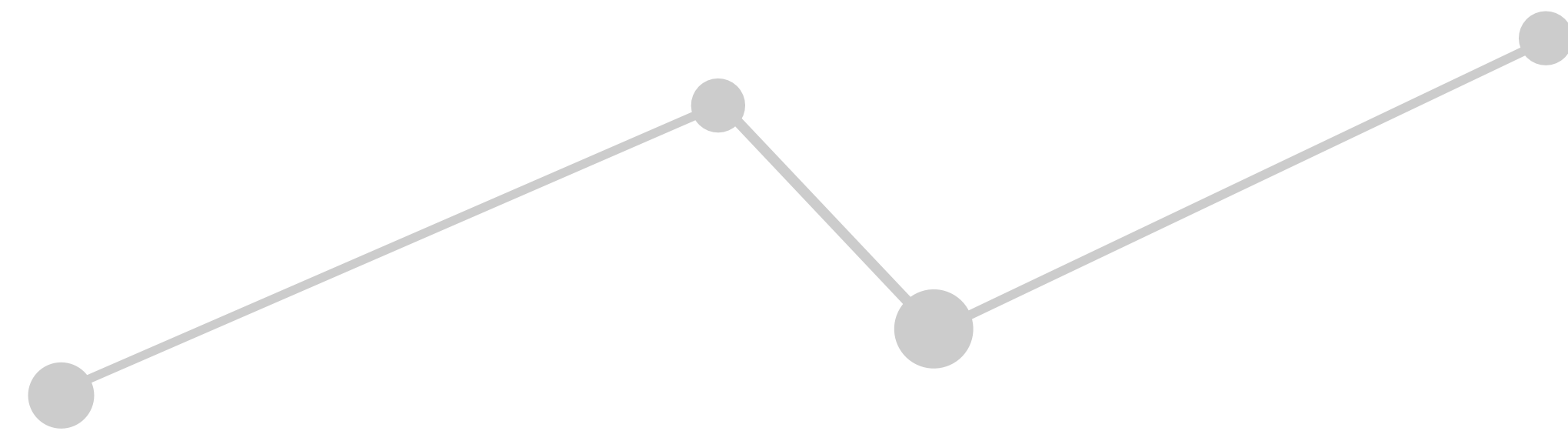
THE *Nervous* SYSTEM:

sending the **signals**.

The nervous system has a big job: to transmit and translate information between different parts of the body, processing information on pain, temperature, balance and much more. When you get into a bath that's too hot, you can thank it for helping you jump out before anything gets cooked or scalded.

It also processes and coordinates erotic stimuli: the touch of a hand, the sweet words of your lover, a complex fantasy involving a nun and a fireman, and the involuntary process which leads to erection.

The nervous system communicates via electrochemical signals which are carried along specialised cells called neurons. These are relatively quick in comparison to other signalling systems within the body such as hormones - this is why an erection can arrive rapidly should something adequately float your boat.



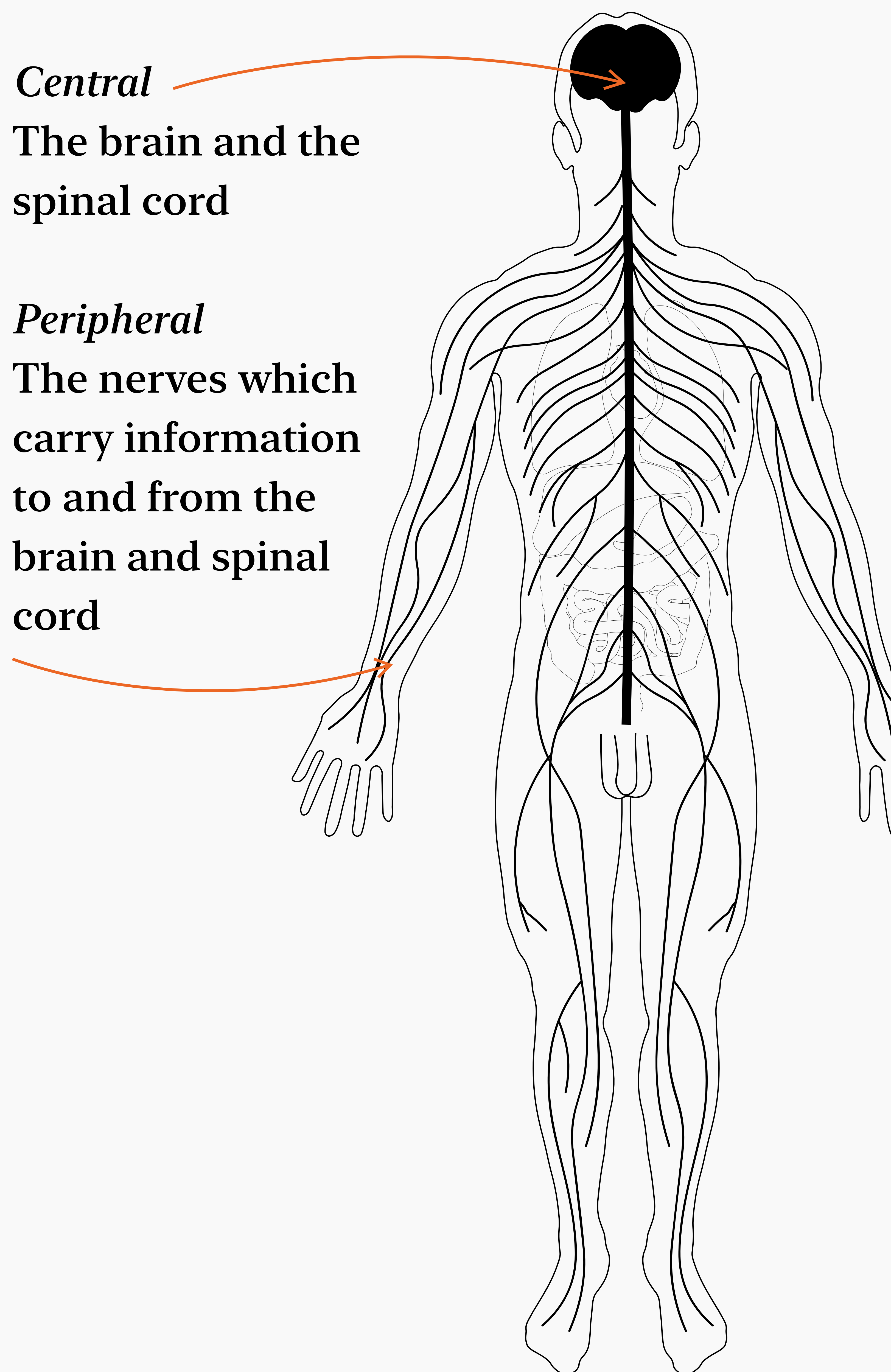
The nervous system is divided into two parts:

Central

The brain and the spinal cord

Peripheral

The nerves which carry information to and from the brain and spinal cord



THE PERIPHERAL *nervous* SYSTEM:

Keeping you connected (...internally).

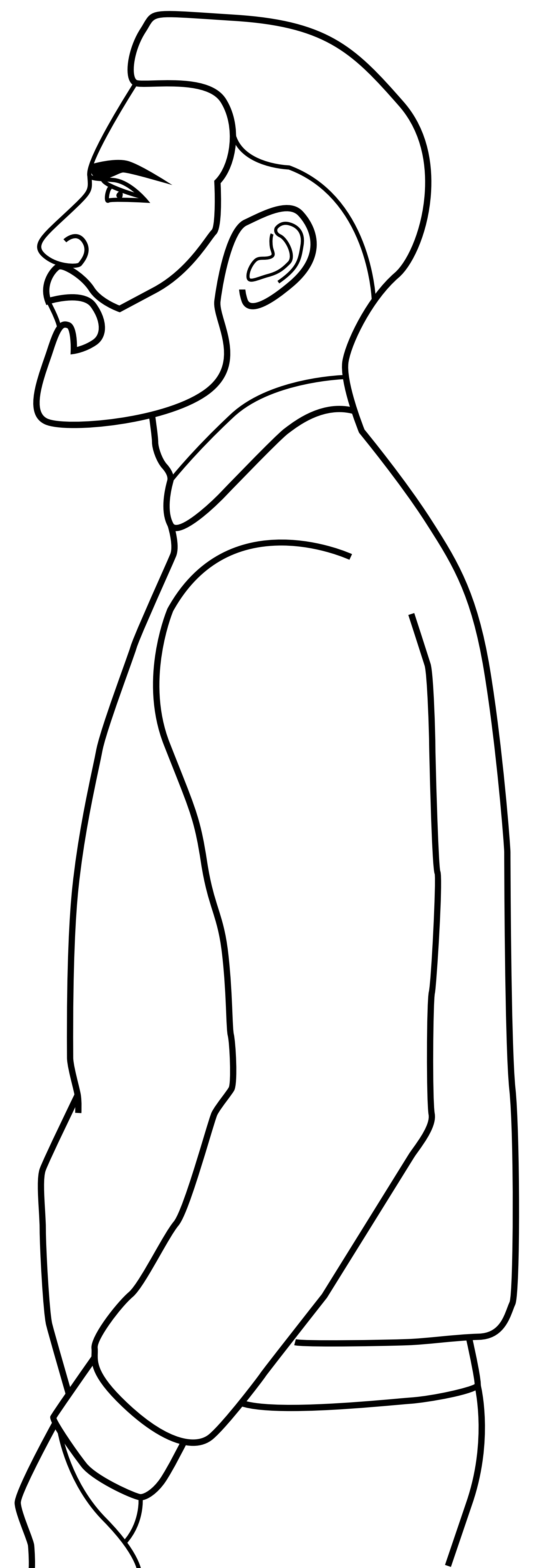
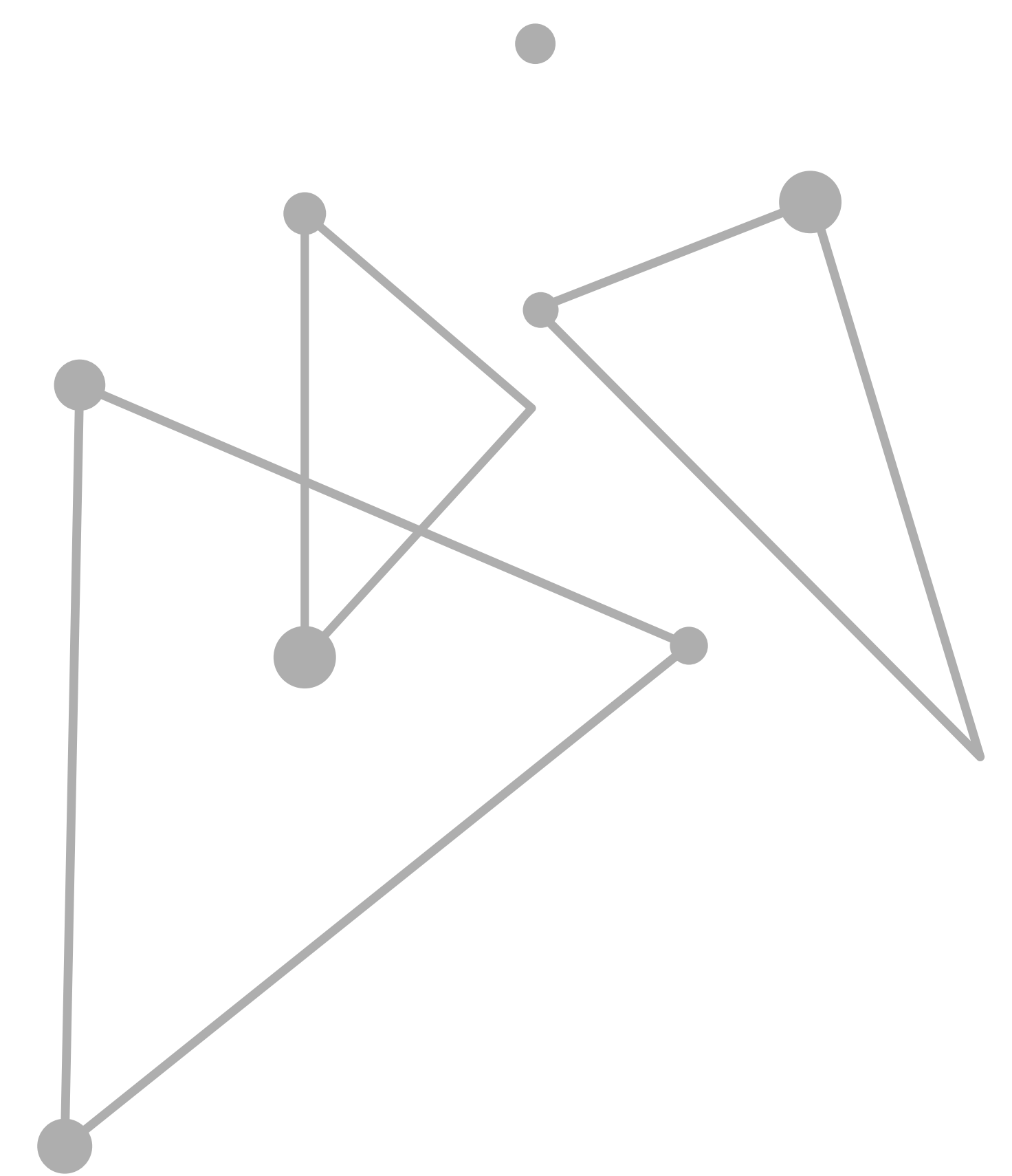
When an erection arrives without you necessarily wanting one, you have the peripheral nervous system (PNS) to thank. When it struggles to arrive at all, the finger points to its sympathetic subsystem...

The PNS refers to all of the nerves outside of the brain and spinal cord, penetrating internal organs, skin and muscles. It relays information such as touch, balance and temperature to the central nervous system, where it is then processed and made conscious. The PNS is divided into the somatic and autonomic nervous systems (ANS);

the latter is highly involved in how your erection functions.

Heart rate and digestion, and reflex actions such as sneezing, coughing and vomiting, are all processes which require no conscious control. These all rely on the ANS, which also happens to be the neurological manager of erections.

The ANS is further subdivided into the sympathetic (SNS) and parasympathetic nervous systems (PSNS). These stimulate complementary sets of reactions within the body. They operate in a balance — as one becomes more active, the other is suppressed and vice versa.



THE SYMPATHETIC NERVOUS SYSTEM:

Stopping erections in their tracks since, well, forever.

ANXIETY AND STRESS
CREATES A 'FIGHT OR
FLIGHT' RESPONSE.
THE RESULT? LESS
BLOOD IS SUPPLIED
TO ORGANS NOT
NECESSARY FOR YOUR
IMMEDIATE SURVIVAL
— THAT INCLUDES
YOUR PENIS.

When the body is under stress or senses danger, the SNS is activated. Heart rate is increased, airways within the lungs are dilated, sweat is secreted, the pupil of the eye dilates (to enhance distant vision), blood supply to the muscles is increased and less blood is supplied to all organs not necessary to your immediate survival — including the penis.

The net effect of these actions, popularly known as 'fight or flight' responses, is to prepare the body for action. Sex, unfortunately, is not one such action.

This was evolutionarily beneficial when our day-to-day existence

largely involved running from predators but as modern human beings, these responses can be unwelcome and triggered at inopportune moments.

Perhaps you've been trying to charm someone for months when you finally succeed. The lights are turned low, you're excited, you're ready — then this evolutionary hard-wiring kicks in. Your first-night nerves are wrongly interpreted as being chased by a hungry alligator. And nobody needs an erection with a 230-kilo reptile bearing down on them. The result? Your erection slowly peters away.

THE PARASYMPATHETIC NERVOUS SYSTEM:

The hero behind every welcome erection.

The PSNS, in contrast to the SNS, is activated when the body feels relaxed. Whether this calm state is achieved through meditation or with the help of a ‘Slow Bedroom Jamz’ playlist, the effects are the same: heart rate is slowed, salivation and digestion stimulated, along with sexual arousal.

In men, activation of the PSNS stimulates the arteries and muscular structures in the penis to dilate (open), encouraging blood to flow into it and preventing blood from leaving, which causes your penis to become hard. In women, there is similar dilatation of arteries in the clitoris, causing relatively subtler engorgement

and enhancing sensitivity.

Collectively these are sometimes known as ‘rest and digest’ or ‘feed and breed’ responses (which, as it happens, would make equally good Spotify playlist titles).

In contrast, stimulation of the SNS reduces blood supply to the penis and inhibits the erectile response. Or to bring it to its climatic ending: ejaculation.

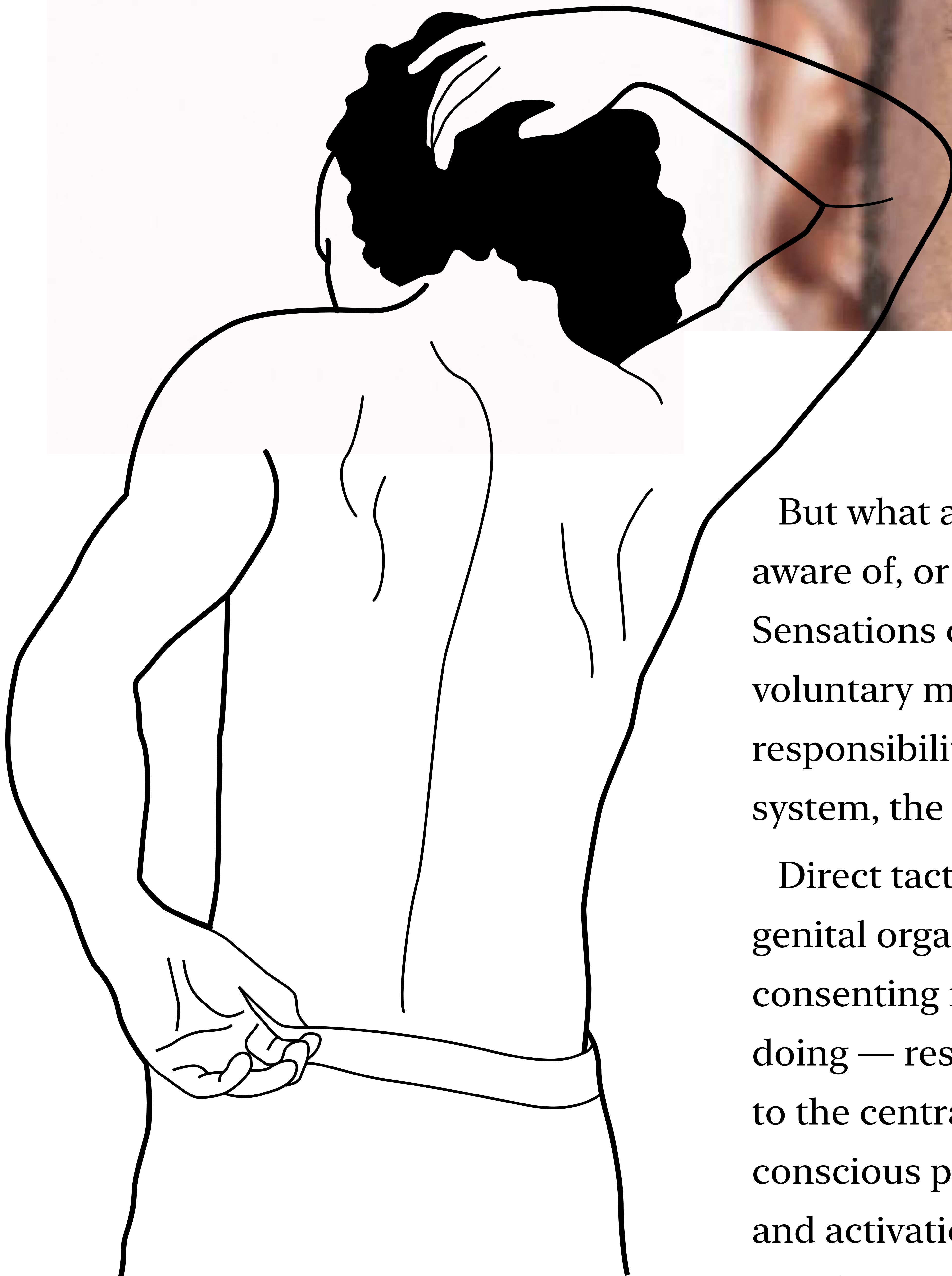
Interestingly, nocturnal erections are thought to occur because of inhibition of the SNS during REM (rapid eye movement) sleep, which results in relative activation of the PSNS.



DEPENDING ON HOW STRESSED THE MIND AND BODY IS FEELING, SEXUAL AROUSAL CAN BE PROMOTED OR BLOCKED BY THE AUTONOMIC NERVOUS SYSTEM (ANS).

THE SOMATIC NERVOUS *system*

The bit you can control.



But what about the things you are aware of, or that you can control? Sensations of touch and taste, and the voluntary movement of muscles are the responsibility of the somatic nervous system, the other division of the PNS.

Direct tactile stimulation of the genital organs — be that by a consenting friend or of your own doing — results in signals being sent to the central nervous system (causing conscious perception of this stimuli) and activation of the PSNS, inducing an erection.

THE CENTRAL NERVOUS SYSTEM:

The mainframe.

Enclosed within the skull and spine are the brain and spinal cord, respectively. These make up the CNS; the system which coordinates and processes every touch, sensation and stimulus received by the peripheral nervous system, and transforms it into conscious perception.

The brain can initiate an erection in response to audiovisual stimuli, such as seeing a sexy firefighter emerging from a smouldering building, or fantasy, imagining you're being carried by said firefighter. Signals are sent, via the spinal cord, to activate the autonomic pathways with the end result, an erection.

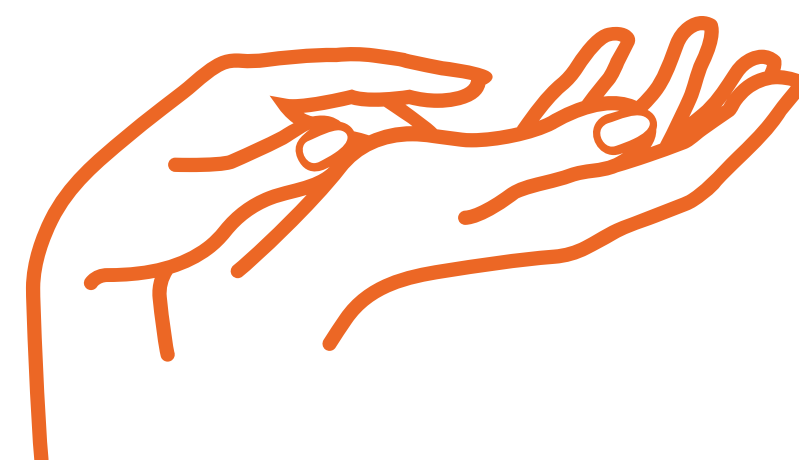
THE NERVOUS SYSTEM AND THE PENIS:

A summary:

There are three ways that the autonomic nervous system can be activated to trigger an erection:



1. The brain — stimulated by sound, sight or fantasy, the brain can send signals via the spinal cord to activate the PSNS.



2. Touch — the somatic nervous system transmits signals from touch sensors in the genital region to the brain, resulting in the conscious perception of touch, and PSNS, activating the erectile response.



3. Suppression of the SNS — when you're asleep, your body is relaxed and the SNS is more quiet. This is thought to result in relative activation of the PSNS, which is why you wake up with an erection in your pyjamas.

THE CARDIOVASCULAR SYSTEM:

Getting the blood to
where it's needed most.

The symbolic connection between love and the heart goes back, it's thought, as far as the first century AD. The relationship between the penis and the heart is much less celebrated or likely to appear on Valentine's cards, but it's a hard, physiological fact.

The cardiovascular system is composed of the heart and all of the veins and arteries in the body. Its function is to circulate substances necessary to sustain life, including oxygen and carbon dioxide, sugar, electrolytes, cells which fight infection and hormones.

It might be easier to conceptualise it as the

plumbing system of the body — the heart is essentially a pump, which needs to function efficiently in order to ensure appropriate blood pressure.

The pipes of the body are the arteries and veins, which should be smooth, unobstructed and straight as possible in order to allow uninterrupted, streamlined blood flow. Arteries carry oxygen-rich blood from the heart to the organs, muscles and tissues, and veins carry the blood back to the heart, and from there, back to the lungs to resupply it with oxygen.

When activated, the



PSNS triggers dilatation of arteries in the penis, allowing blood to flow in. A strong, firm erection depends on these arteries being healthy — we'll cover the problems that can arise here in later chapters.

THE PENIS:



Where everything comes perfectly together.

Motionless and flaccid: for most of the day, your penis hangs there doing very little at all. But when prompted, provided the heart is pumping efficiently, the arteries are healthy and the nervous system is operating smoothly, it is ready to spring into action like a highly-caffeinated doctor on-call.

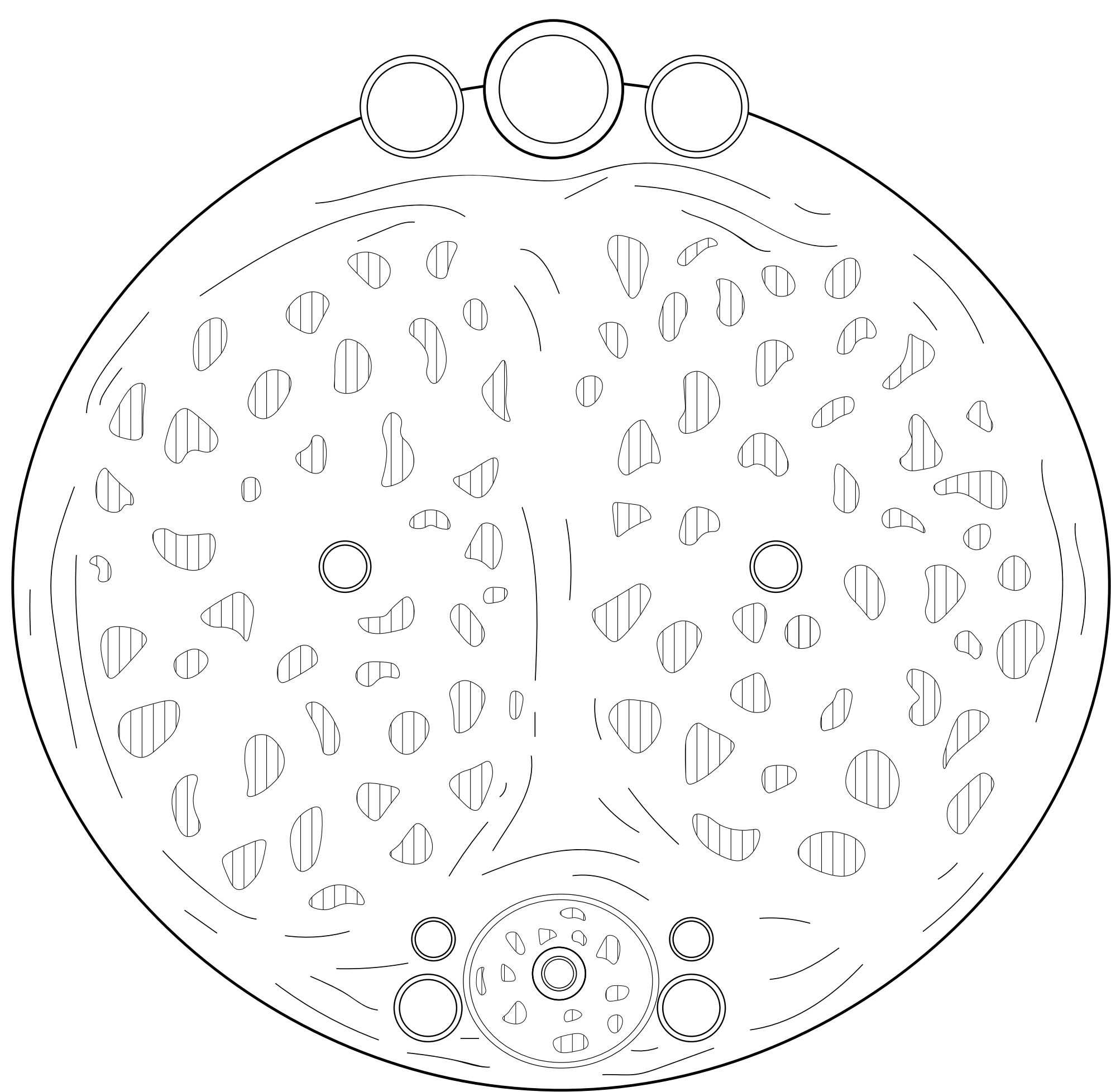
In response to a parasympathetic activation (the reflex that tells your penis when it's time for business), blood enters the sinusoids of the corpus cavernosum, a unique, spongy, muscular tissue which spans the length of the penis, allowing it to become erect.

If the timing and place is right (in bed with your

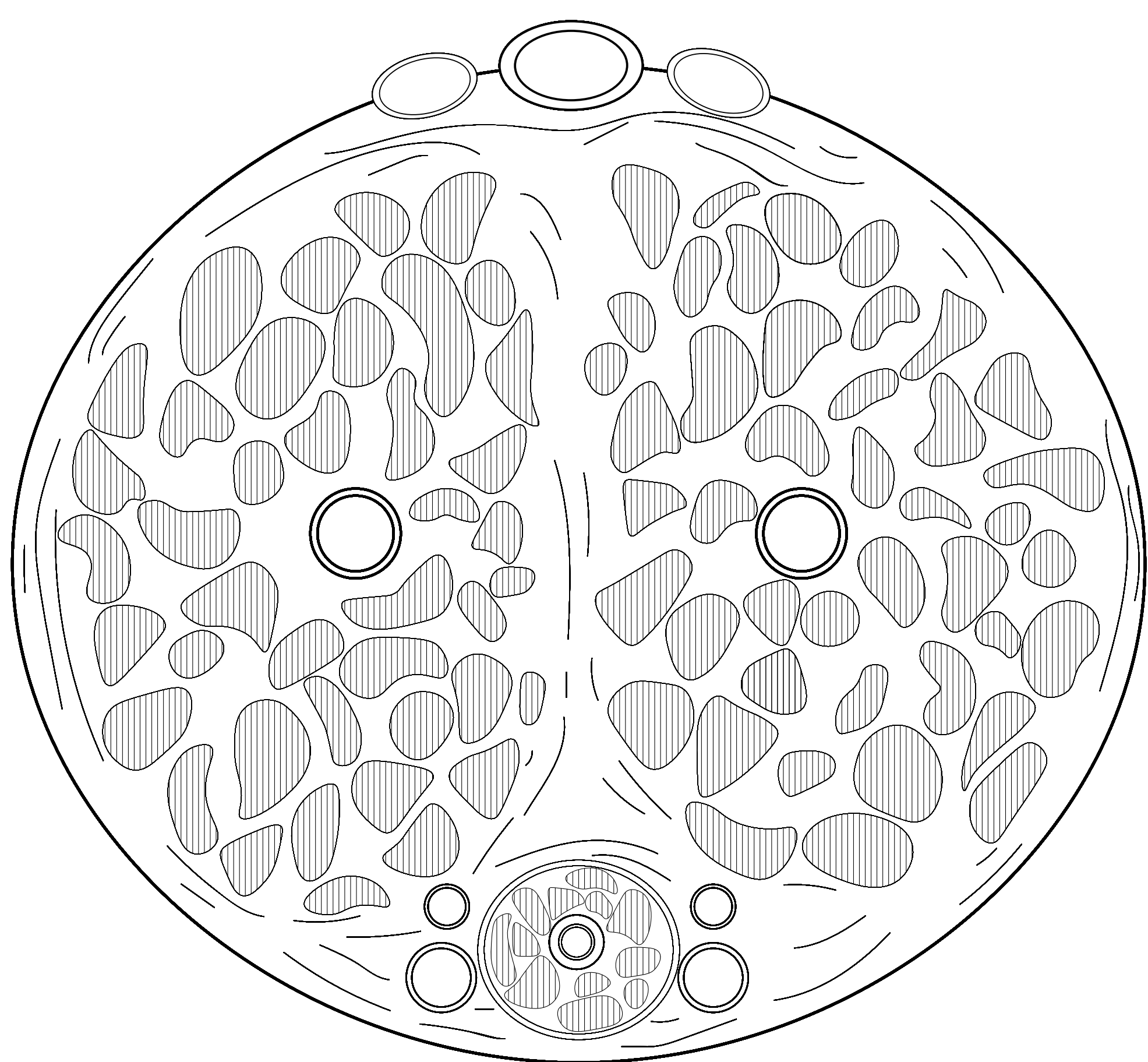
consenting partner, right, on a bus, not so right), sex or masturbation may swiftly ensue, followed by ejaculation.

This climactic finish stimulates the SNS, resulting in constriction of the arteries and allowing the blood that had been trapped to flow back through the veins. The penis once again becomes flaccid.

Flaccid: Transverse View



Erect: Transverse View



NOW YOU KNOW HOW AN ERECTION WORKS

When it isn't working, this is how medication can make it more reliable:



Once you understand how muscles relax and arteries dilate in an erection, it's easier to get to grips with how medication for erectile dysfunction — such as sildenafil — works.

There is smooth muscular tissue within the walls of arteries which allow them to widen and narrow. The spongy tissue of the corpus cavernosum of the penis responds similarly.

When triggered by the PSNS, molecular signals result in the relaxation of the walls of the arteries and the corpus cavernosum, encouraging blood flow into the penis, and an erection to

proudly present itself.

During this process, cells which line the arteries and muscles release nitric oxide, which starts a cascade of signals within the muscle cells. One of the most important messengers here is cGMP, a molecule which instructs the muscle proteins to relax.

For an erection to subside — whether that's desired or not — cGMP needs to be broken down by an enzyme called PDE5. Stopping, or inhibiting, this enzyme before it gets to work, keeps the cGMP intact, the smooth muscles relaxed, and your erection very much there.

This is how the entire class of PDE5 inhibiting medications work — including sildenafil (Viagra) and tadalafil (Cialis). They block the breakdown of cGMP, so that blood remains trapped in your penis, and your erection is maintained for the task at hand, be that making slow, passionate love or a five-and-a-half-minute session on a Tuesday night.

THE ENDOCRINE *system*

Where testosterone
comes into play.

The cardiovascular and nervous systems may take the limelight in the average biology textbook, but the endocrine system has more than just a supporting role in a healthy, fully-functioning body, and that goes for healthy erectile function too.

Exactly what this role is remains somewhat of a mystery.

The endocrine system consists of a network of organs which regulate the release of hormones into the bloodstream. One of these hormones has become synonymous with all things male, hairy and aggressive: testosterone.

Largely produced in the testicles — and contrary to its often bad press — it promotes healthy sperm

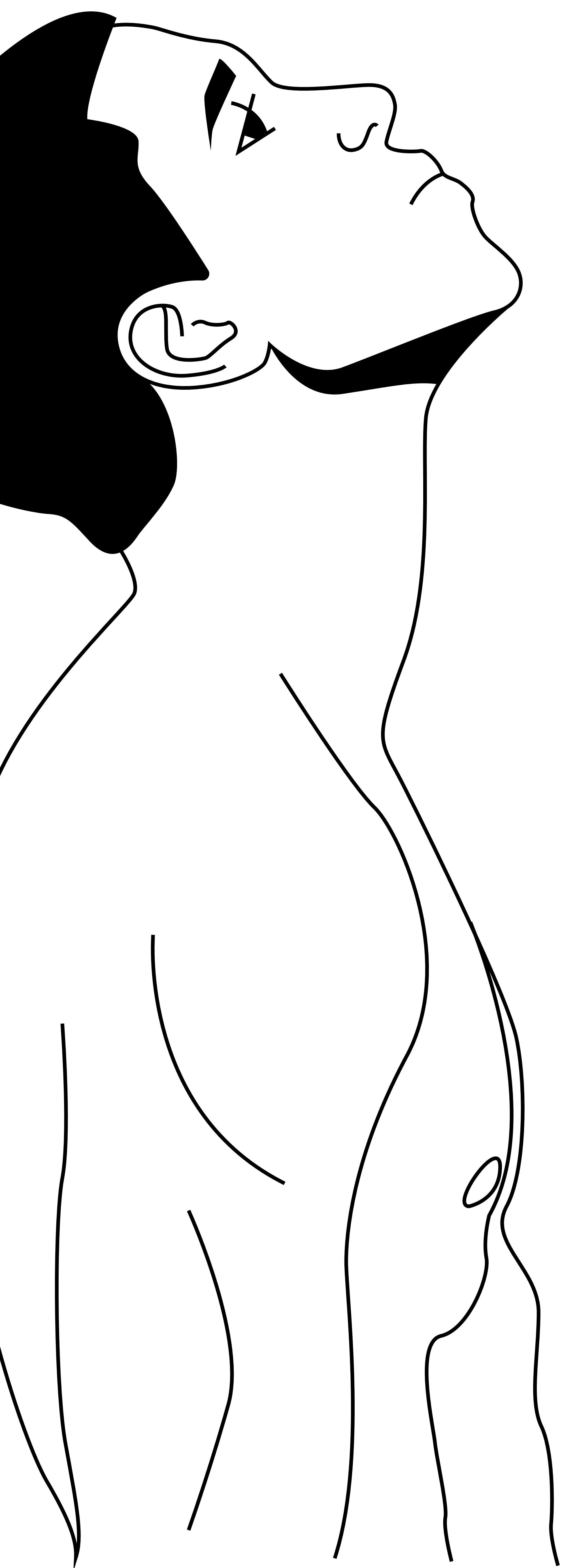
production, libido, bone and muscle strength.

While low levels can cause erectile dysfunction, it's still not known exactly why.

A number of different theories have been suggested as to how testosterone is involved in healthy erectile function. Some of the suggested roles include:

- involvement in healthy growth and functioning of the nerves involved in erection
- involvement in production of nitric oxide, and thus the activity of PDE5

As research into the roles of testosterone in erectile function grows, new treatment strategies may emerge. But until that time, PDE5 inhibitors remain the prime means to treat the symptoms of erectile dysfunction — and effectively at that.



SO NOW YOU *know*

An erection is a truly remarkable piece of physiological engineering.

An intricate sequence of events, one with numerous stages, and complex systems required to work in perfect harmony.

Of course, with so much going on, and everything so finely balanced, there is potentially more that could go wrong. In the next chapters we'll explore some of the different reasons why erections can become elusive, and the different ways you can make them more reliable.



WITH SO MUCH GOING ON, AND EVERYTHING
SO FINELY BALANCED, THERE IS POTENTIALLY
MORE THAT COULD GO WRONG.



CHAPTER 2

WHEN ERECTIONS GO AWRY: PHYSIOLOGICAL CAUSES

322 MILLION

The number of men worldwide expected to be affected by ED by 2025.

That's a lot of men by anyone's standards. It's the equivalent to the entire population of the UK, France, Germany, Italy, Spain and a good part of Peru all struggling to get or maintain an erection.

Erectile dysfunction (ED) is thought to affect over 100 million men worldwide, rising to an enormous 322 million cases by 2025.

Despite being relatively common, there are still plenty of misconceptions around the condition and it remains an awkward subject. To be clear, ED is not just a difficulty in obtaining an erection, but maintaining one too.

While the general risk of developing ED increases with age, it's important to note that it can occur at any time in a man's life. In fact, according to a Numan survey, 55% of men aged 25-35 have experienced ED.

LIKE A *sports car...*

As your body ages, all of its systems become a little less efficient.

The more complex the car, the more parts can go wrong. An erection, like a 1970s Aston Martin Lagonda, is a very complex thing indeed.

We divide the underlying problems that lead to erectile dysfunction into two main categories:



Physical

Relating to dysfunctions of biological systems



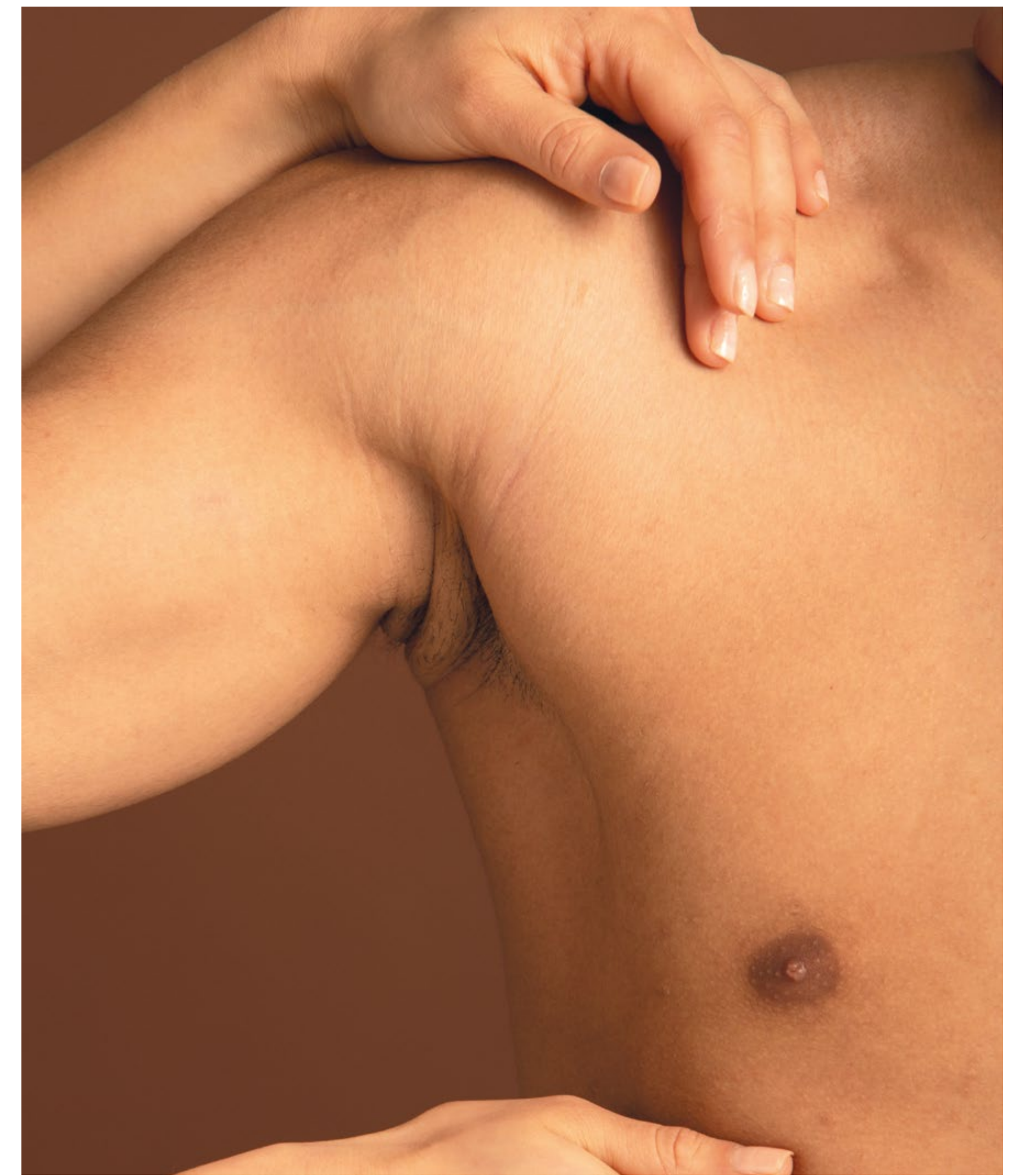
Non-physical

Relating to psychological processes that can impair normal physiological functioning

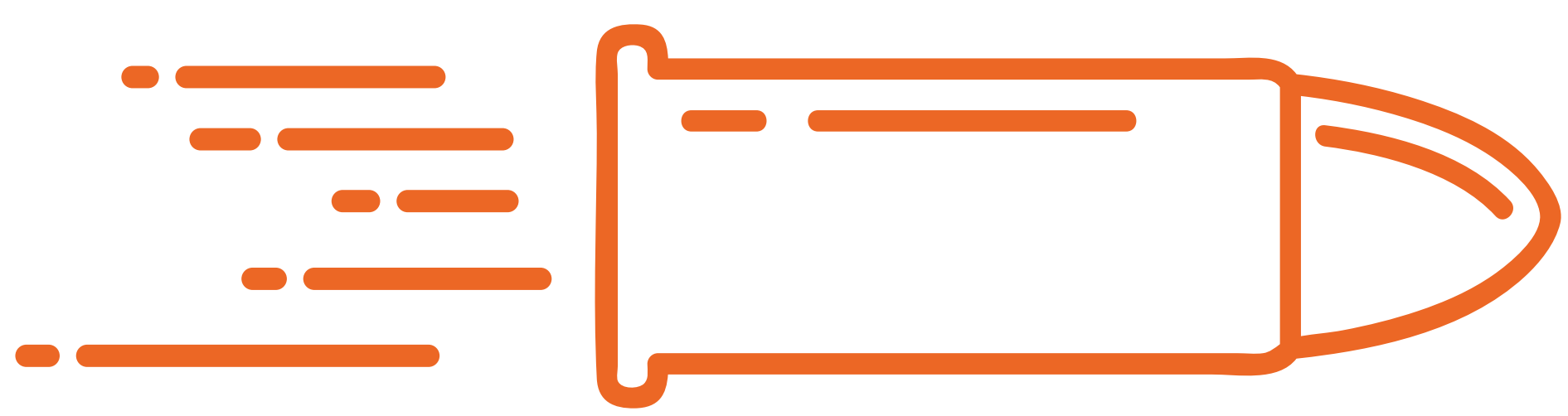
Most men who have ED are affected by more than one underlying cause. In this chapter, we're going to cover some of the physical reasons and how they interfere with your ability to get an erection. This isn't a completely exhaustive list, but we hope to cover most of the main culprits.

**THE MORE COMPLEX
THE CAR, THE MORE
PARTS CAN GO
WRONG. AN ERECTION,
LIKE A 1970S ASTON
MARTIN LAGONDA,
IS A VERY COMPLEX
THING INDEED.**

NERVOUS SYSTEM PROBLEMS



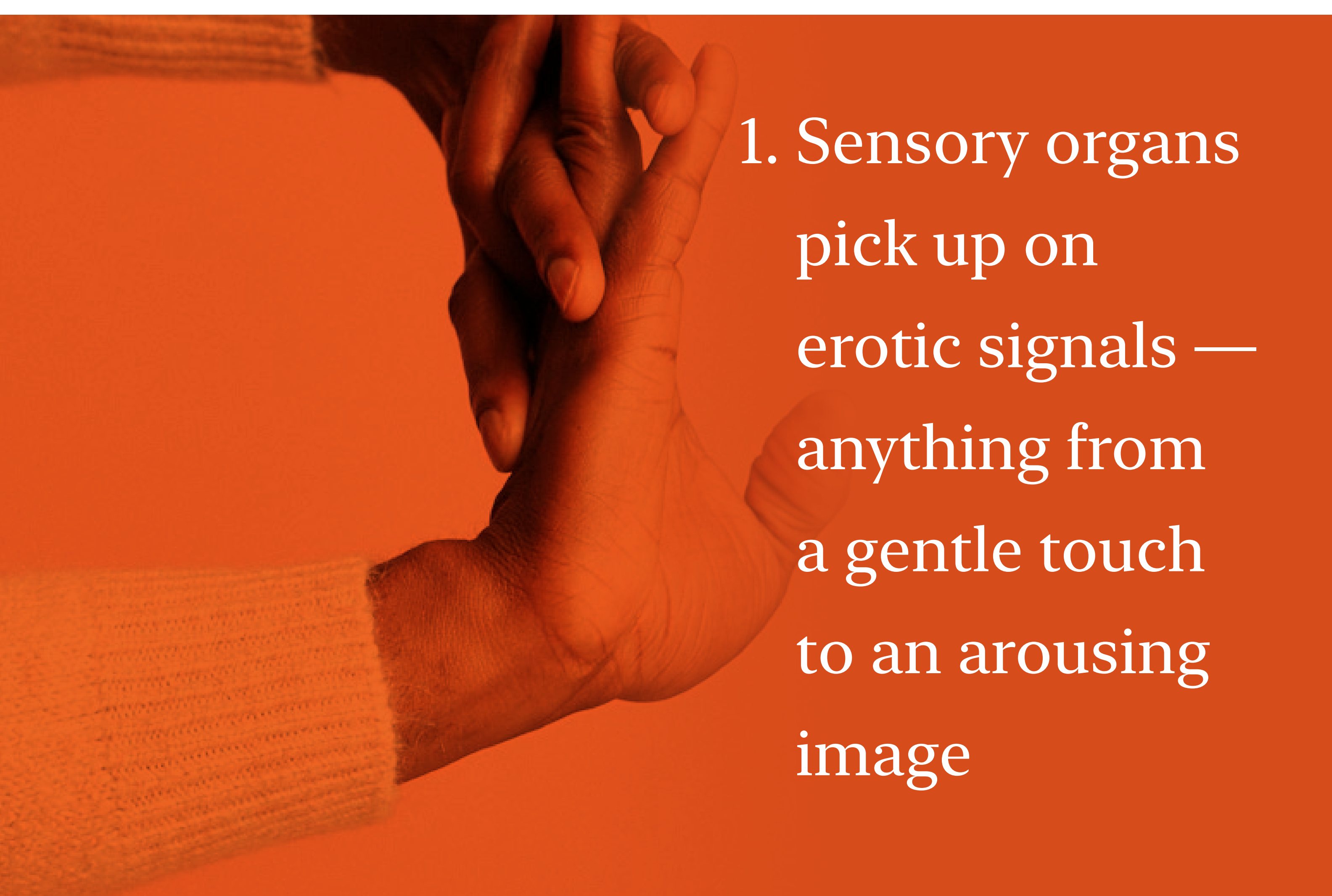
The nervous system is master and commander of your erection.



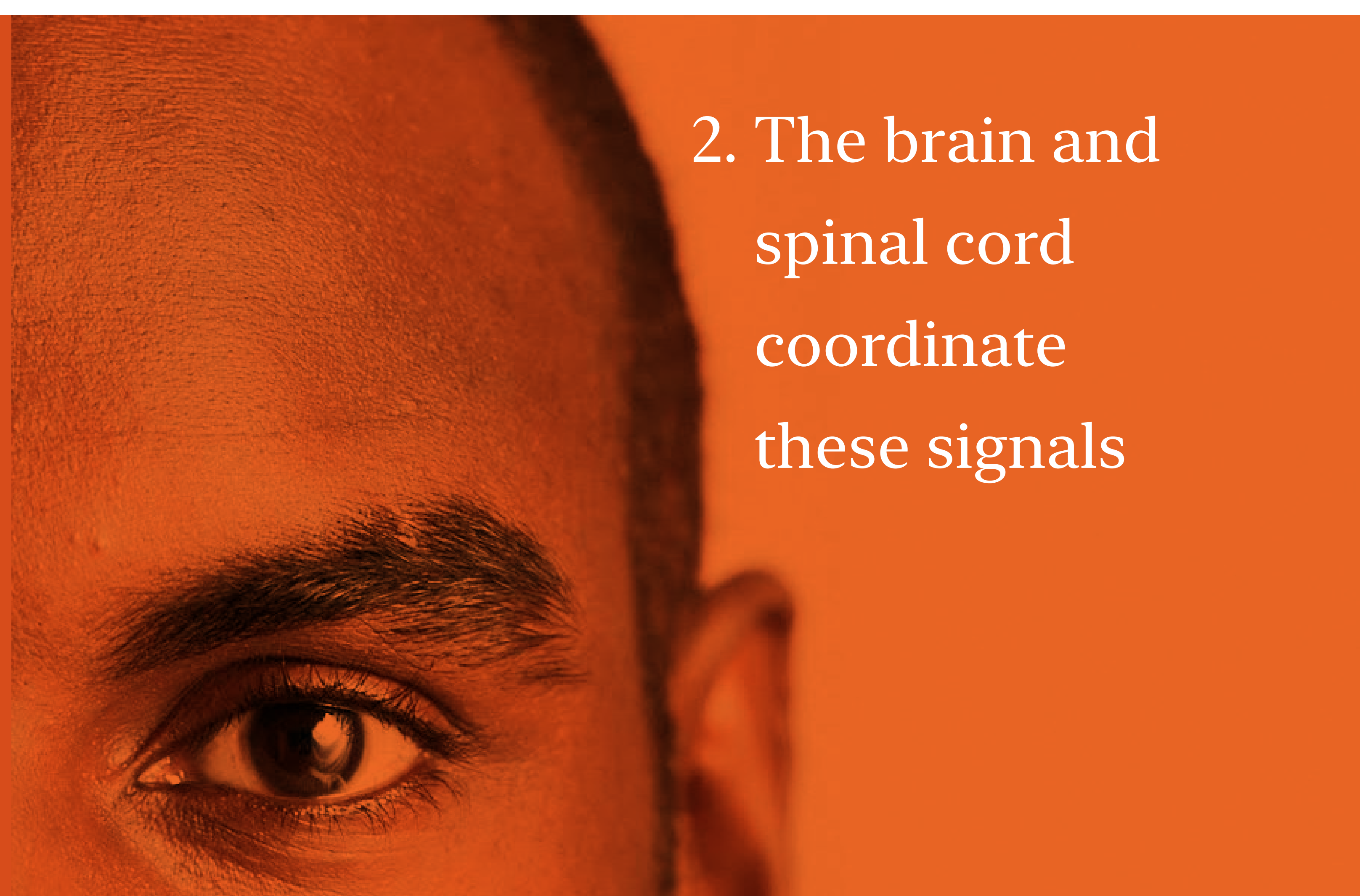
If it's not firing on all cylinders, your penis probably won't be either

If you're struggling to get or maintain an erection, there are a number of underlying

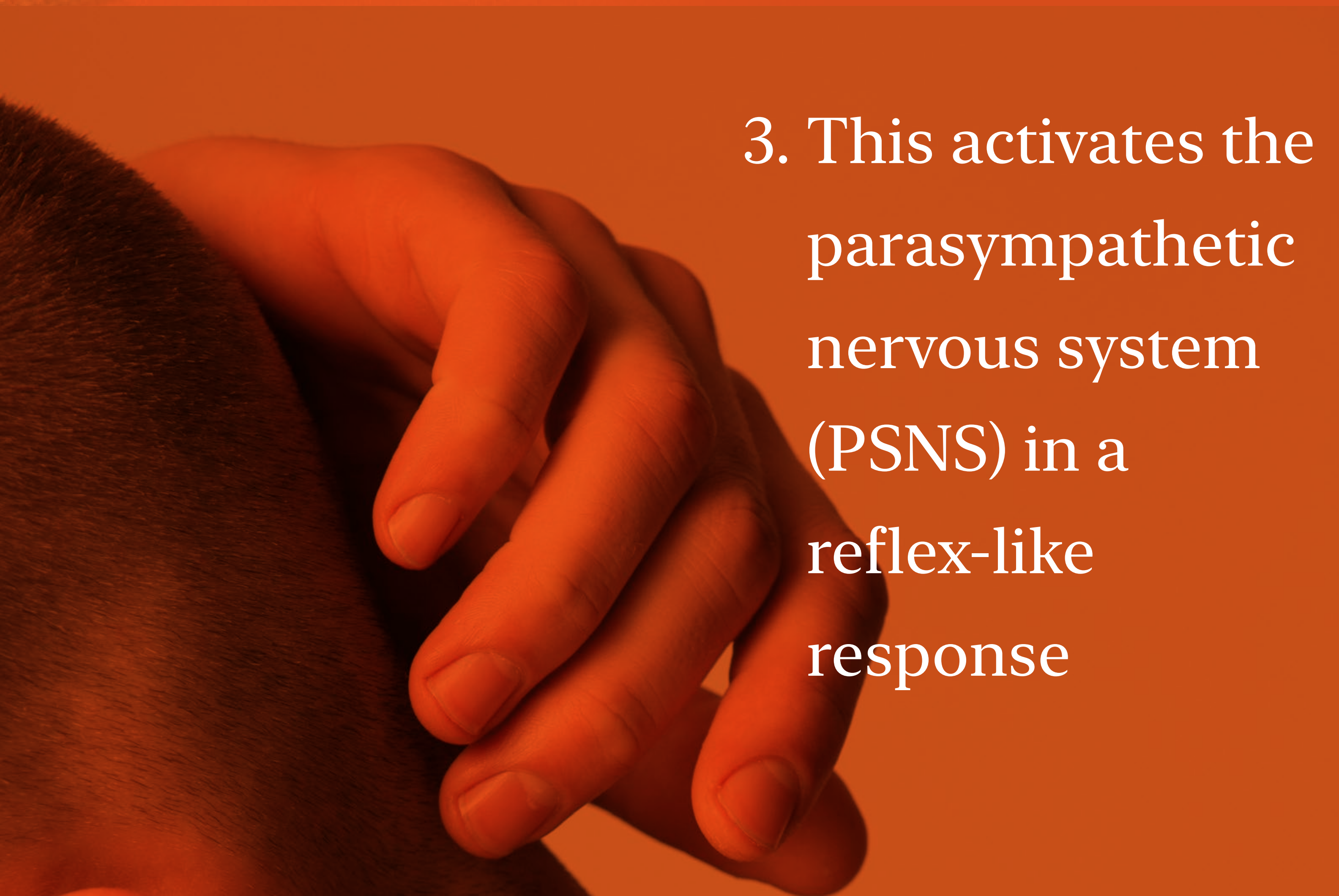
issues affecting the nervous system which may be at play. Some are rarer than others, and most of them are conditions you would probably already be aware of if you have them.



1. Sensory organs pick up on erotic signals — anything from a gentle touch to an arousing image



2. The brain and spinal cord coordinate these signals



3. This activates the parasympathetic nervous system (PSNS) in a reflex-like response



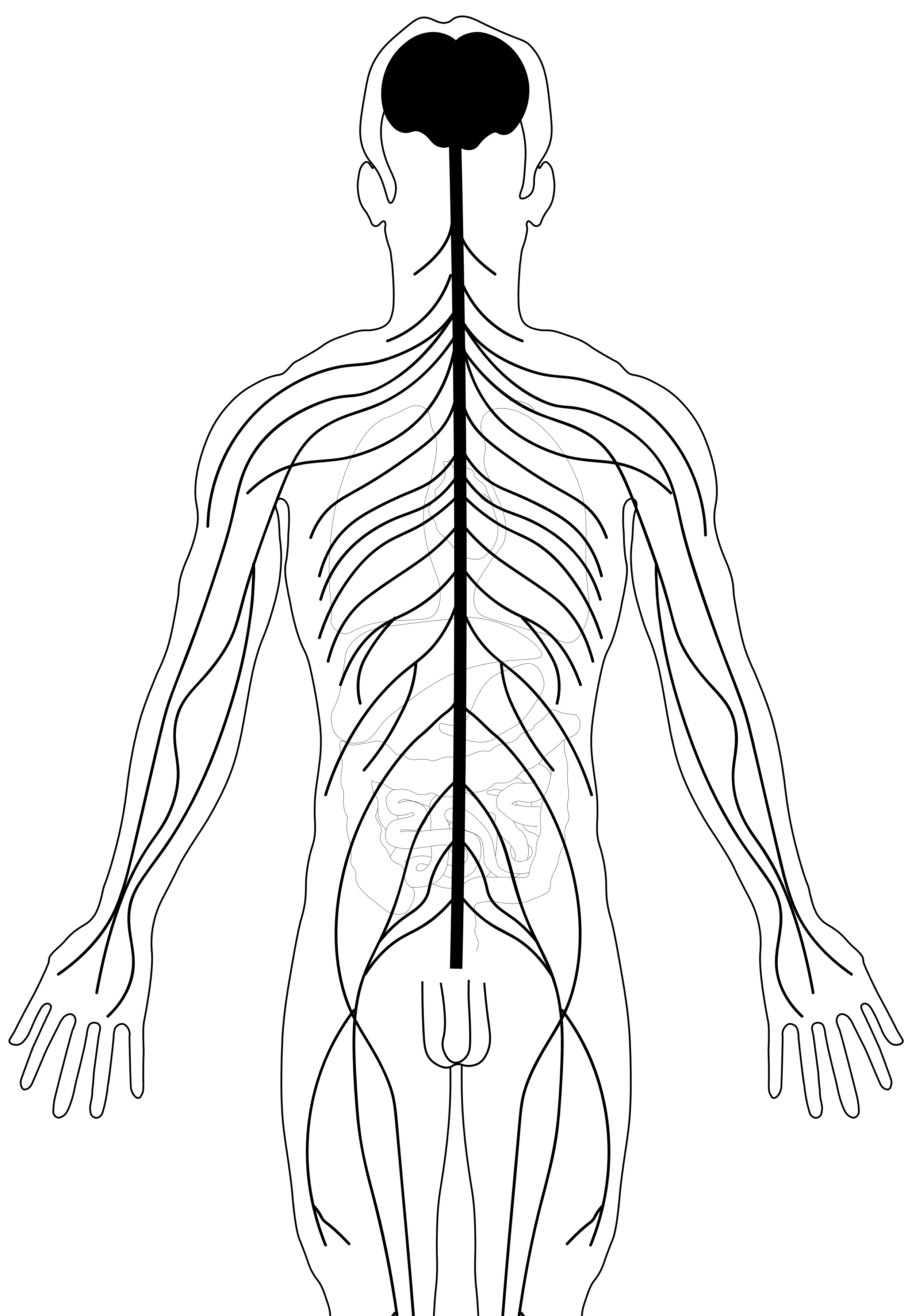
4. PSNS reacts by stimulating an erection

CENTRAL NERVOUS SYSTEM *(CNS)*

Areas in the brain which integrate erotic stimuli and relay signals to initiate erection can be affected by diseases such as Parkinson's disease and strokes.

Tumours can also affect any area of the CNS (brain and spinal cord) which may impinge on pathways involved in erectile function.

Spinal cord injury, specifically to the lower half, can result in difficulty achieving erection, as can multiple sclerosis, a condition which causes inflammation to nerves in different areas of the CNS.



PERIPHERAL NERVOUS SYSTEM *(PNS)*

Nerves which are crucial for carrying signals to stimulate erection can be damaged during surgery involving the organs in the pelvis, such as the bladder, prostate or lower parts of the gut.

Peripheral nerves can also become inflamed and damaged in a condition known as peripheral neuropathy. Causes include excess alcohol consumption, diabetes mellitus or deficiencies of vitamins B1 (thiamine) and B12.

ON YOUR *bike?*

THERE IS SOME EVIDENCE TO
SUGGEST THAT CYCLING FOR MORE
THAN THREE HOURS PER WEEK CAN
CAUSE ERECTILE DYSFUNCTION.

Erections and cycling.

There is some evidence to suggest that cycling for more than three hours per week can cause erectile dysfunction, possibly because of compression of nerves in the groin. However, more recent studies haven't backed this up in any convincing way. There are some things you can do to reduce any small risk that might exist, like making sure your bike is sized correctly and increasing the padding on your seat. What we do know for sure is that cycling is fantastic exercise and being in good cardiovascular health reduces the chance of your experiencing erectile dysfunction.



CARDIOVASCULAR PROBLEMS

The cardiovascular system carries blood to the penis.

Without it working properly, your erection might get lost along the way.

The arteries supplying the penis have a very important function: to

expand in response to the parasympathetic reflex, causing the spongy tissues inside the penis to fill with blood. The end result? A larger, harder penis.

Here’s a reminder how:



The PSNS gets activated



Arteries in the penis dilate

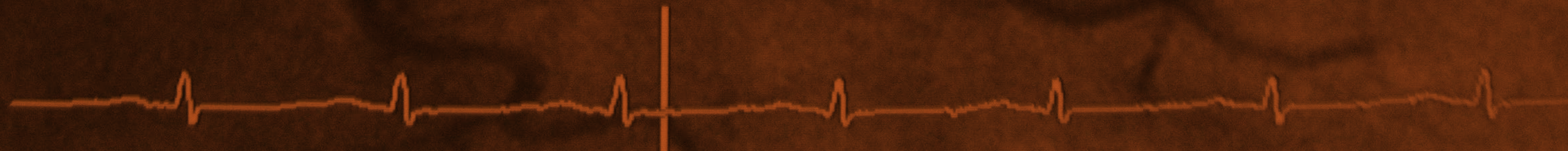


The spongy spaces in your corpus cavernosum fill with blood



Your penis becomes erect

A healthy artery is one where the inner wall is smooth, meaning the blood can flow through it calmly and without interruption.



Narrowing of the arteries of the penis can make it harder to get an erection, and harder to keep it hard. Why does this happen? One word: atherosclerosis.

This disease can affect all of the arteries in the body, not just the penis - which is why erectile dysfunction can sometimes be a sign of co-existing heart disease. It begins with damage to the inner lining of the artery, which allows for cholesterol (specifically LDL, the 'bad' kind you'll find in all the best food: delicious cheese, tasty burgers etc.) to migrate to the site of injury.

Once there, LDL becomes subjected to modifications by some of the products that might be in the blood, including sugar and free radicals.

Free radicals are unstable molecules that can damage cells and tissues in the body. It's worth noting that a certain level of free radicals is considered normal since they are produced as a by-product of the body's natural metabolic processes, but excessive amounts that might come from air pollutants and cigarette smoke can be damaging.

A hard, fatty plaque grows and the artery narrows. This can ultimately result in complete blockage of the artery, and without oxygen being reliably delivered, cells become deprived of oxygen and die. This is clearly not a good thing.

With arteries in the brain, this blockage results in a stroke. In the

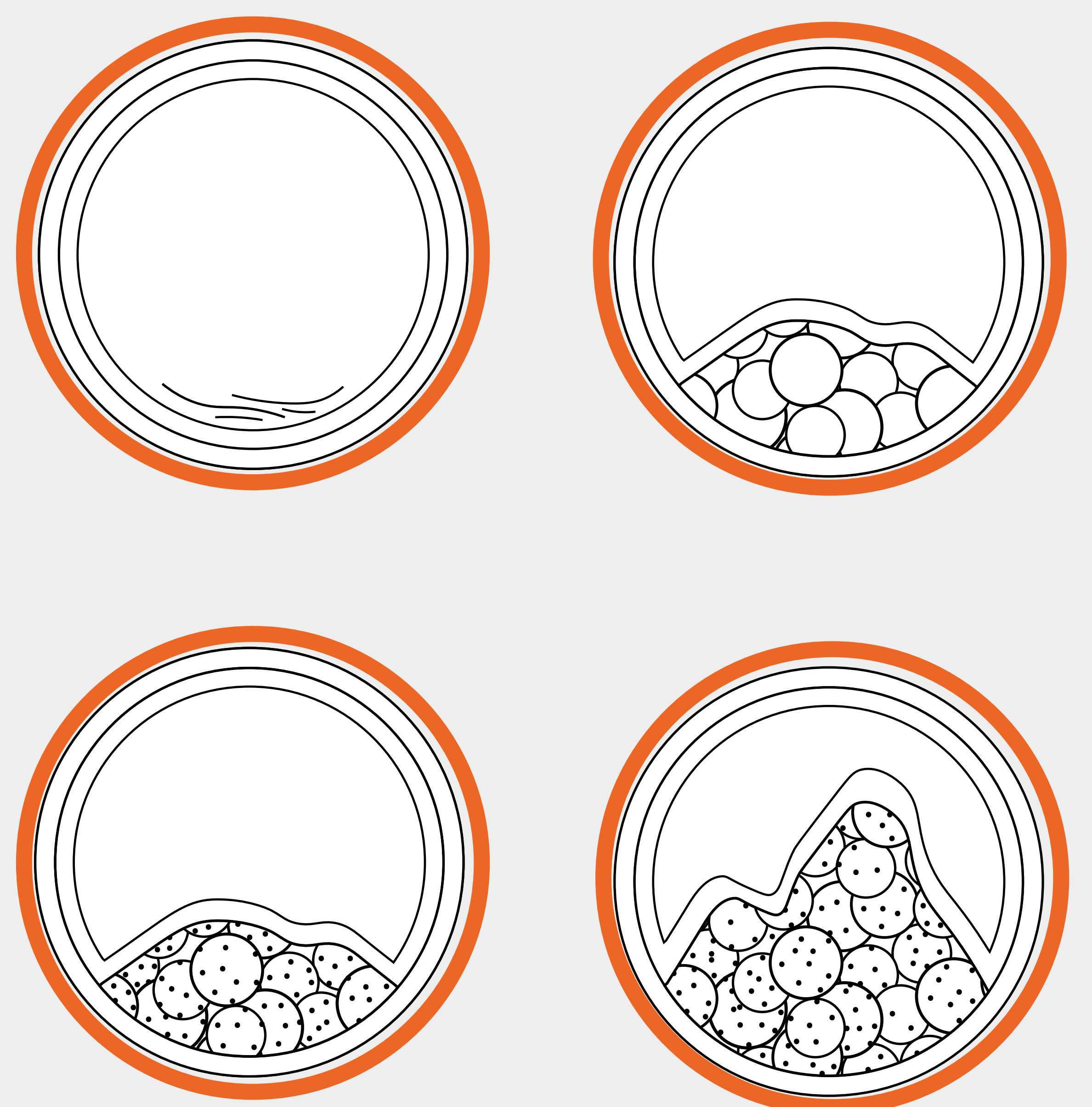
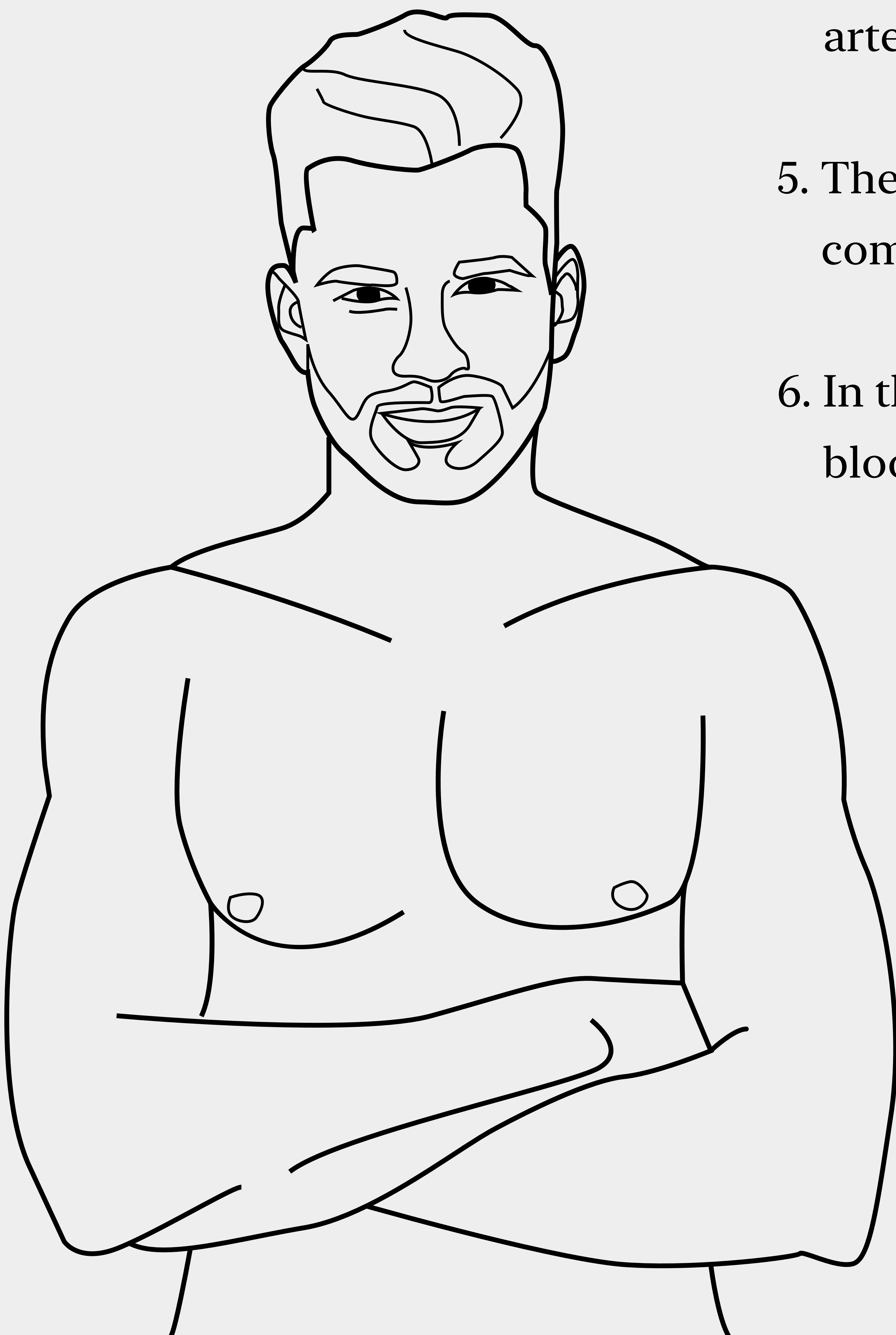
heart? A heart attack. Incidentally, for some men with severe or unstable heart disease, sexual activity may be deemed unsafe, as the increased demand on the heart may be fatal. Which seems as good a reason as any to cut down on fatty food and move a little more.



WHEN ATHEROSCLEROSIS AFFECTS THE ARTERIES SUPPLYING THE *penis*

Erections can be difficult to achieve, or not hard enough for sexual activity. Here's a summary of the process:

1. Damage to the inner lining of the artery
2. LDL (bad cholesterol) accumulates at the site of injury
3. LDL becomes modified (eg. by sugar or free radicals)
4. Fatty plaque grows larger, causing the artery to narrow
5. The artery may become partially or completely blocked
6. In the penis, this means not enough blood flow required for a hard erection



If you want to reduce your chances of developing damaged and diseased arteries (and who wouldn't?) there are several well-established risks to be aware of...



High blood pressure

When your blood pressure is high it can stretch and damage the inner lining of arteries — including in the penis — and initiate the development of atherosclerosis.



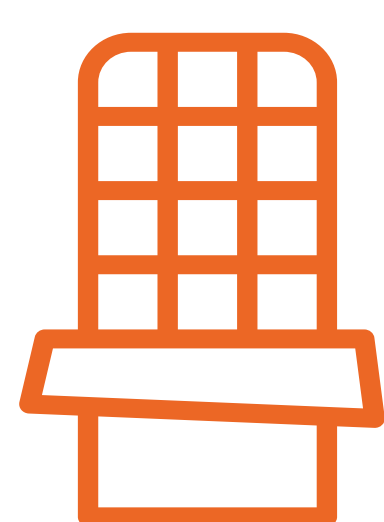
High cholesterol

Excess LDL in your blood accumulates around the damaged inner lining of the arteries where it forms a fatty plaque, restricting blood flow. In your penis, this makes getting or maintaining an erection more difficult.



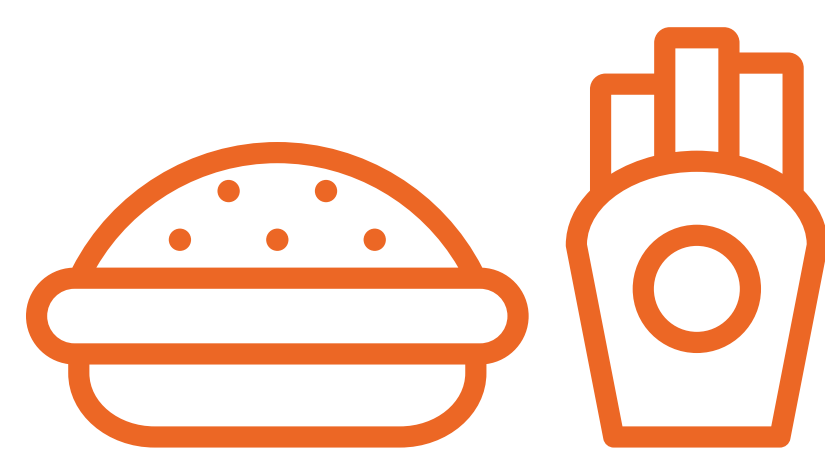
Smoking

Smoking cigarettes is a two-pronged attack on your arteries. The free radicals generated by smoke inhalation can both damage the lining of the arteries and modify the LDL within them. This means more fatty plaques and potentially more erectile issues.



Diabetes mellitus

Excess sugar in your blood is a major factor when it comes to modifying LDL, making it more sticky and prone to morphing into a plaque.



Obesity

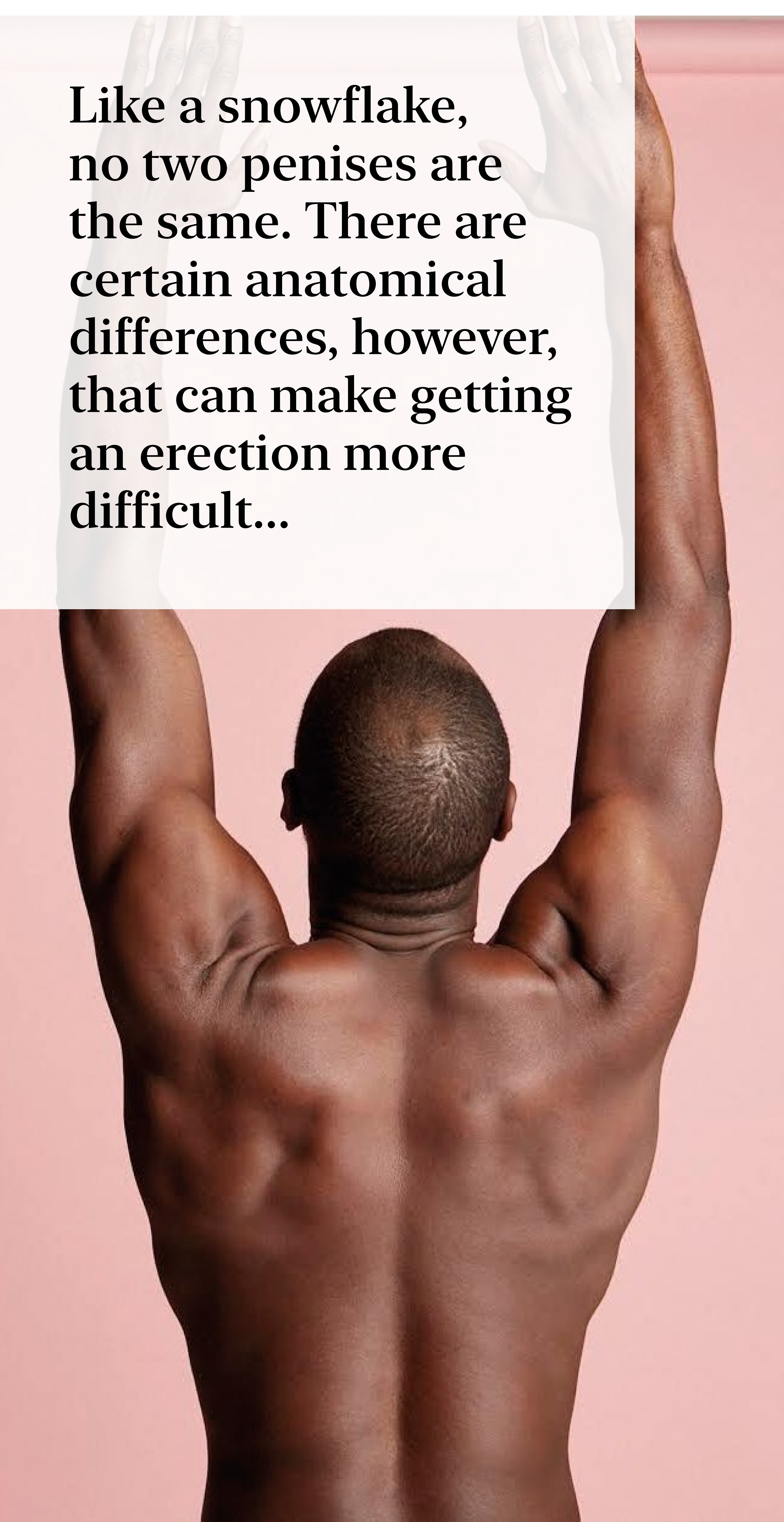
Being severely overweight is associated with many of the problems listed above: diabetes, high blood pressure and high cholesterol levels. The good news? These problems are all controllable, and exercise and a healthier lifestyle will reduce the risk of complications arising — including ED.



Direct injury

Whether it's through an accident or during surgery, damage to the blood vessels can initiate the process of atherosclerosis.

ANATOMICAL PROBLEMS



Like a snowflake, no two penises are the same. There are certain anatomical differences, however, that can make getting an erection more difficult...

Your penis is one of a kind: its internal and external structure is uniquely suited to its job. Alterations to these intricate tissues, however, can result in problems achieving erection.

Take Peyronie's disease, named after the French surgeon who identified it in 1743. This abnormal curvature in the penis is most obvious when it's erect. Not only can this be embarrassing and even painful, it can also result in ED because the bend causes interruption in normal blood flow to the penis.

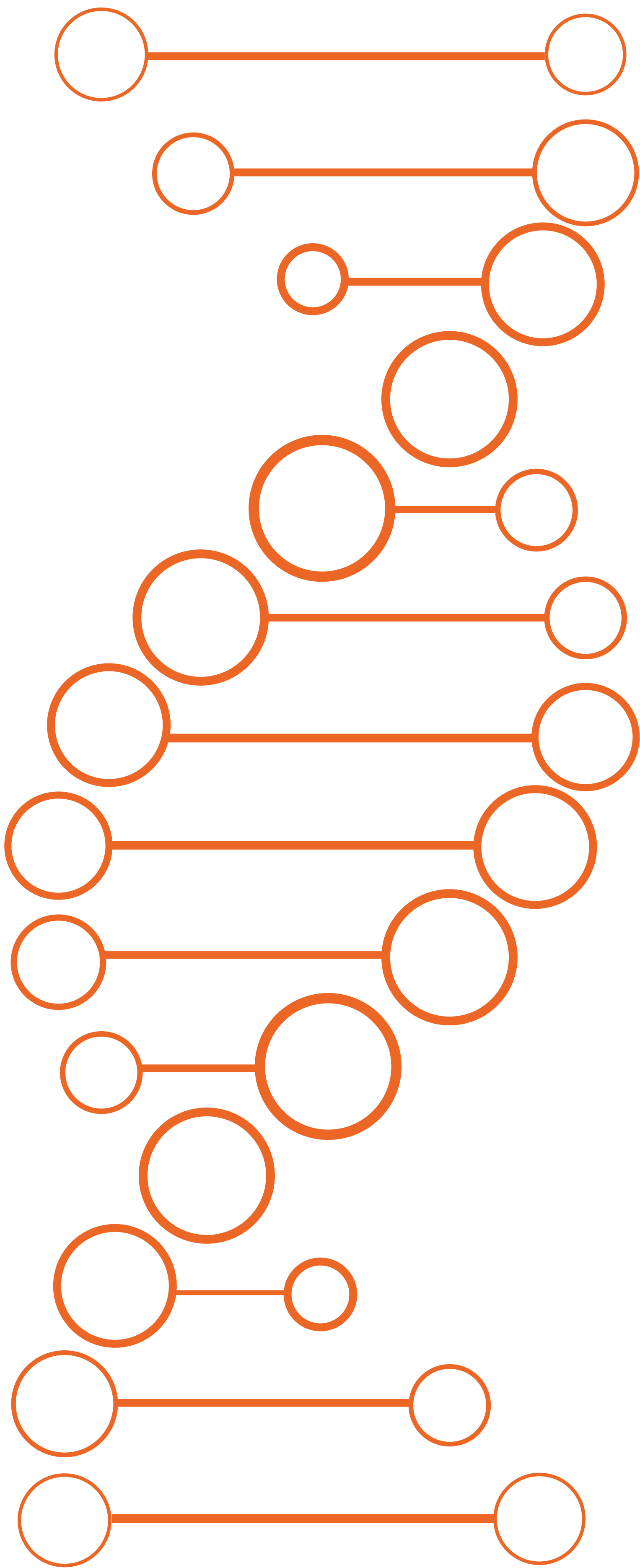
In some cases, PDE5 inhibitors can be used as treatment. However, not every man with Peyronie's disease and erectile difficulties will benefit from this course of action; some men might need surgery. An assessment by a doctor is essential.

HORMONAL PROBLEMS

Hormones are key to sex. If your hormones are out of balance, issues with your erection might follow suit.

Whether you call them ‘nads, balls, nuggets or testicles, if your reproductive organs don’t produce appropriate amounts of sex hormones — a condition termed hypogonadism — your testosterone levels will drop, which can lead to ED.

Hypogonadism can be caused by a number of different conditions. These are either congenital or acquired.



**HYPOGONADISM
CAN BE CAUSED
BY A NUMBER
OF DIFFERENT
CONDITIONS.
THESE ARE EITHER
CONGENITAL OR
ACQUIRED.**

Hypo: From the Greek hupo, meaning under

Gonad: From the Greek gonē, meaning generation, seed

CONGENITAL

(you're born with it)

Congenital causes are generally rarer than acquired causes.



Klinefelter syndrome affects men who have inherited an extra X chromosome — XXY, instead of XY. It is often a subtle diagnosis, picked up later in life when men find they aren't able to have children. This is

because low testosterone levels result in impaired sperm production.

They also include Kallmann syndrome, a genetic disorder which results in an inability to smell, in addition to low testosterone levels.

ACQUIRED

(you *pick it up* along the way)

Acquired causes are much more common.

For example, developing mumps (a viral infection which causes inflammation of the testicles) during childhood can result in a reduced ability to produce testosterone. Luckily, most of us would have been vaccinated against mumps in childhood.

Prolonged use of opioids, such as codeine, morphine, oxycodone, methadone and fentanyl, can also precipitate low testosterone levels. So too can the body builder's dangerous special sauce: anabolic steroids.

Normal ageing also results in a slow decline in the production of testosterone. This is usually not significant enough to result in ED, but in combination with other

factors such as some of the cardiovascular causes listed above, it can become a problem.

Traumatic head injury can be an issue, too. The hypothalamus, the small but crucial hormonal mainframe situated in the middle of the brain, initiates a signalling pathway to the testicles, stimulating them to produce testosterone. If damaged, this process can break down and erectile issues can arise.

DRUG SIDE

effects



Prescription or recreational — there are always side effects to be aware of when taking drugs. An impact on your erection might be one of them.

We've already mentioned a few of the drugs in which ED can be a side effect, but they're just the tip of the iceberg.



PRESCRIPTION MEDICATIONS



We can group these into:

1. Drugs that affect the nervous system

- SSRIs (selective serotonin reuptake inhibitors such as fluoxetine, sertraline and citalopram)
- Tricyclic antidepressants (such as amitriptyline)
- Anti-psychotics (such as haloperidol, chlorpromazine and risperidone)

2. Drugs that affect the cardiovascular system

- Beta-blockers (such as bisoprolol, atenolol and propranolol)
- Spironolactone
- Thiazides (such as bendroflumethiazide)
- Anti-arrhythmics (such as digoxin and amiodarone)

3. Drugs that affect hormones

- Steroids (such as prednisolone and dexamethasone)
- Finasteride and dutasteride
- Anti-androgens (such as bicalutamide, flutamide, enzalutamide and cyproterone acetate)
- Goserelin and leuprorelin

4. Antihistamines

- Such as cimetidine

It's worth noting that the nature of side effects is that they don't affect everyone. Some men will have taken these medications without any problems arising at all. It's worth talking to your doctor if you

RECREATIONAL *drugs*

Clinical data looking at the side effects of recreational drugs on erections is, perhaps unsurprisingly, thin on the ground.

It's challenging (to say the least) to get ethical approval to experiment with illicit substances, no matter how many keen volunteers there might be.

Still, theories and anecdotal data suggest there are three main culprits that can have an impact on erectile functioning:

Alkyl nitrites

(Poppers) cause a drop in blood pressure (which explains the commonly experienced side effects: headaches, dizziness and fainting). This is down to the widespread relaxation of blood vessels. This means there is less blood flow available to the penis, which is why ED can be experienced in people using poppers.

Cocaine

Causes narrowing of the blood vessels, which is the opposite of what's needed to allow an erection to happen.

Alcohol

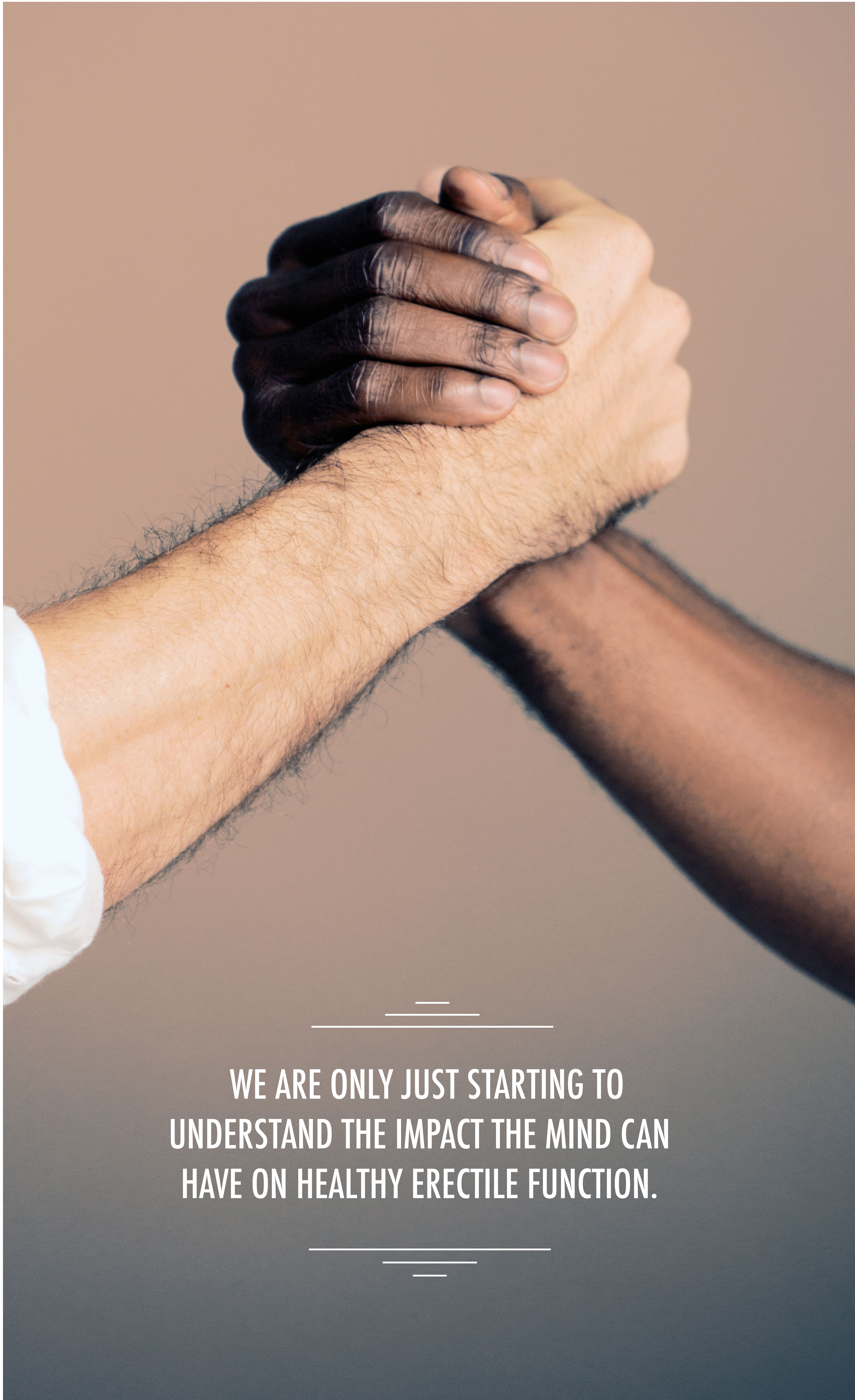
In excess has a negative effect on erectile function in general, as it causes a drop in blood pressure. This might be a short-term problem after a one-off heavy night out. Longer-term, though, alcohol abuse can damage nerve function and cause a more chronic form of ED.

WE'VE COVERED THE KEY PHYSICAL REASONS BEHIND ERECTILE *problems*



It's largely a well-researched and widely understood area of medicine. The same cannot be said for non-physical issues.

From depression to anxiety, we are only just starting to understand the impact the mind can have on healthy erectile function and the extent of the problem in men under 40. In the next chapter, we'll be exploring some of these issues and how to combat them.



WE ARE ONLY JUST STARTING TO
UNDERSTAND THE IMPACT THE MIND CAN
HAVE ON HEALTHY ERECTILE FUNCTION.



CHAPTER 2

WHEN ERECTIONS GO AWRY: PHYSIOLOGICAL CAUSES

YOUR PENIS DOES NOT HAVE A MIND OF ITS OWN.

That much we can be sure of.
Understanding how your mind impacts
your erectile function is less certain.

While the physiological causes of erectile dysfunction (ED) are undoubtedly complex, the science behind it is extensive and — with a little effort — relatively simple to grasp.

The same cannot be said for the psychological causes. When it comes to matters of the mind and healthy erectile function, the waters can fast become muddy.

Psychological problems can interfere with the normal functioning of almost any physiological system, from your skin breaking out in hives, to a no-show erection for the evening's big performance.

Often the symptoms can be alleviated with medication, but the underlying causes and the stories behind them can be much more difficult to untangle, and may require therapy to uncover and analyse.

So, when someone says it's all in your mind, for erectile issues, it often is.

PROBLEMS WITH SELF-EVALUATION



Performance anxiety —
when the show must go on
but sometimes just doesn't.

Take off your expensive shirt, drop your favourite jeans and wriggle out of those lucky pants. Before you know it, you're standing there, naked as the day you were born.

A lot can surface when you're in an intimate setting, and even more when all your clothes are in a pile on someone else's floor.

Performance anxiety comes down to the fact that sex involves two people — or possibly more if you're the experimental kind — meaning there's at least one other person's opinion to worry about.

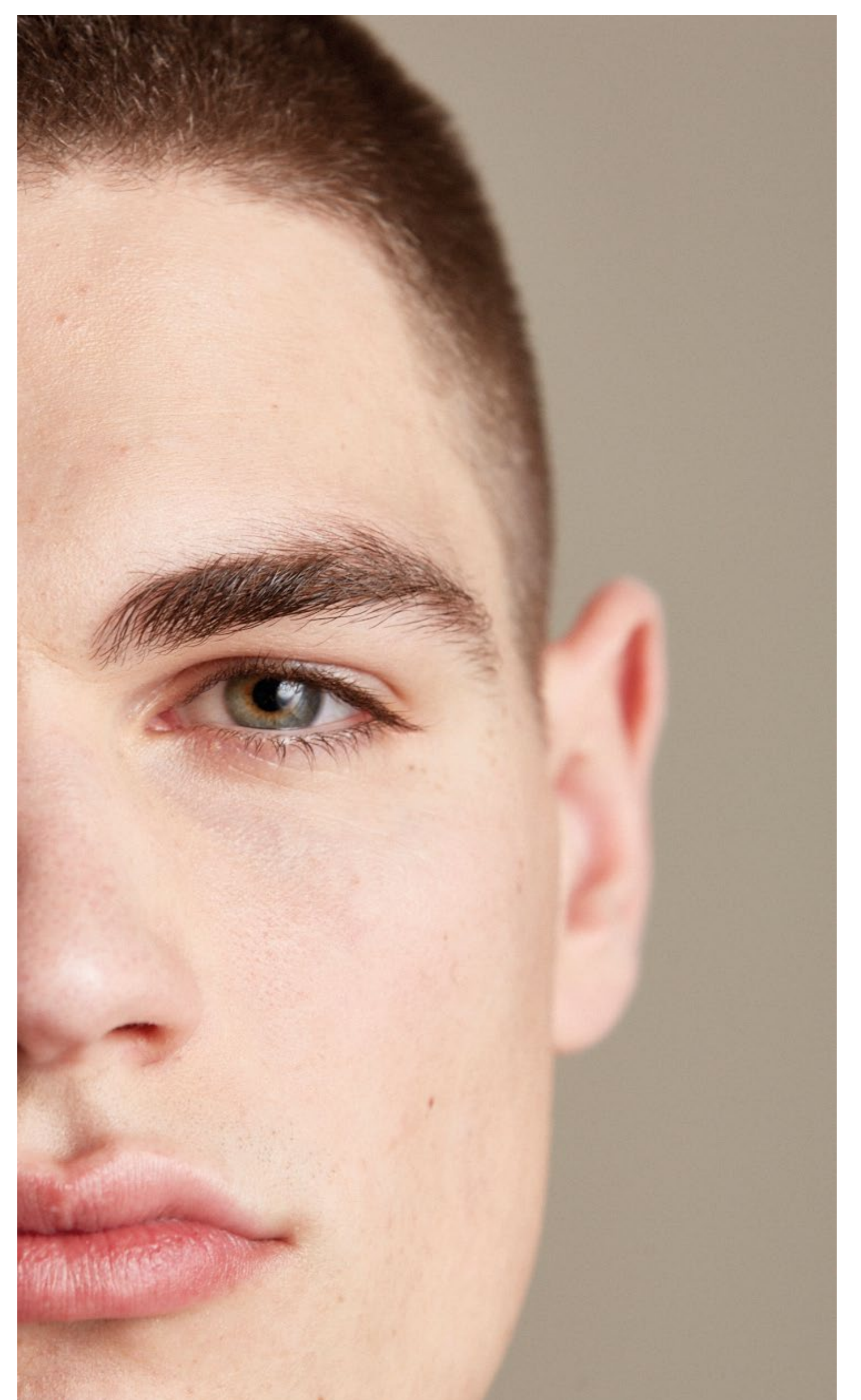
Equally, anxiety might stem from negative ideas about how your body

looks. Most men do not look like Hugh Jackman in Wolverine, but these omnipresent unrealistic expectations about what our bodies should look like persist.

It might be that you struggled to get or keep an erection previously, and you're worried it might be a problem again.

Add to that the sexual athletics and pneumatic genitals on display on the likes of PornHub and concerns about your ability to please your partner or measure up to their previous sexual experiences — that's more baggage than a Hollywood A-lister takes for a weekend away.

IT MIGHT BE THAT
YOU STRUGGLED
TO GET OR KEEP AN
ERECTION PREVIOUSLY,
AND YOU'RE WORRIED
IT MIGHT BE A
PROBLEM AGAIN.



THINK OF IT LIKE A *Tennis* *match*

Become overwhelmed with anxieties, the minutiae of your performance or what others think of your backhand, and you're on a counterproductive path to crashing out in the first set.

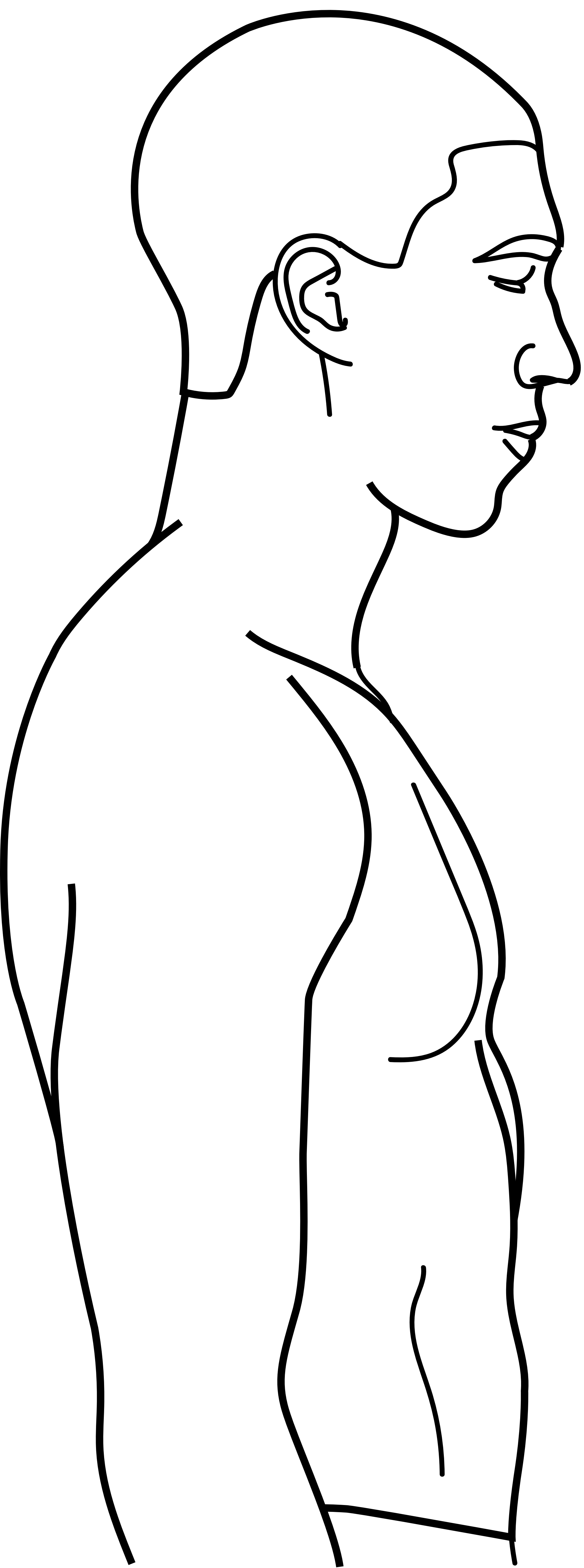


Instead, channel some Novak Djokovic-like confidence and don't be overly focused on your immediate performance. Instead, hone in on your opponent's moves, or in this case, the erotic signals from your sexual partner.

As in tennis, if you want to emit large grunts or ear-piercing screams mid-flow, go for it.

PARTNER OR RELATIONSHIP- ASSOCIATED *problems*

When it comes to long-term relationships, sex and ED, time is not always a healer.



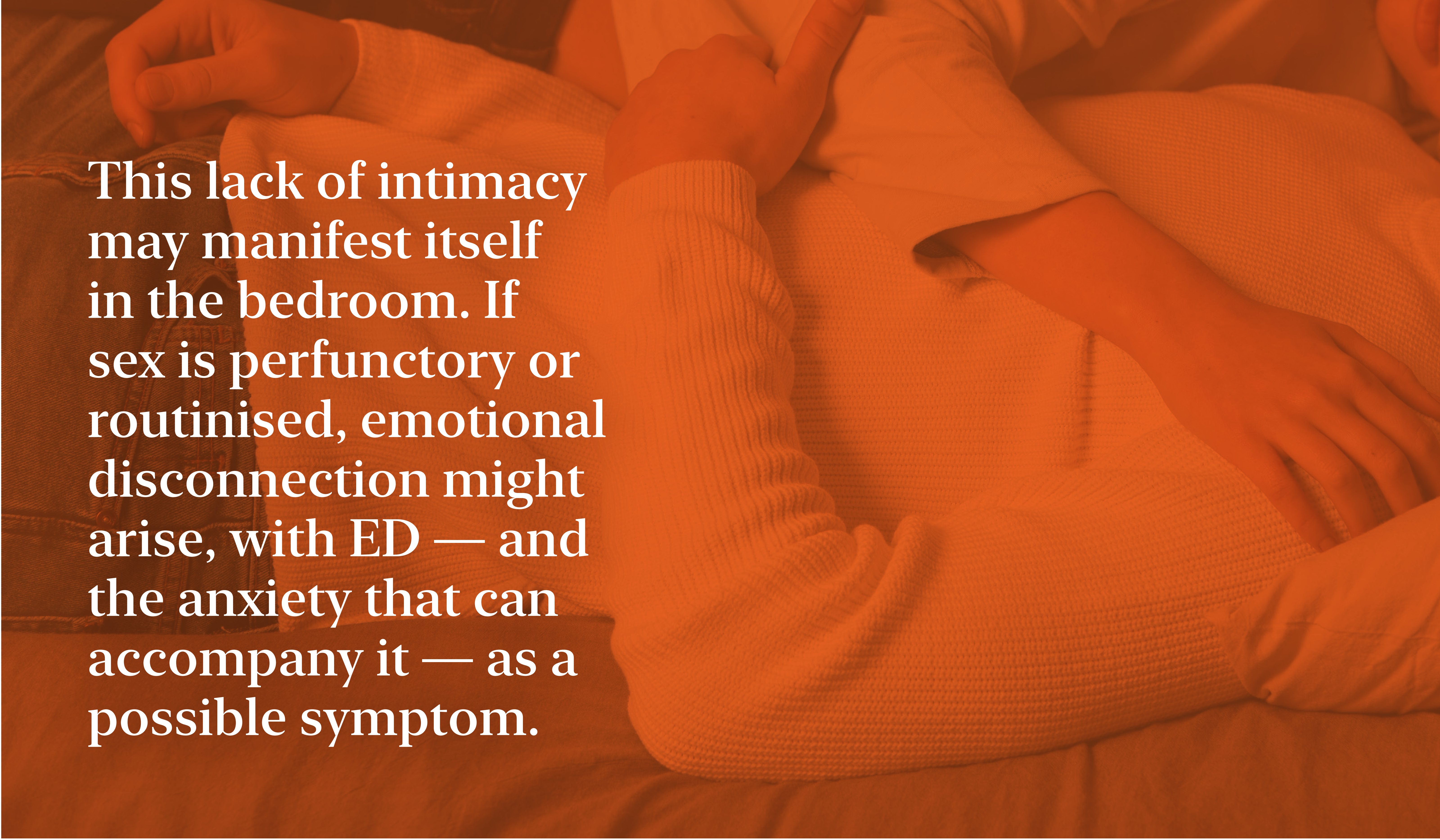
Performance anxiety, as described above, is largely an affliction of star-crossed new lovers. For couples who've seen each other naked as many times as they've had arguments over hot dinners, there are other changes and disruptions in the course of a relationship that can trigger changes in self-esteem.

Whether it's the loss of a job, health problems or trying to make a relationship work after an infidelity, such issues can leave either partner at risk of sexual dysfunctions, including ED.

All relationships, even

the best ones, require tending, like a garden. Without apportioning enough attention to your sex life, things can start to wilt. Early on, sex might have been fantastic, with time to focus on your partner and discover what they enjoy. After a while — perhaps with the addition of children to the household and increased career demands — there may be an intrusion on that abundance.

Before you know it, you have one of those gardens overrun with brambles, upturned patio furniture and a rusty barbecue you haven't used in years.

A photograph of a couple lying in bed, partially covered by a bright orange overlay. The man is on the left, wearing a white shirt, and the woman is on the right, wearing a white sweater. They are both looking towards the camera.

This lack of intimacy may manifest itself in the bedroom. If sex is perfunctory or routinised, emotional disconnection might arise, with ED — and the anxiety that can accompany it — as a possible symptom.

Any kind of sexual dysfunction can trigger shame in the sufferer. A painful reflection that makes you feel like you're fatally flawed can fester and become a destructive force within yourself, and between you and your partner.

The impact of shame can vary greatly depending on how it's handled. Communication is essential, and so is the right reaction from your partner. If you feel judged, or if shame is compounded by behaviours such as shutting down, blaming, or even denying the

problem or keeping it a secret, the problem can deepen.

On the other hand, shame can be dissolved by empathy. Speaking about the problem with your partner whilst keeping the conversation kind and free of blame, labels and judgement is key. Supporting them through the process of seeking out help can even be an opportunity to build connection.

Unfortunately, it is often the case that partners of men with ED can take the problem as a slight on their own attractiveness, ability to sexually

please or maintain attention. Although in some circumstances this may be the case, it most frequently isn't. Reassurances can go a long way.

BEFORE YOU KNOW IT, YOU HAVE ONE OF THOSE GARDENS OVERRUN WITH BRAMBLES, UPTURNED PATIO FURNITURE AND A RUSTY BARBECUE YOU HAVEN'T USED IN YEARS.

PROBLEMS WITH SEXUAL *arousal*

With or without medication, sexual arousal is vital for healthy erectile function.



We all know that changes in mood can affect you and your partner's libido. When it's more than the fallout from a one-off argument about the hot water running out mid-shower and it starts impacting on long-term sexual function, it might be time to seek help.

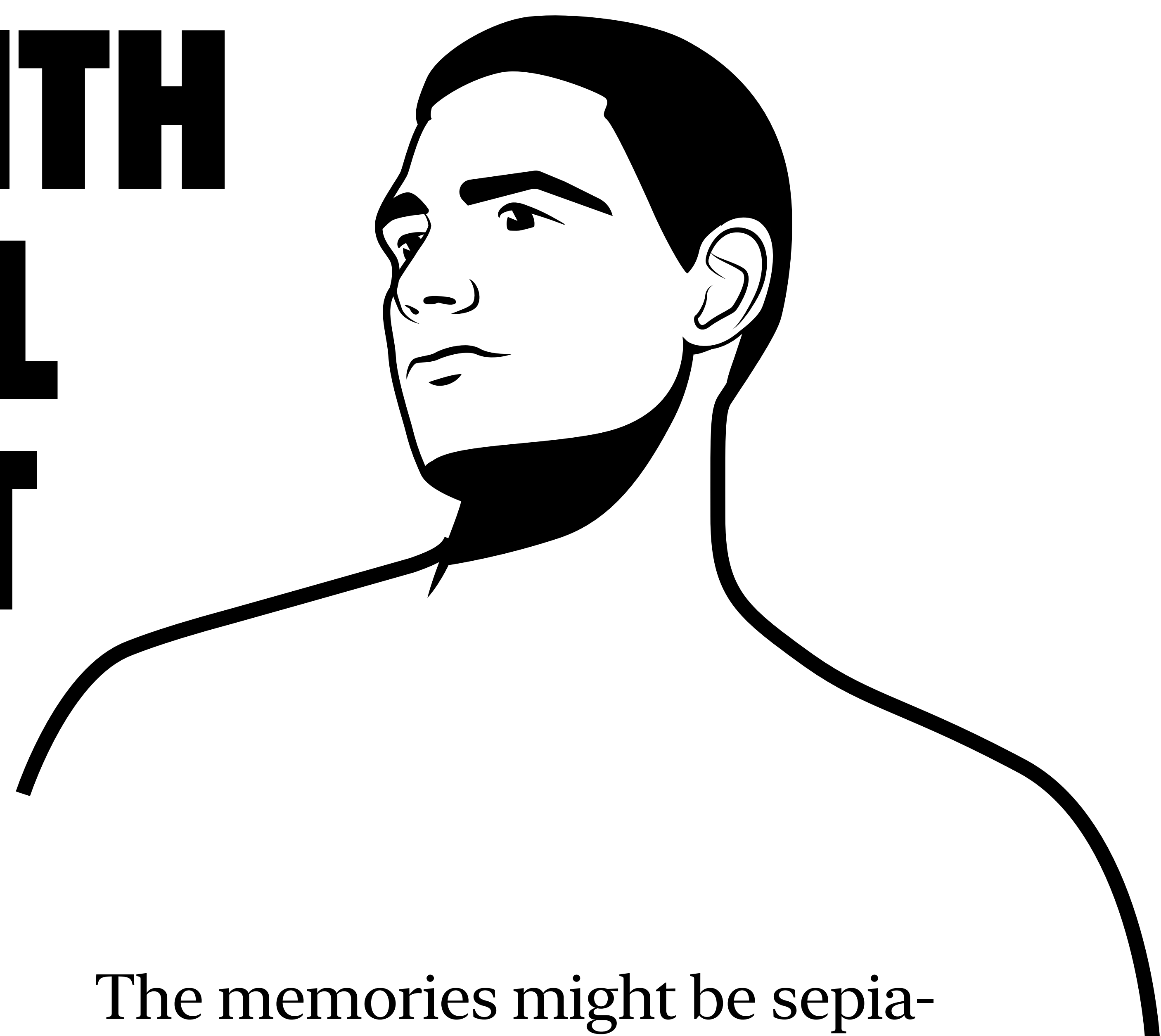
Low mood and depression can lead to an overall loss of interest in sex, as can some of the medications used to treat depression.

ED can also relate to anxiety, whether related to a recent event or something more generalised and chronic.

It is also worth mentioning that erectile dysfunction and overall inability to feel sexually aroused can be related to unspoken or suppressed sexual desires. Desire is incredibly diverse and some of us may have had limited scope to explore what turns us on.

**LOW MOOD AND
DEPRESSION CAN LEAD
TO AN OVERALL LOSS
OF INTEREST IN SEX,
AS CAN SOME OF THE
MEDICATIONS USED TO
TREAT DEPRESSION.**

PROBLEMS WITH PSYCHOSOCIAL DEVELOPMENT



First kisses and early experimental fumbblings can have a lasting effect on your sexuality.



The memories might be sepia-tinged now, but the feelings and attitudes we developed towards sex as we were growing up play a crucial role in our current healthy sexual functioning.

Honesty and openness about sex from an appropriate age, with emphasis on empathy, trust, respect and consent is what is broadly recommended. If, however, you grew up in an environment where attitudes were restrictive towards sexuality, due to certain religious or cultural norms or beliefs held by your family, healthy interest in sex might have been curtailed.

Traumatic experiences of sex, including sexual abuse can of course have an impact on sexual functioning, regardless of the point in life at which they occur. Whilst personal resilience is of huge benefit in these cases, such experiences are most appropriately and safely discussed with a trained counsellor or psychotherapist.

ISSUES AROUND *pornography*

More pornography;
more cases of ED
in young men —
experts say the link
is clear.



While the plots of most porn films are highly predictable, one ending we didn't see coming was the number of men who have suffered from ED as a result of watching it.

How watching porn can impact on healthy sexual functioning is a topic of much discussion currently, and for good reason.

Compulsive sexual behaviour disorder (CSBD) was recognised by the World Health Organization in the 11th edition of the International Classification of Diseases as recently as 2018.

Previously, excessive or problematic use of porn — for example, where personal responsibilities have been neglected to the point that there have been notable negative consequences, or where little to no enjoyment is derived from the activity — was not recognised as a disease that might warrant treatment. This is in spite of the fact that many people clocked this as a problem themselves a long time prior to this formal recognition.

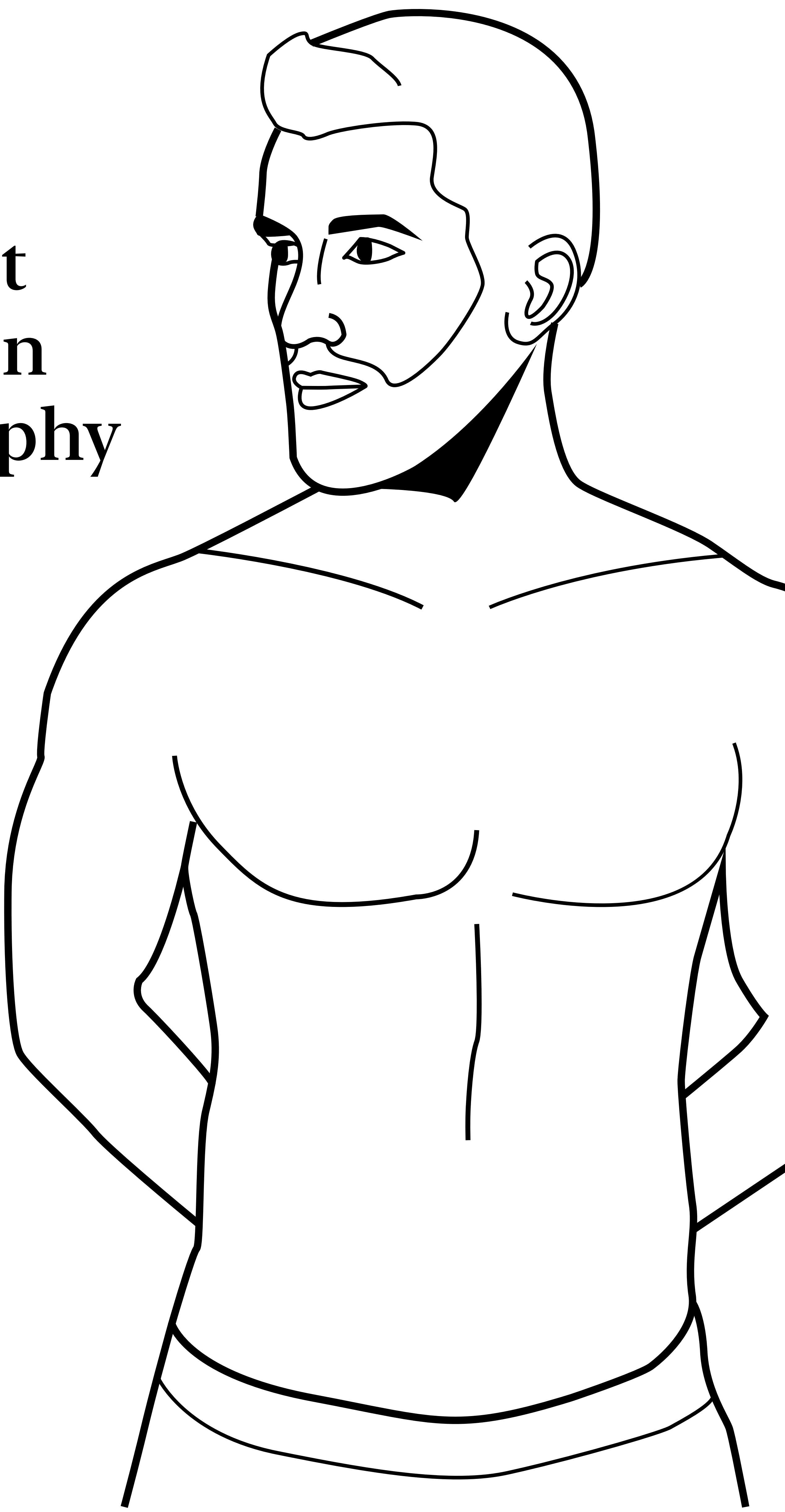
The effect of exposure to explicit sexual content at a young age (on social media, internet pornography sites etc) is now also emerging.

Paula Hall, a psychosexual therapist specialising in helping people affected by porn addiction, has found that the effects cannot be pigeonholed into a single category. “Some young men saw pornography before understanding what sex, or even sexual arousal even was,” she says. “This can severely impact on their ability to develop erections with a partner, as a part of an intimate relationship.”

Not only this, but there are perils of the availability of increasingly hardcore material online. “Some men feel they need progressively more and more hardcore material in order to feel aroused. Not only does this trigger

feelings of shame, but some men even escalate to hiring sex workers to enact certain scenes. These men will often experience difficulty attaining an erection with their regular partner.”

There are different therapeutic methods for treating these disorders, in order to help men (and women) recover their sexuality from porn and develop a healthy and more fulfilling sex life. Abstinence from pornography has been found to rapidly



**SOME MEN FEEL THEY
NEED PROGRESSIVELY
MORE AND MORE
HARDCORE MATERIAL
IN ORDER TO FEEL
AROUSSED.**



CHAPTER 4

KEEPING ERECTIONS HEALTHY

GOOD NEWS! ED IS TREATABLE.

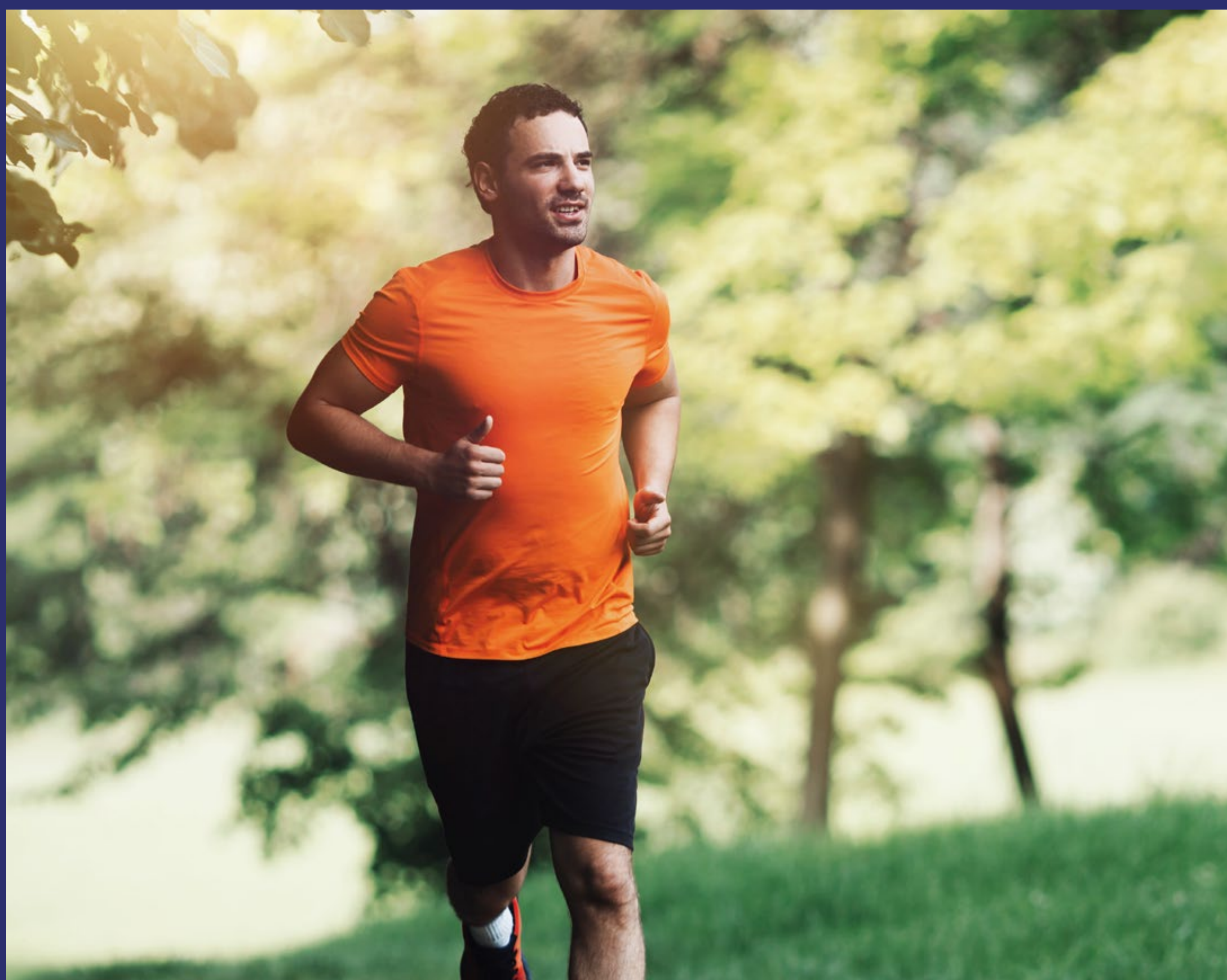
There's no miracle cure or quick fix but there are solutions, and we're here to help you find them.

If you don't have ED, there are still loads of ways to ensure your healthy erections stay that way.

There's no magic bullet for ED. But, once you, with the help of your doctor, have identified the key causes of your ED, treatments can be tailored and combined to produce an effective solution.

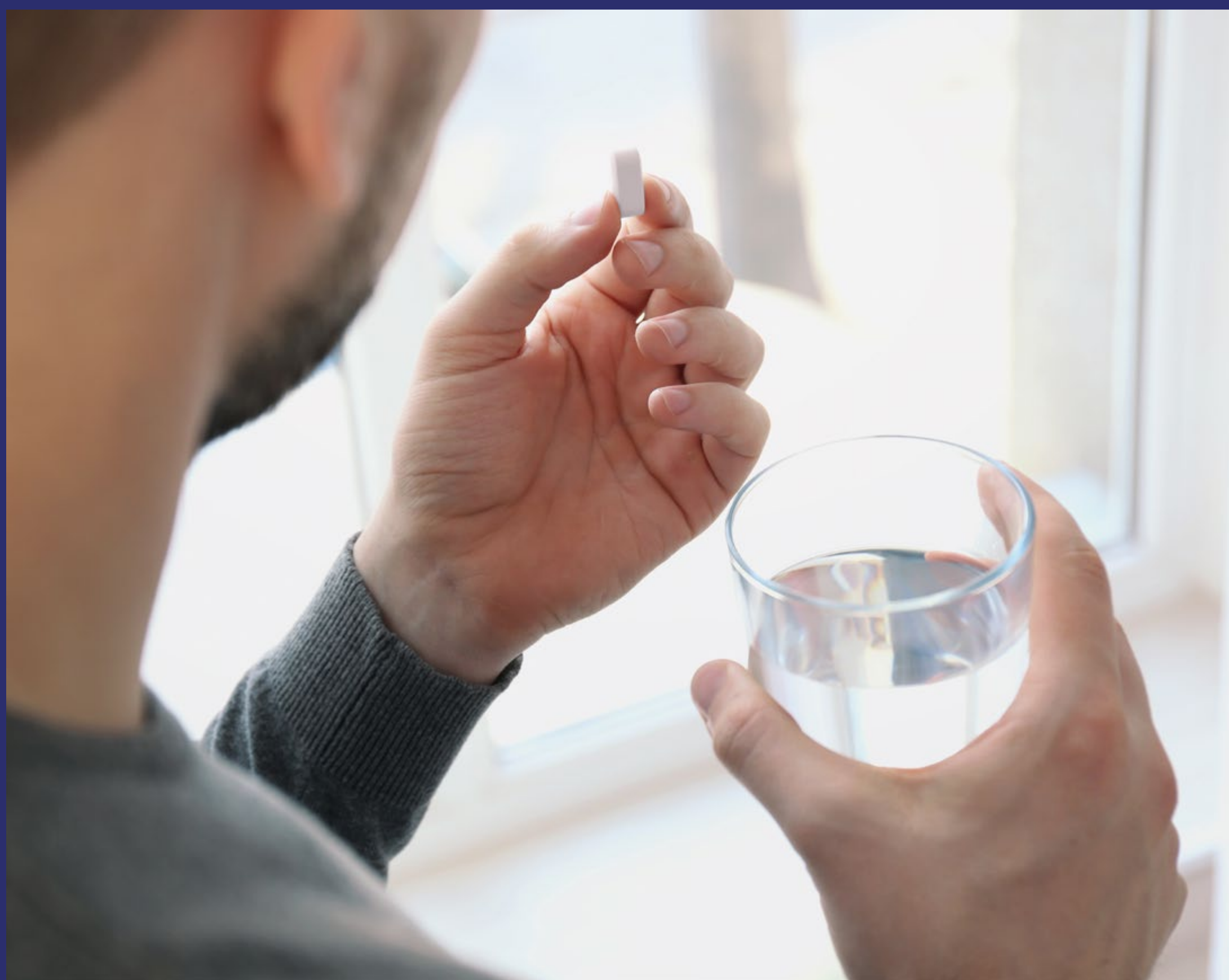
With the causes of erectile dysfunction specific to the individual, it's only natural that their solutions differ greatly too.

Let's break these solutions down into four key sections:



1. Lifestyle advice

Changes you can make on your own to help with ED.



2. Medical treatments

The investigations your doctor might arrange and the medicines they might prescribe to help with ED.



3. Psychological therapies

The different courses and types of therapy that can help with ED.



4. Surgical treatments

If other treatments haven't worked, the treatments and procedures that a urologist might recommend to help with ED.

LIFESTYLE *advice*

Make improvements to your lifestyle and your erection will thank you later.

There are many changes you can make to your own lifestyle which can help banish ED for good.

Here's where to start:

1



Controlling your weight and taking care of your cardiovascular health

That means a better diet, more exercise and stopping smoking once and for all.

2



Minimising consumption of substances and content that can make ED worse

That includes drugs and alcohol, and going easy on the pornography.

3



Training your parasympathetic nervous system (PSNS)

Finding a more relaxed, less-stressed state through meditation and mindfulness.

EAT LIKE AN *Italian*

Diet, exercise, smoking and your cardiovascular health.



As Feargal Sharkey sang, a good heart these days is hard to find. Sharkey, of course, is fully aware of the correlation between heart disease and erectile dysfunction.

Luckily, whatever your age, it's possible to improve your cardiovascular health with small lifestyle changes.

Eat more fruit and vegetables, consume less sugar and sprinkle a little less salt. The latter causes the body to conserve more water, and can lead to high blood pressure which we know from chapter 3, can increase your risk of having a heart attack or stroke, as well as ED.

One answer is to eat like an Italian — the healthy ones, not the weightier ones you see struggling to get up a hill on a Vespa. The Mediterranean diet — fresh fruit and vegetables, legumes and nuts, unsaturated fats from olive oil and less red meat and dairy — has been shown to prevent cardiovascular disease and stop it from progressing if already present.

We all know frequent exercise is essential but if you're looking for a bit more motivation, you could visualise a healthy erection when trying to do a few more minutes on the cross trainer.



Regular exercise keeps your heart and blood vessels in good shape — better blood flow, better erections.

The more muscles your body has to recruit for a particular exercise, the harder your heart works to pump blood to all of them, and the stronger and healthier it gets.

Swimming is particularly effective because it uses so many muscle groups, but all kinds of exercise, done properly, will help.

The final point, which you already know:

smoking. Cigarette smoke mounts a multi-pronged attack on the body, damaging blood vessels which leads to the buildup of fatty plaques inside the arteries. That's without mentioning the tar deposits, emphysema and carcinogenic effects on the lungs. Stopping smoking has (unsurprisingly) been shown to improve erectile function — the sooner you quit, the better chance your erectile function has of improving.

**STOPPING
SMOKING HAS
(UNSURPRISINGLY)
BEEN SHOWN TO
IMPROVE ERECTILE
FUNCTION.**



THE TRICKY *trio*

Alcohol, drugs
and pornography.



We'll get straight to the point: when it comes to erections, alcohol, drugs and pornography can be like Kryptonite to Superman.

Alcohol and certain illicit drugs can inhibit adequate blood flow to the penis which, as we noted in chapter 2, can stop you from being able to get or maintain an erection that's sufficient for sex.

More generally, dependence on alcohol and drugs can attest to latent mental health problems, such as depression and anxiety, which in themselves can cause ED. Using substances as a coping mechanism for stress and more serious mental health issues is all too common, but they can

frequently exacerbate the problem.

Alcohol, for example, is a depressant. That brief feeling of disinhibition and confidence you get when you have a drink? That's the effect of alcohol depressing the bits of the brain that control your inhibitions. Additional drinks go on to depress other parts of the brain, causing slurring of speech, aggression, anxiety and ultimately, loss of consciousness. It's no surprise, then, that it's known to make mental illness worse.

Numbing with substances might be something you can talk about with friends; the same, in most cases, cannot be said for compulsive pornography use.

Men who find it easy to attain an erection when using porn but difficult with a partner, or who find themselves having to recall porn scenes in order to attain an erection with their partner, may already realise that their porn use is problematic.

The good news? Giving up internet pornography is sometimes enough to reverse the problem, and to help rewire the reward pathways in the brain that are thought to cause dependence on porn. Don't forget though, there may be underlying stress and anxiety leading to the addictive behaviour in the first place. Those may require more concentrated treatment — more on that later.

...AND RELAX:

Training your parasympathetic nervous system.



Your nervous systems is your erection's boss and line manager. Too much stress, communication breaks down, and quickly the whole show goes to pot.

Healthy erectile function requires one key attribute: relaxation. Let's remind ourselves briefly of the role of the parasympathetic nervous system (PSNS), which we covered in detail in chapter 1.

**HEALTHY ERECTILE
FUNCTION REQUIRES
ONE KEY ATTRIBUTE:
RELAXATION.**

When your body is in a relaxed state, the PSNS activates a cascade of events which leads to an erection in response to erotic signals. It makes sense then, to optimise conditions for it to do its job as it's supposed to.

The PSNS is suppressed by stress, which activates the sympathetic nervous system (SNS) and drives away your erection. So, the first thing to try and work on here is stress reduction. Easier said than done, we know.

Mindfulness may make you think of Gwyneth Paltrow advocating some sort of five-star face yoga (actually a thing) but many of the techniques used have genuinely been

shown to ameliorate symptoms of depression, anxiety and chronic pain. They also reduce blood pressure, a useful marker of reduced SNS activity.

Mindfulness-based stress reduction (MBSR) and mindfulness-based cognitive therapies (MBCT) incorporate some of the meditation practices used in mindfulness courses and apps.

Combined movement and breathing techniques taught in practices like yoga and tai chi may also be helpful. There's only been a small study on mindfulness techniques for ED specifically, but it showed encouraging results.

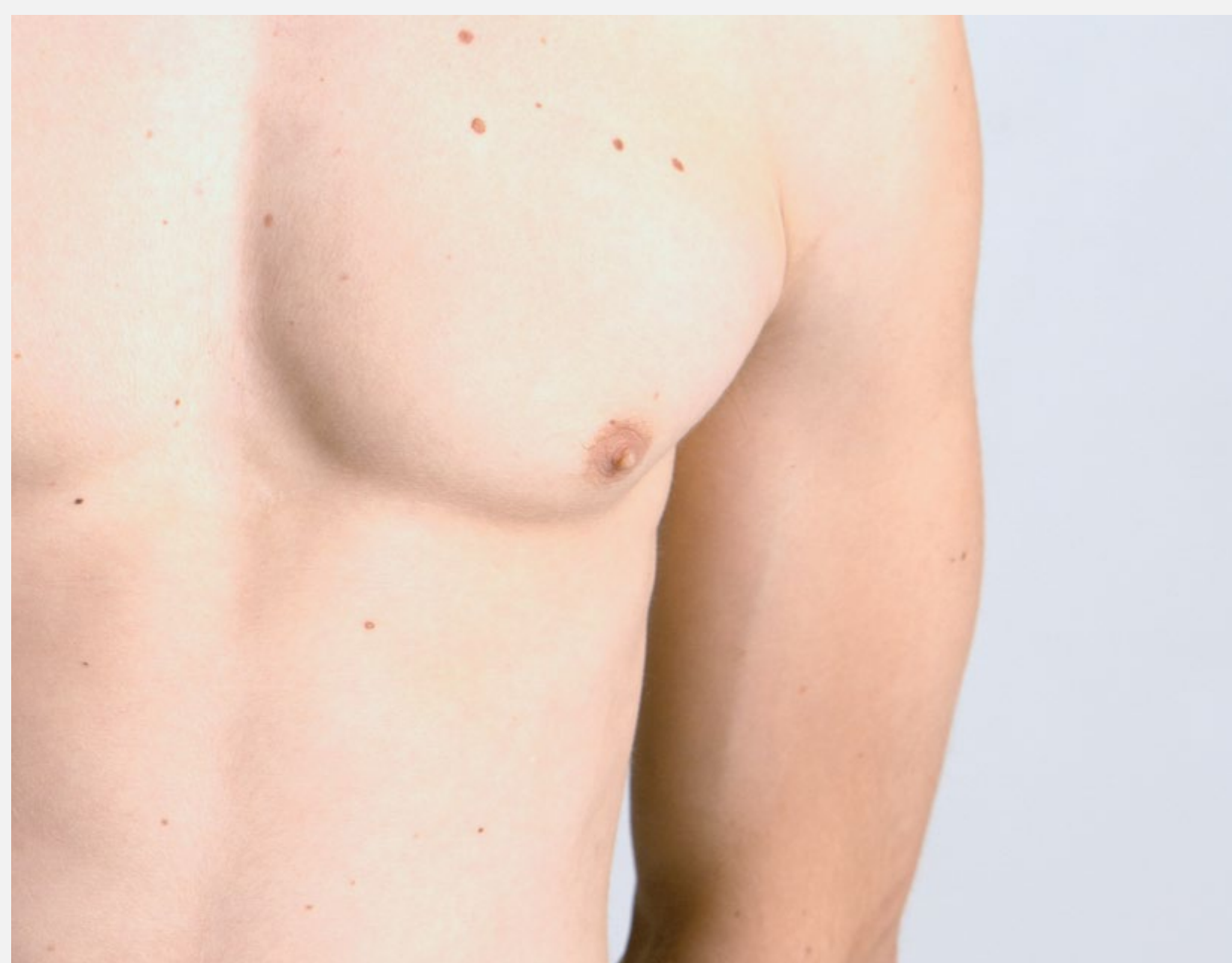
MEDICAL *treatments*

Simple and effective.

Visit your doctor for ED and the first thing they'll do is repeat the lifestyle advice above, ad nauseam.

In assessing you for underlying causes, they may wish to perform a physical examination to check for anatomical and neurological abnormalities.

They'll most likely test:



Your BMI and
blood pressure

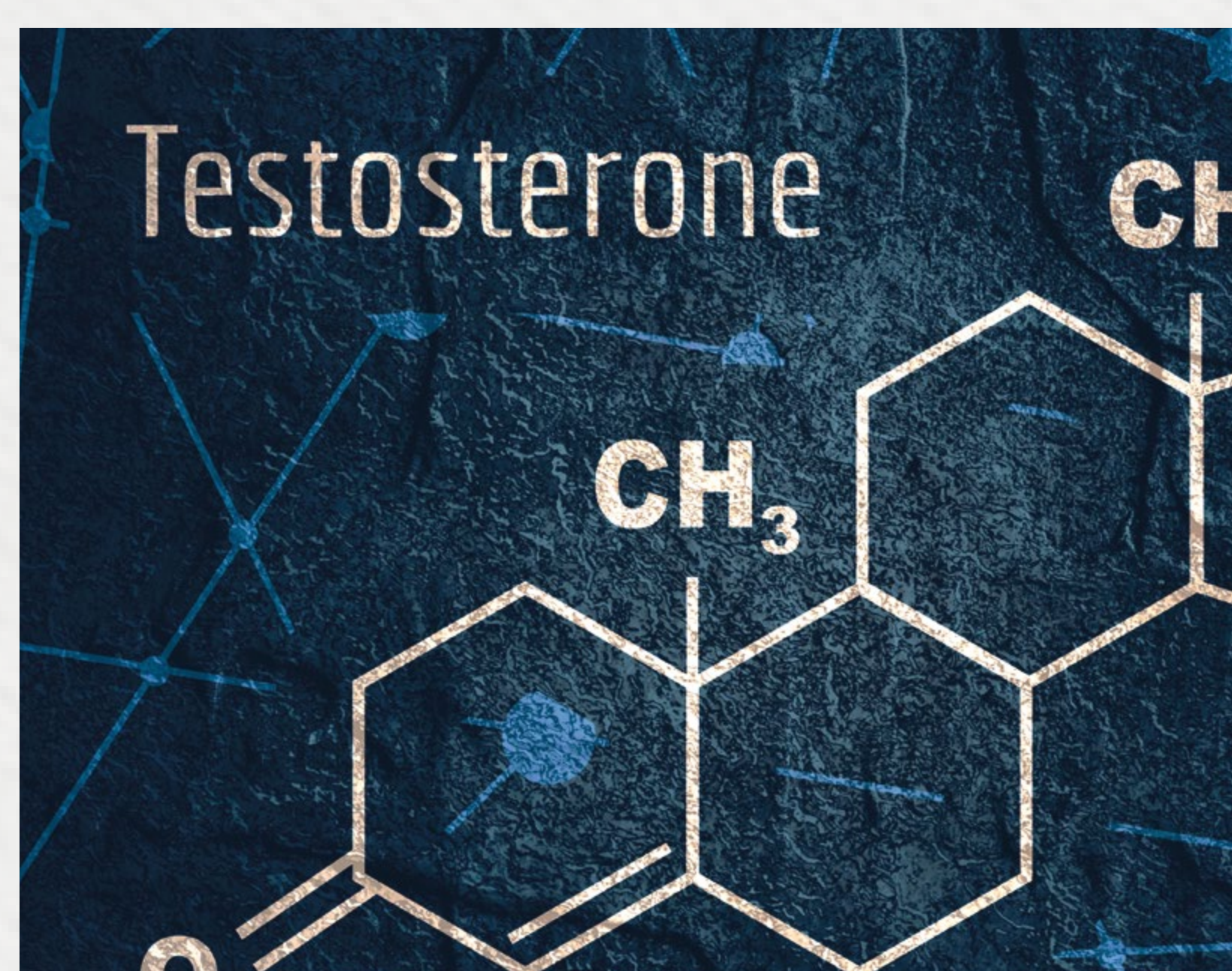


A lipid profile
of your blood,

which shows your different
levels of cholesterol
subtypes

The results of these tests should provide a fairly good idea of whether there are any underlying physical problems that could need treatment. Your doctor will be particularly interested in assessing your cardiovascular risk factors (see

chapter 2) because as we mentioned earlier, erectile dysfunction may be an early sign of heart disease. Initial treatments might include blood pressure medication or cholesterol-lowering drugs, such as statins and anti-diabetic medications.



An HbA1c level,
which can diagnose diabetes

Your testosterone level

(normally taken first thing
in the morning)



Then there's the question of medication which specifically treats ED as a symptom.



The cornerstone of ED medication remains the PDE5 inhibitors, such as sildenafil and tadalafil. These are used as a first-line treatment unless there are specific reasons that they could be unsuitable or harmful to you.

In chapter 1, we talked about exactly how these work. Here's a recap: essentially, a molecule called cGMP, activated by the PSNS, signals the arteries and muscular tissue in your penis to relax, which lets it fill with blood and become hard.

The cGMP normally gets broken down by an enzyme called PDE5. The PDE5-inhibiting medicines stop this enzyme working, letting the arteries and muscular tissue stay relaxed. Et voilà: a harder, longer-lasting erection.

Normally, if the initial dose you're given doesn't work well for you, you can try a different dose, or an alternative PDE5-inhibiting medication.

PSYCHOLOGICAL *therapies.*

Look after your mind, and your body (and hopefully your erection) will follow.

As we mentioned in chapter 3, erectile difficulties may have psychological roots. In these cases, you may wish to directly seek, or be referred for, psychological therapy.

Here are the most common types of therapy used to treat men seeking psychological treatment for ED:

Cognitive behavioural therapy (CBT)

CBT is a type of talking therapy which focuses on identifying negative thoughts and behavioural patterns so you can examine and challenge them. The therapy encourages the development of targeted positive coping methods.

This can be useful for men who struggle with negative ideas about themselves and poor self-esteem, both of which might impact sexual performance.





Group work

Group work is commonly and successfully used for addiction-based problems. It normally consists of individuals sharing experiences, insights and feelings with each other and a trained therapist.

This may be daunting at first, but it can be helpful for issues such as compulsive use of pornography which can be a factor impacting erectile function.

Psychotherapy

Both CBT and group work, unlike psychotherapy, are often confined to a set number of sessions or a specified course.

For problems that require more in-depth, long-term support — such as troubled psychosocial development or traumatic sexual experiences — psychotherapy can be a suitable alternative.

Couples therapy

Couples therapy is useful when the underlying issues pertain more to your relationship, or where ED as a symptom has brought problems to the surface that are not being constructively discussed between you both.

Once again, couples therapy may seem intimidating, but it can provide a diplomatic way of addressing your issues in a safe and supportive environment.



SURGICAL *treatments.*

For when the drugs don't work.

While it may sound like an extreme route, there are a number of reasons that surgical treatments might be necessary. They offer a less convenient, but still effective alternative to medication.

If PDE5 inhibitors don't work for you, aren't suitable, or if you experience intolerable side effects, there are other treatments that can be considered. These are normally decided on and recommended by a urologist, who might suggest one of the following:



Injectons and suppositories

A medicine called prostaglandin E1 works by dilating the blood vessels near to where it's released. When it's administered, either by injection into the corpus cavernosum of the penis or by insertion of a suppository into the urethra, it brings about erection by allowing blood to fill the penis.

Vacuum erection assistance device (VED)

This cylindrical device is placed over the penis before all the air is pumped out. It creates a vacuum, which causes the penis to fill with blood. Once this is complete, a tight ring is placed at the base of the penis to help the blood stay there and for an erection to be maintained.

Vascular surgery or angioplasty

If blockages are found in a larger artery supplying the penis, vascular surgery or angioplasty may be considered. The latter is a minimally invasive surgery which widens narrowed blood vessels.

Penile prosthesis

Usually a last resort as it's a fairly invasive procedure, a penile prosthesis is only recommended when all other treatment methods have failed. The prostheses permanently replace the corpus cavernosum, which is the erectile tissue in the penis. These are then usually inflated with a pump, resulting in an erection.

THANK YOU FOR READING. IT'S BEEN A *journey*

We've taken you through the anatomy of an erection from start to finish.

We've looked at how erections can go wrong, through no fault of our own, or when our lifestyle choices have an unexpected impact on our sexual health.

We've rounded off our journey right here — looking at how the symptoms of ED can, for many, be simply and effectively treated. And while the root causes can be diverse and complex, they can be tackled or ameliorated.

The science and research behind ED and its treatment continues to evolve and improve, and we'll be keeping track of those developments — and indeed the whole world of male health and wellness — on our journal, Numankind.

If you've enjoyed this book and found the content interesting, useful, or both, we'd love to know. We look forward to seeing you at Numankind.

REFERENCES

Ambrose, J. and Barua, R. (2004). The pathophysiology of cigarette smoking and cardiovascular disease. *Journal of the American College of Cardiology*, 43(10), pp.1731-1737.

Benyamin, R., Trescot, A., Datta, S., Buenaventura, R., Adlaka, R., Sehgal, N., Glaser, S. and Vallejo, R. (2008). Opioid complications and side effects. *Pain Physician*, 11(2 Suppl), pp.S105-20.

Cks.nice.org.uk. (2019). Erectile dysfunction - NICE CKS. [online] Available at: <https://cks.nice.org.uk/erectile-dysfunction#!scenario> [Accessed 29 Jan. 2019].

Bossio, J., Basson, R., Driscoll, M., Correia, S. and Brotto, L. (2018). Mindfulness-Based Group Therapy for Men With Situational Erectile Dysfunction: A Mixed-Methods Feasibility Analysis and Pilot Study. *The Journal of Sexual Medicine*, 15(10), pp.1478-1490.

Brown, B. (2016). *Daring Greatly: How the Courage to be Vulnerable Transforms the Way We Live, Love, Parent, and Lead*. London: Penguin Books Ltd.

Dean, R. and Lue, T. (2005). Physiology of Penile Erection and Pathophysiology of Erectile Dysfunction. *Urologic Clinics of North America*, 32(4), pp.379-395.

Estruch, R., Ros, E., Salas-Salvadó, J., Covas, M., Corella, D., Arós, F., Gómez-Gracia, E., Ruiz-Gutiérrez, V., Fiol, M., Lapetra, J., Lamuela-Raventos, R., Serra-Majem, L., Pintó, X., Basora, J., Muñoz, M., Sorlí, J., Martínez, J. and Martínez-González, M. (2013). Primary Prevention of Cardiovascular Disease with a Mediterranean Diet. *New England Journal of Medicine*, 368(14), pp.1279-1290.

Gotink, R., Chu, P., Busschbach, J., Benson, H., Fricchione, G. and Hunink, M. (2015). Standardised Mindfulness-Based Interventions in Healthcare: An Overview of Systematic Reviews and Meta-Analyses of RCTs. *PLOS ONE*, 10(4), p.e0124344.

Hall, P. (2019). *Understanding and treating sex and pornography addiction*. 2nd ed. Oxon: Routledge.

Kalman, T. (2008). Clinical Encounters with Internet Pornography. *The Journal of the American Academy of Psychoanalysis and Dynamic Psychiatry*, 36(4), pp.593-618.

Mente, A., de Koning, L., Shannon, H. and Anand, S. (2009). A Systematic Review of the Evidence Supporting a Causal Link Between Dietary Factors and Coronary Heart Disease. *Archives of Internal Medicine*, 169(7), p.659.

Marceau L, Kleinman K, Goldstein I, McKinlay J. Does bicycling contribute to the risk of erectile dysfunction? Results from the Massachusetts Male Aging Study (MMAS). *Int J Impot Res*. 2001;13:298-302.

Park, B., Wilson, G., Berger, J., Christman, M., Reina, B., Bishop, F., Klam, W. and Doan, A. (2016). Is Internet Pornography Causing Sexual Dysfunctions? A Review with Clinical Reports. *Behavioral Sciences*, 6(3), p.17.

Pourmand, G., Alidaee, M., Rasuli, S., Maleki, A. and Mehraei, A. (2004). Do cigarette smokers with erectile dysfunction benefit from stopping?: a prospective study. *BJU International*, 94(9), pp.1310-1313.

Rajendran, R. and Cummings, M. (2012). Erectile dysfunction: a weighty issue?. *Practical Diabetes*, 29(1), pp.32-35.

Rajendran, R. and Cummings, M. (2014). Erectile dysfunction: assessment and management in primary care. *Prescriber*, 25(12), pp.25-30.

Refieian-Kopaei, M., Setorki, M., Douadi, M., Baradaran, A. and Nasri, H. (2014). Atherosclerosis: Process, Indicators, Risk Factors and New Hopes. *Int J Prev Med*, 5(8), pp.927-946.

Rodriguez, J., Al Dashti, R. and Schwarz, E. (2005). Linking erectile dysfunction and coronary artery disease. *International Journal of Impotence Research*, 17(S1), pp.S12-S18.

Rowland, D. (2012). *Sexual dysfunction in men*. Cambridge, Mass: Hogrefe.

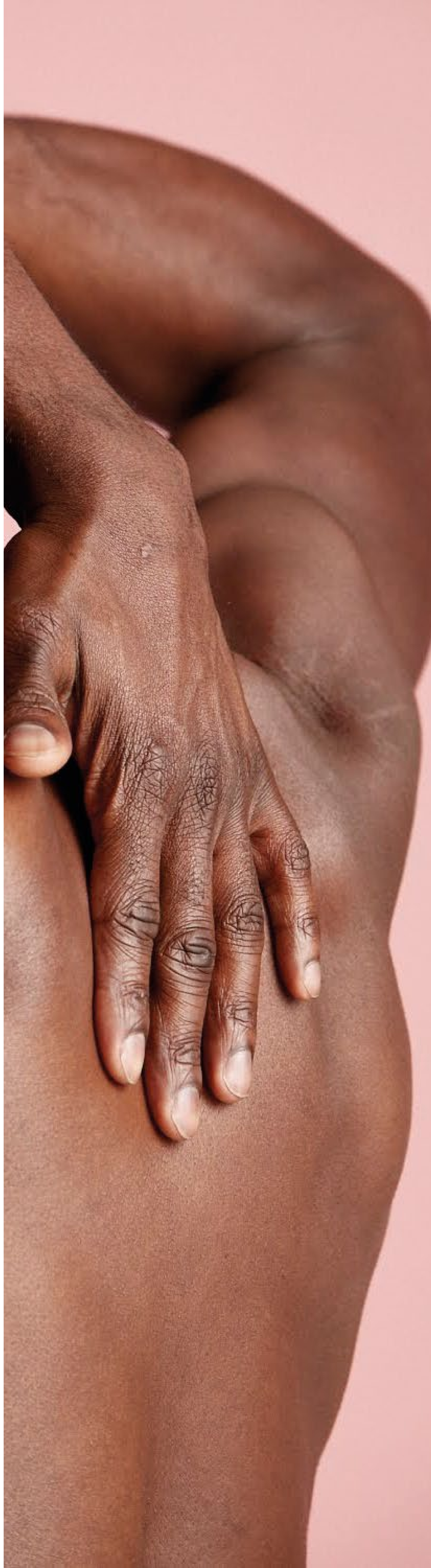
Schwartz, B. and Kloner, R. (2011). Cardiovascular Implications of Erectile Dysfunction. *Circulation*, 123(21).

Tang, G., Meng, X., Li, Y., Zhao, C., Liu, Q. and Li, H. (2017). Effects of Vegetables on Cardiovascular Diseases and Related Mechanisms. *Nutrients*, 9(8), p.857.

Terra, M., Pedrosa, D., Zoppi, C., Werneck, C. and Vicente, C. (2019). Physical exercises decreases thrombus and neointima formation in atherosclerotic mice. *Thrombosis Research*, 175, pp.21-31.

Traish, A., Goldstein, I. and Kim, N. (2007). Testosterone and Erectile Function: From Basic Research to a New Clinical Paradigm for Managing Men with Androgen Insufficiency and Erectile Dysfunction. *European Urology*, 52(1), pp.54-70.

Widmer, R., Flammer, A., Lerman, L. and Lerman, A. (2015). The Mediterranean Diet, its Components, and Cardiovascular Disease. *The American Journal of Medicine*, 128(3), pp.229-238.





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