Erectile Dysfunction

Training Module

What is Erectile Dysfunction?

Erectile dysfunction (impotence) is the inability to get and keep an erection firm enough for sex.

1. *Symptoms of Erectile Dysfunction*

- being able to get an erection sometimes, but not every time you want to have sex
- being able to get an erection, but not having it last long enough for sex
- being unable to get an erection at any time
- reduced sexual desire

In easy language,

Erectile dysfunction symptoms might include persistent:

- Trouble getting an erection
- Trouble keeping an erection
- Reduced sexual desire

2. *Causes of Erectile Dysfunction*

1. Biological Causes
    - Cardiovascular Diseases - Conditions such as atherosclerosis (hardening of the arteries or the buildup of plaques in the arteries), high blood pressure, and high cholesterol can impair blood flow to the penis leading to erectile dysfunction. Peripheral Artery Disease i.e., reduced blood flow in arteries other than the coronary arteries can also affect erectile function.
    - Diabetes - High blood sugar levels can damage blood vessels and nerves that control erection.
    - Hormonal Imbalances - Hormones play a crucial role in regulating sexual function, and any disruption in hormonal levels can significantly impact erectile capability. Low levels of testosterone also known as hypogonadism or other hormonal issues can contribute to ED.
    - Neurological Disorders - Multiple Sclerosis can damage the nerves involved in the erectile process. Other neurological diseases like Parkinson's disease and damage to spinal cord can affect the nerves, the transmission nerve impulses and brain centres involved in sexual arousal. Neurological causes also include stroke and partial complex seizures.

- Medications - Some drugs, including certain antihypertensives, antidepressants, and antipsychotics, can cause ED as a side effect.
- Obesity – Excess body weight is associated with vascular disease, diabetes, and hormonal imbalances, all of which can contribute to ED.

2. Psychological Causes
    - Stress, anxiety and Depression - Mental health issues like stress, anxiety and depression can interfere with sexual arousal and performance. High levels of stress and anxiety can interfere with sexual arousal and the ability to achieve an erection. Performance anxiety, in particular, can create a cycle of ongoing erectile difficulties. Depression can reduce libido and impair the neurological pathways involved in sexual arousal.
    - Relationship Issues- Interpersonal conflicts and lack of communication with a partner can affect sexual performance.

3. Environmental and Lifestyle Causes
    - Smoking, Alcohol and Substance abuse - Smoking can damage blood vessels and reduce blood flow to the penis. Excessive alcohol consumption and drug use can also impair erectile function.
    - Lack of Physical Activity - Sedentary lifestyles are associated with obesity, cardiovascular disease, and reduced blood flow, all of which can contribute to ED.
    - Poor Diet - Diets high in saturated fats, sugars, and processed foods can lead to obesity, diabetes, and vascular disease, increasing the risk of ED.
    - Sleep Disorders - Conditions such as sleep apnea can affect hormone levels and blood flow, leading to erectile difficulties.

4. Anatomical and Structural Causes
    - Peyronie's Disease - The development of fibrous scar tissue inside the penis can cause curved, painful erections and difficulty maintaining an erection.
    - Penile Injuries - Trauma or injury to the penis, pelvis, or perineum can damage the vascular and nerve structures involved in erection.
    - Surgery - Surgeries involving the prostate, bladder, or colon can damage nerves and blood vessels critical to erectile function.

3. ***Types of Erections***

- Reflexogenic Erection – This happens when someone touches the genitals and triggers arousal. This erection happens during masturbation or sexual foreplay.

- Psychogenic Erection – This happens when you think of sexual memories or fantasies. This type of erection happens without physical touch.
- Nocturnal Erection – This erection happens when you're asleep. These occur more commonly during the deep stages of sleep.

4. ***Types of Erectile Dysfunctions***

There are different types of erectile dysfunction (ED):

- **Primary ED,** the man has never been able to attain or sustain an erection
- **Secondary ED,** acquired later in life by a man who previously was able to attain erections
- **Situational ED,** where because of a certain situation, a man is unable to have or maintain an erection

Primary ED is rare and is almost always due to psychological factors or clinically obvious anatomic abnormalities.

Secondary ED is more common, and > 90% of cases have an organic etiology. Many men with secondary ED develop reactive psychologic difficulties that compound the problem.

Psychologic factors, whether primary or reactive, must be considered in every case of ED. Psychologic causes of primary ED include guilt, fear of intimacy, depression, or anxiety. In secondary ED, causes may relate to performance anxiety, stress, or depression. Psychogenic ED may be situational, involving a particular place, time, or partner.

Situational ED is a form of ED that occurs only during certain circumstances. For example, some men may have trouble maintaining an erection with a partner but not during masturbation. Psychological factors, such as nervousness or performance anxiety often cause it. Targeting the psychological cause is usually the best treatment option in these cases. Alcohol and drug use can also lead to situational ED.

5. ***Physiology of an Erection***

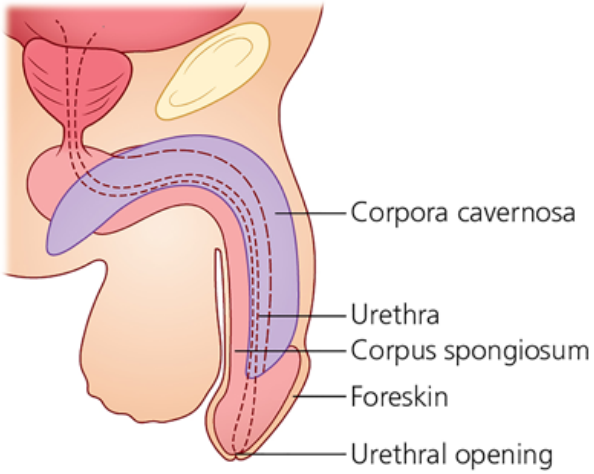
An erection begins with sensory and mental stimulation in your brain. Your brain sends messages to your penis via your nerves.

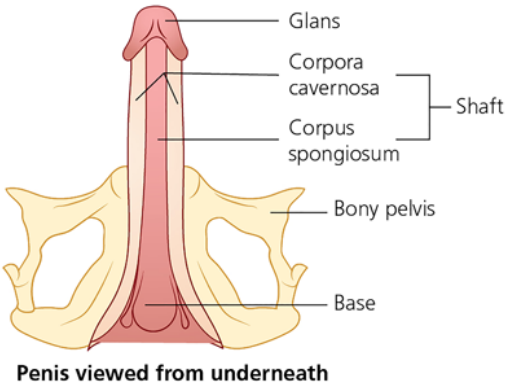
Essentially, these messages tell the muscles of your corpora cavernosa (this contains the sponge-like material) to relax, allowing blood to flow in and fill the open spaces. When the blood vessels of the corpora cavernosa relax and open up, blood rushes in to fill them. The blood then gets trapped under high pressure by a series of valves, creating an erection.

The tunica albuginea (a membrane surrounding the corpora cavernosa), helps to trap the blood in the corpora cavernosa, so you stay hard.

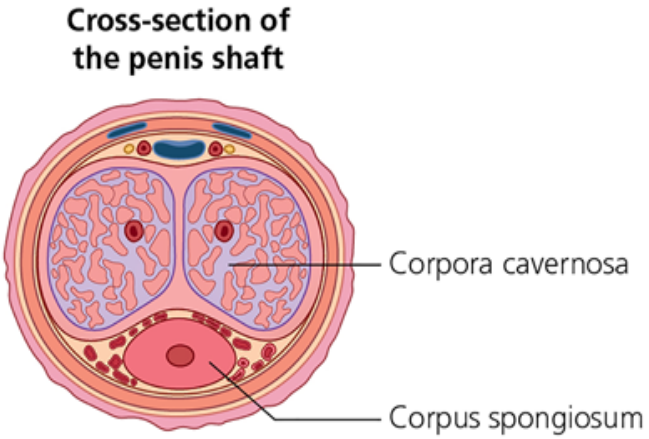
An erection is reversed when muscles in your penis contract, stopping the flow of blood. The pressure decreases and the valves open, letting the blood flow out. Your penis loses its erection and becomes flaccid (soft).

6. ***Anatomy of a Penis***





Penis viewed from underneath



- The penis is made of three major parts: the base, shaft and glans. The base and glans form the portions closest and furthest away from the body, respectively. The shaft forms the main body of the penis.
- The base attaches the penis to the body via the bony pelvis.
- The shaft consists of the corpora cavernosa, the corpus spongiosum, and a sturdy layer of fat and skin.

- The corpora cavernosa are paired cylinders of erectile tissue and provide the erectile properties of the penis. They are made of a spongey tissue with a lattice-like structure that is able to fill with blood to produce an erection.
- The corpus spongiosum is close to the surface of the penis and encloses the urethra. It also consists of a sponge-like tissue and, when filled with blood during an erection, helps to keep the urethra open.
- The glans is found at the tip of the penis and, in uncircumcized men, is covered by the foreskin.

7. ***Degree of Hardness of Erection***

The Erection Hardness Scale (EHS), an easy-to-use, four-point scale for erectile dysfunction (ED), provides a reliable measure of erection hardness and an indicator of other health and wellbeing outcomes, according to new data reported at the *European Association of Urology.*

EHS rates the hardness of erection on a scale of one to four, with four being the maximal score. The language used is simple and direct so that men with ED can use the scale to assess the severity of their condition and to monitor the impact of treatment. A score of 1 indicates that the penis is larger than normal, but not hard; 2 means the penis is hard, but not hard enough for penetration, 3 means the penis is hard enough for penetration but not completely hard, and 4 indicates that the penis is completely hard and fully rigid.

Degree of Erection Hardness: The Erection Hardness Score (EHS)

The Erection Hardness Score (EHS) is a widely used tool to assess the quality and firmness of an erection. It provides a simple yet effective way to gauge erectile function, particularly in clinical settings and studies. The EHS ranges from 1 to 4, with each score representing a different level of erection hardness. Here's a detailed look at each degree:

EHS 1: Penis is Larger but Not Hard

-Description: The penis is enlarged but not firm. It does not have sufficient rigidity for penetration. This level often indicates significant erectile dysfunction.

- Experience: The erection is comparable to a cooked noodle. It may be visually noticeable but cannot sustain any sexual activity.

- Implications: EHS 1 often suggests serious blood flow or nerve function issues. It can be related to severe vascular problems, significant psychological distress, or advanced neuropathy.

- Treatment Considerations: Requires medical evaluation to determine underlying causes and may necessitate interventions like medications, lifestyle changes, or therapy.

EHS 2: Penis is Hard but Not Hard Enough for Penetration

- Description: The penis is firmer and can expand, but it is not sufficiently rigid to enable penetration. This erection level may be sufficient for non-penetrative sexual activities but not for intercourse.

- Experience: The erection is akin to a peeled banana or a semi-soft state. It shows partial firmness but bends easily.

- Implications: EHS 2 can indicate moderate erectile dysfunction. It might be due to factors like partial vascular insufficiency, mild hormonal imbalances, or stress-related issues.

- Treatment Considerations: Often responds to oral medications (like PDE5 inhibitors), therapy for psychological factors, or lifestyle modifications. Further assessment is required to identify specific causes.

EHS 3: Penis is Hard Enough for Penetration but Not Completely Hard

- **Description:** The penis is firm enough to allow penetration but does not reach full rigidity. It can sustain intercourse but may feel less firm than desired.

- **Experience:** This erection is similar to an unpeeled banana. It is mostly hard but slightly soft, especially at the base.

- **Implications:** EHS 3 indicates mild erectile dysfunction or a temporary issue. It may be associated with factors like mild cardiovascular issues, stress, or side effects of medications.

-**Treatment Considerations**: Generally manageable with lifestyle adjustments, stress management, or medications. Improving cardiovascular health and reducing stress can enhance firmness.

EHS 4: Penis is Completely Hard and Fully Rigid

- **Description:** The penis is completely rigid and fully hard, providing optimal conditions for penetration and sustaining intercourse. This level of hardness is considered normal and ideal.

- **Experience:** The erection is as hard as a cucumber, fully firm, and upright.

-**Implications:** EHS 4 indicates normal erectile function without significant underlying issues. This level of erection is typical of a healthy sexual response.

-**Treatment Considerations:** No treatment is necessary. Maintaining overall health and managing stress can help sustain this level of function.

8. ***Stages of Erection***

An erection requires a healthy mind-body "team effort" led by the brain. Upon receiving signals from the brain, the blood vessels, nerves, and hormones work together to cause and maintain an erection.

The soft (flaccid) penis - If nothing is causing a man to become aroused, then his body's erection "team" of brain, nerves, blood vessels, and hormones won't begin working to cause an erection. The amount of blood flowing into the penis's spongy chambers (corpora cavernosa and corpus spongiosum) equals the amount flowing out. His penis remains soft.

The swollen (tumescent) penis - A man becomes aroused through his senses (such as sight or touch) or his thoughts (such as memories or fantasies). During arousal, messages brought by nerves cause the blood vessels and spongy chambers to dilate (open up). More blood flows into his penis than flows out. His penis starts to swell.

The erect (rigid) penis - As arousal continues, nerves keep carrying messages of arousal between the penis and the brain. Blood keeps moving into the man's penis. Blood-swollen tissues press against the veins. Some of the blood is kept from flowing back out. Filled with blood, his penis becomes rigid. The man can have intercourse.

9. ***How hormone levels affect Erectile Dysfunction***

a. Testosterone

Testosterone is the primary male sex hormone. In men it is mainly produced by the testicles and its production is controlled by the brain (the hypothalamus and the pituitary gland). The erectile bodies (the corpus *cavernosa)* have receptors for testosterone and it is well known that this hormone plays an important role in their structure and function. These erectile bodies are responsible for generating penile erections – a process co-dependent on a complex interaction of psychological, neural, vascular and hormonal factors. Certain conditions can cause testosterone deficiency (hypogonadism in medical jargon), a situation in which the body fails to produce enough of this hormone.

Normal Testosterone Levels- Normal testosterone level in males is considered to be 300-1000 ng/dl (nanograms per decilitre). According to the American Urological Association (AUA), you have low testosterone if your level is below 300 ng/dL when you're tested twice on separate occasions. Some doctors, though, think levels below 250 ng/dL should be considered low.

Central Nervous System Effects

- Libido and Sexual Desire: Testosterone significantly influences sexual desire (libido). It acts on the brain, particularly in regions such as the hypothalamus and limbic system, which are involved in the regulation of sexual behavior. Higher levels of testosterone enhance sexual thoughts and fantasies, which can lead to increased sexual arousal and the initiation of the erectile process.
- Neurotransmitter Modulation: Testosterone affects the levels and activity of several neurotransmitters, including dopamine and nitric oxide (NO). Increased dopamine levels, stimulated by testosterone, enhance sexual arousal and contribute to the initiation and maintenance of an erection.

Peripheral Effects

- NO Production: Testosterone enhances the release of NO from endothelial cells and nerve endings in the penile tissue. NO is a key vasodilator that triggers the relaxation of smooth muscle cells in the corpus cavernosum, the sponge-like regions of erectile tissue.
- cGMP Pathway Activation: NO activates the enzyme guanylate cyclase, which increases the levels of cyclic guanosine monophosphate (cGMP). Elevated cGMP levels cause the smooth muscle cells to relax, leading to the dilation of blood vessels and increased blood flow into the corpus cavernosum. This process is crucial for achieving an erection.

Vascular Effects

- Endothelial Function**:** Testosterone improves endothelial function, which is critical for the health of blood vessels. Healthy endothelium enhances NO production and release, facilitating the vasodilation required for an erection.
- Penile Blood Flow**:** By promoting NO production and improving endothelial function, testosterone ensures adequate blood flow to the penis. Enhanced blood flow fills the corpus cavernosum, leading to the swelling and rigidity necessary for an erection.

Primary Testosterone Deficiency: When testosterone deficiency is caused by a failure of the testicles to make enough testosterone, it is referred to as a 'primary testosterone deficiency', which might trigger ED. In blood tests, this condition is characterized by low testosterone levels and high levels of the hormones LH and FSH (Follicle – Stimulating Hormone).
Primary testosterone deficiency occurs in 1-2% of older men.
Secondary Testosterone Deficiency: Testosterone deficiency can also be caused due to a problem in the parts of the brain (the hypothalamus and the pituitary gland) which produce hormones that stimulate the testicles to make testosterone. This condition is called 'secondary testosterone deficiency', which means that the testicles are functioning well but they fail to produce testosterone due to a hormonal imbalance at the level of the brain. A secondary deficiency is characterized by low testosterone blood levels and low-normal blood levels of LH and FSH.

b. Prolactin

Prolactin is an important hormone that supports many actions and processes that happen in the body every day, including the creation of blood vessels. An increase in prolactin hormone in the blood is associated with erectile dysfunction, decline in libido and other problems with sexual function, as higher concentration of prolactin suppresses testosterone production. Prolactin production can be elevated due to various causes, including hypothyroidism, the use of certain medications and more rarely a benign tumor in the pituitary gland.
Normal prolactin level in males is less than 20 nanograms per millilitre (ng/mL).

c. Estrogen

There are cases where the age-related decline in testosterone levels among men aged 40 and above, leads to a gradual elevation in estrogen levels which causes hormonal imbalance. Liver disease might likewise cause an increase in estrogen levels among men. This testosterone-estrogen imbalance (also known as estrogen dominance) might give rise to ED, including a reduction in spontaneous and nocturnal erections and high stress levels.

d. Cortisol

Cortisol is a steroid hormone that regulates a wide range of important processes in the body, including metabolism and the immune response. It is commonly known as the "stress hormone" because its production increases at times of high mental or physical stress. Cortisol levels gradually rise with age after the age of 40. High cortisol levels can disrupt hormonal balance and suppress testosterone production. In addition, high cortisol levels are associated with narrowed arteries and penile blood flow restriction. This is why chronic high cortisol levels can lead to ED.

Additionally, our brain triggers cortisol release in response to many different kinds of stress, including injury, surgery, diseases (diabetes, Parkinson's, Cushing's syndrome etc.'). Smoking, excessive alcohol consumption and drug use can cause chronic cortisol elevation and ED.

10. ***Diabetes and Erectile Dysfunction***

Diabetes mellitus (DM), a chronic metabolic disease characterized by elevated blood glucose levels, is among the most common chronic diseases. The incidence and prevalence of DM have been increasing over the years. The complications of DM represent a serious health problem. The prevalence of ED is approximately 3.5‑fold higher in men with DM than in those without DM. Common risk factors for the development of DM and its complications include a sedentary lifestyle, overweight/obesity, and increased caloric consumption.

The connection between diabetes and ED is related to your circulation and nervous system. Poorly controlled blood sugar levels can damage small blood vessels and nerves. Damage to the nerves that control sexual stimulation and response can impede a man's ability to achieve an erection firm enough to have sexual intercourse. Reduced blood flow from damaged blood vessels can also contribute to ED.

How long does it take for diabetes to cause ED?

Research suggests that about half of men who are diagnosed with type 2 diabetes will develop ED within 10 years of their diagnosis. However, there are ways to overcome ED through lifestyle changes that involve a healthy diet, getting regular exercise, and not smoking.

An estimated 10 percent of men ages 40 to 70 have severe ED, and another 25 percent have moderate ED. ED tends to become more common as men age, though it isn't an inevitable part of aging. For many men, other health conditions, such as diabetes, contribute to the likelihood of developing ED.

However, the results suggest that if you have diabetes but adopt a healthier lifestyle, you may reduce your diabetes symptoms and improve your sexual health. These lifestyle habits include eating a balanced diet and getting regular exercise.

11. ***How do anti-depressants affect erection in men?***

Common side effects of anti-depressants in men include decreased libido and difficulty getting an erection. Some men have trouble maintaining an erection. Men taking antidepressants also report delayed or blocked orgasm. Some drugs, like Celexa, can cause a man's sperm count to drop to nearly zero. The main classes of antidepressants are the tricyclic antidepressants (TCAs), SSRIs, SNRIs, monoamine oxidase inhibitors (MAOIs), and the atypical antidepressants. SSRIs increase serotonin by inhibiting its reuptake, which can reduce sexual arousal and delay ejaculation. High serotonin levels can suppress dopamine, a neurotransmitter essential for sexual arousal and erection. Some antidepressants also affect noradrenaline levels, which can impact sexual function by altering the balance of neurotransmitters involved in arousal and erection.

12. ***How does smoking affect erection?***

Endothelial Dysfunction: Smoking damages the endothelium, the inner lining of blood vessels. This damage impairs the production of nitric oxide, a critical molecule for vasodilation. Without sufficient nitric oxide, blood vessels cannot relax properly, leading to reduced blood flow to the penis, which is essential for achieving an erection.

Atherosclerosis: Smoking accelerates the process of atherosclerosis, the buildup of plaques in arteries. These plaques can narrow the penile arteries, restricting blood flow and making it difficult to achieve and sustain an erection.

Nerve Damage: Smoking can cause neuropathy or damage to the nerves, including those responsible for the signalling processes involved in erection. This can disrupt the communication between the brain and the erectile tissues, making it harder to achieve an erection.

Lower Testosterone Levels: Studies suggest that smoking can lower testosterone levels, which are crucial for libido and erectile function. Lower testosterone can reduce sexual desire and impair the mechanisms necessary for erection.

Increased Cortisol Levels: Smoking elevates cortisol, the stress hormone, which can disrupt the balance of other hormones like testosterone and impair erectile function by inducing stress and anxiety.

The toxins in cigarette smoke, such as nicotine and carbon monoxide, reduce the availability of nitric oxide, which is essential for relaxing the smooth muscles in the corpora cavernosa and allowing them to fill with blood.

Smooth Muscle Dysfunction: The chemicals in tobacco smoke can damage the smooth muscle cells in the penile tissue. These cells must relax to allow the corpora cavernosa to fill with blood. Damage to these cells can lead to poor erectile response.

Stress and Anxiety: Smoking is often used as a coping mechanism for stress, which can exacerbate anxiety. High levels of stress and anxiety are common contributors to erectile dysfunction (ED).

Body Image and Self-Esteem: Smokers may experience lower self-esteem or negative body image due to the physical effects of smoking, such as poor stamina or odor, which can affect sexual performance and confidence, further impacting erectile function.

Respiratory Issues: Smoking causes respiratory problems, including chronic obstructive pulmonary disease (COPD). Poor respiratory function can lead to reduced stamina and energy, indirectly affecting sexual performance and the ability to maintain an erection.

13. ***How does alcohol affect Erection?***

Problems with orgasms

Alcohol interferes with your ability to feel sexual stimulation. It does this by interfering with the signals between the brain and the genitals. Alcohol lowers hormone levels, including testosterone. It also damages cells in your testes. Even mild damage may prevent you from getting or maintaining an erection.

After heavy drinking, you may:

- find it hard to ejaculate (come) or may ejaculate too fast
- find it harder to have an orgasm, or have less intense orgasms

Sex drive (libido)

Drinking heavily over a long period can lead to a lower sex drive (libido). This is because it reduces your levels of testosterone.

Shrinking of sex organs

High-risk drinking over a long time can cause the testes and penis to shrink.

Fertility

Lowered testosterone can affect sperm production. This can reduce fertility.

Sexually transmitted infections (STIs)

Alcohol lowers your inhibitions and affects your judgment. This increases your chances of having unprotected sex. This puts you at risk of sexually transmitted infections (STIs).

What is considered heavy alcohol use?

Heavy alcohol use is a pattern of drinking that is dangerous for a person's health and well-being. It refers both to how much and how often a person drinks. Heavy drinking is defined as:

- Having 4 or more standard alcoholic drinks per day (or more than 14 drinks per week) for male people
- Having 3 or more standard alcoholic drinks per day (or more than 7 drinks per week) for female people

When it comes to defining heavy alcohol use, the amount you drink matters. What you purchase at a bar or in the store may contain more alcohol than one standard drink. This means that you may be drinking more than you think you are.

A standard drink refers to:

- 1.5 oz of liquor
- 5 oz of wine
- 8 oz of malt liquor
- 12 oz of beer

Each of these drinks contains approximately 14 g of pure alcohol. If you order a double shot of liquor, which is 3 oz, then you are actually consuming two drinks. If a person is drinking more than the daily or weekly limits of standard drinks listed above, then they are engaging in heavy alcohol use.

14. ***How do recreational drugs affect erection?***

Recreational drugs are chemical substances taken for enjoyment rather than for medical reasons. Alcohol, tobacco and caffeine can be classed as recreational drugs but are not covered in this leaflet. Recreational drugs are usually started to provide pleasure, or improve life in some way. However, they can lead to addiction, to health and social problems and to crime.

Cocaine - Be it in your brain, your heart or your penis, cocaine causes the narrowing of blood vessels in the body, known as vasoconstriction. Long-term use of cocaine has been linked with permanent vascular damage that means potentially chronic erectile issues. It also paves the way for a whole host of other problems such as intracerebral hemorrhages

MDMA -

(MDMA) Methylenedioxymethamphetamine, commonly known as ecstasy when activated, the sympathetic nervous system constricts blood flow to the penis, causing your erection to fade. This usually happens after ejaculation, can be triggered by stress, or in this case the trigger can be mimicked by a drug: MDMA.

Some male users mix MDMA with sildenafil (Viagra) or other ED medication to counteract these effects. This is, perhaps unsurprisingly, highly inadvisable.

It's a cocktail that can result in dangerous adverse effects and more alarmingly, this kind of drug use is linked to high-risk sexual behaviours (such as unprotected sex and/or sex with multiple partners), and transmission of STIs including HIV and other blood-borne viruses.

Methamphetamine (Meth)

Methamphetamine, or crystal meth, increases the amount of the natural chemical dopamine in the brain making users exhilarated, alert and awake. The risks though are immense, including severe depression, dental problems (AKA meth mouth) and psychosis. Sexual aggression and compulsive sexual behaviors are common amongst male users, with many reportedly using sildenafil. This suggests that methamphetamine may cause erectile dysfunction or that the behaviours it promotes necessitates its use.

15. ***Hormone Binding Agents and Erectile Dysfunction***

A hormone binding agent is a substance that interacts with specific hormones by binding to them, thereby affecting their activity, availability, and overall function within the body. These agents can either enhance or inhibit the action of hormones, depending on their nature and the context of their use. Sex Hormone-Binding Globulin (SHBG) is a glycoprotein produced primarily by the liver that binds to sex hormones, specifically testosterone and estradiol (a form of estrogen), in the bloodstream. By binding to these hormones, SHBG regulates their bioavailability and activity in the body. Although SHBG binds 3 hormones, the hormone that's critical in this test is testosterone. SHBG controls the amount of testosterone that your body tissues can use. Too little testosterone in males and too much testosterone in females can cause problems. The level of SHBG in your blood changes because of factors such as sex and age. It can also change because of obesity, liver disease, and hyperthyroidism.

16. ***Role of Blood Pressure in Erectile Dysfunction***

High blood pressure is a major cause of erection problems. A study in the Journal of the American Geriatrics Society found that about 49% of men ages 40 to 79 with high blood pressure had erectile dysfunction. High blood pressure keeps the arteries that carry blood into the penis from dilating the way they're supposed to. It also makes the smooth muscle in the penis lose its ability to relax. As a result, not enough blood flows into the penis to make it erect. Men with high blood pressure may also have a low testosterone level. Testosterone is the male hormone that plays a big role in sexual arousal. High blood pressure by itself can lead to erectile dysfunction. But some drugs for treating high blood pressure can actually be the cause as well.

ED is an occasional side effect of BP drugs like thiazide diuretics, loop diuretics, and beta-blockers, all of which can decrease blood flow to the penis and make it difficult to get an erection. However, other BP drugs, such as alpha-blockers, ACE inhibitors, and angioten-sin-receptor blockers, rarely cause ED. Some research even suggests the effect of blood pressure drugs may be more psychological than physical. When ED occurs after a man begins to take a new medication, it's possible that anxiety about his health, rather than the medication, may trigger the problem. And being aware of possible side effects may make a man more likely to recognize them as abnormal.

Normal Blood Pressure Range for Men – 120/80 mm Hg.

17. ***Role of Cholesterol in Erectile Dysfunction***

Cholesterol is a waxy, fat-like substance in the bloodstream. We have both ‘good cholesterol’ (called HDL) and ‘bad cholesterol’ (called LDL). When there is too much LDL in the bloodstream, plaque is created in the arteries which blocks proper blood flow. When these circulation issues occur in the genital area and penis, erectile dysfunction or erection problems can occur. The more LDL you have in your bloodstream, the greater the chance of developing erection problems or impotence.

High cholesterol also affects the body’s ability to properly release nitric oxide into the bloodstream. Nitric oxide is needed to allow for the proper relaxation of the penile tissue that leads to the blood flow that creates the erection.

Additionally, high cholesterol is linked to lowered testosterone production. Testosterone is the primary sex hormone in men, controlling sexual drive and desire, and is needed for beginning and maintaining an erection. The testicles produce the body’s testosterone, and high cholesterol limits blood flow to the testicles. As a result, too much cholesterol may damage their ability to produce testosterone, which can lead to ED. However, common medications that are effective for reducing cholesterol by decreasing lipids in the body can also lead to symptoms of erectile dysfunction.

Normal cholesterol levels

Type of cholesterol	Anyone 19 or younger	Males aged 20 or over	Females aged 20 or over

Total cholesterol	less than 170 mg/dl	125–200 mg/dl	125–200 mg/dl
Non-HDL	less than 120 mg/dl	less than 130 mg/dl	less than 130 mg/dl
LDL	less than 100 mg/dl	less than 100 mg/dl	less than 100 mg/dl
HDL	more than 45 mg/dl	40 mg/dl or higher	50 mg/dl or higher

18. ***Significance of Morning Erections***

Erections that happen first thing in the morning are completely normal and a sign of good health. The term “morning erection” is commonly used to describe erections that occur as a man is waking up.

The formal name for morning erections is nocturnal penile tumescence (NPT). The word nocturnal is used because morning erections are typically the last in a series of erections that occur as a man sleeps.

Men can experience morning erections at any age, but it is less and less common as age increases. This is a gradual process, meaning as a man’s hormones slowly decrease with age, so does his likelihood of having morning erections, also known as nocturnal erections.

What causes morning erections**?**

Rather than being caused by sexual arousal, nocturnal erections are caused by regular functions of the male reproductive system.

In REM sleep, the deepest sleep stage in the cycle, the body’s parasympathetic nervous system is activated. This system is responsible for rest, as opposed to the sympathetic nervous system, which is responsible for your fight or flight response. The parasympathetic nervous system is also activated during sexual arousal.

While men are in REM sleep they can experience spikes in hormones, which may be a trigger for nocturnal erections. Together, the parasympathetic nervous system, the male reproductive system, and REM sleep all affect a man’s likelihood of having nocturnal erections.

Not all men experience regular morning erections though. It’s just as normal to experience one every day as it is to experience it just once or twice a week.

Why Morning Erections Are Good For You ?

Erections that happen first thing in the morning are completely normal and a sign of good health. The term “morning erection” is commonly used to describe erections that occur as a man is waking up.

The formal name for morning erections is nocturnal penile tumescence (NPT). The word nocturnal is used because morning erections are typically the last in a series of erections that occur as a man sleeps.

Men can experience morning erections at any age, but it is less and less common as age increases. This is a gradual process, meaning as a man’s hormones slowly decrease with age, so does his likelihood of having morning erections, also known as nocturnal erections.

What is it a sign of? Morning erections are a positive sign indicating health in all of these areas:

Testosterone - Healthy male reproductive system isn't complete without healthy testosterone levels. Testosterone reaches peak levels first thing in the morning, which is often enough to cause an erection even without physical stimulation. This means your morning erection is an indication that testosterone levels are healthy.

Sexual Health - Sexual health for men includes the ability to have and maintain an erection. Presence of an erection in the morning means firstly that you are capable of an erection, a sign of sexual health. A complete lack of morning erections may signify some form of erectile dysfunction.

Blood Flow- Erections are partially caused by changes in blood flow to the penis. Blood fills small chambers in the penis called erectile tissue, resulting in an erection. Healthy blood flow to and from the erectile tissue results in healthy erections. If blood flow becomes blocked in any way, it can cause a condition called priapism, resulting in painful erections that last irregularly long and can even result in permanent damage.

Nerve Health- Erections are caused by the parasympathetic nervous system, the system in charge of the "rest" state of your body. This is opposite to the sympathetic nervous system, responsible for your fight or flight response. Experiencing nocturnal erections or morning erections is a sign that your parasympathetic nervous system is functioning well.

19. ***Treatments of Erectile Dysfunction***

Erectile Dysfunction (ED) is the inability to achieve or maintain an erection sufficient for satisfactory sexual performance. It can result from various physical, psychological, or lifestyle factors. Effective treatment requires a comprehensive approach, often combining multiple strategies.

1. Lifestyle and Behavioral Changes

1. **Healthy Diet and Weight Management**:
    - **Benefits**: Improves cardiovascular health, reduces ED risk factors like diabetes and high blood pressure.
    - **Actions**: Adopt a balanced diet rich in fruits, vegetables, whole grains, and lean proteins. Avoid excessive fats and sugars.
2. **Regular Exercise**:
    - **Benefits**: Enhances blood flow, boosts stamina, reduces stress, and helps maintain a healthy weight.
    - **Actions**: Engage in aerobic activities (e.g., walking, running, swimming) and strength training regularly.
3. **Quit Smoking**:
    - **Benefits**: Improves vascular health and blood flow to the penis.

    - **Actions**: Seek support through smoking cessation programs or use nicotine replacement therapies.
4. **Limit Alcohol and Avoid Illicit Drugs**:
    - **Benefits**: Reduces negative impacts on sexual performance and overall health.
    - **Actions**: Moderation is key—limit alcohol intake and avoid drugs that impair erectile function.
5. **Stress Reduction and Sleep**:
    - **Benefits**: Lowers anxiety and improves overall mental and physical health.
    - **Actions**: Practice relaxation techniques (e.g., meditation, deep breathing) and ensure adequate, quality sleep.

2. Medical and Pharmacological Treatments

1. **Oral Medications (PDE5 Inhibitors)**:
    - **Common Drugs**: Sildenafil (Viagra), Tadalafil (Cialis), Vardenafil (Levitra), Avanafil (Stendra).
    - **Mechanism**: Enhance blood flow to the penis by inhibiting the enzyme PDE5, which regulates blood flow in the penis.
    - **Usage**: Taken before sexual activity; effectiveness and duration vary by drug.
2. **Hormone Therapy**:
    - **Testosterone Replacement Therapy**: For men with low testosterone levels.
    - **Benefits**: Restores hormonal balance, potentially improving libido and erectile function.
    - **Methods**: Patches, gels, injections, or oral supplements.
3. **Penile Injections and Suppositories**:
    - **Drugs**: Alprostadil (Caverject, Muse).
    - **Mechanism**: Directly relaxes blood vessels and muscle tissue to increase blood flow.
    - **Application**: Injected into the base or side of the penis, or inserted as a suppository into the urethra.
4. **Vacuum Erection Devices**:
    - **Function**: Creates a vacuum that draws blood into the penis, inducing an erection.
    - **Usage**: A constriction ring is placed at the base of the penis to maintain the erection after the device is removed.
    - **Advantages**: Non-invasive and can be used as needed.
5. **Penile Implants**:
    - **Types**: Inflatable or malleable (semi-rigid) implants.
    - **Function**: Surgically placed devices that allow the penis to become erect.
    - **Suitability**: For men who do not respond to other treatments.
6. **Vascular Surgery**:
    - **Procedure**: Corrects vascular blockages or leaks that prevent adequate blood flow.

- **Indication**: Typically recommended for younger men with specific vascular conditions.

3. Psychological and Counseling Approaches

1. **Cognitive Behavioral Therapy (CBT)**:
   - **Focus**: Addresses negative thought patterns and anxiety related to sexual performance.
   - **Benefits**: Helps men reframe their thoughts and reduce performance-related stress.
2. **Sex Therapy**:
   - **Goal**: Improve communication and intimacy with partners, and explore sexual techniques and preferences.
   - **Benefits**: Enhances emotional and sexual satisfaction.
3. **Mindfulness and Relaxation Techniques**:
   - **Techniques**: Practices like mindfulness meditation or progressive muscle relaxation.
   - **Benefits**: Reduces stress and anxiety, promoting better sexual function.
4. **Relationship Counseling**:
   - **Objective**: Resolve conflicts and improve emotional intimacy between partners.
   - **Benefits**: Strengthens the overall relationship, reducing the impact of ED on the couple.

4. Emerging and Alternative Treatments

1. **Low-Intensity Shockwave Therapy (LiSWT)**:
   - **Mechanism**: Uses sound waves to improve blood flow and stimulate new blood vessel formation.
   - **Benefits**: Non-invasive, showing promise for long-term improvements in ED.
2. **Platelet-Rich Plasma (PRP) Therapy**:
   - **Process**: Involves injecting concentrated platelets from the patient's blood into the penis.
   - **Potential**: Aims to rejuvenate penile tissues and enhance erectile function.
3. **Herbal and Natural Supplements**:
   - **Examples**: Ginseng, L-arginine, Yohimbe.
   - **Caution**: Limited scientific evidence; consult a healthcare provider before use.
4. **Acupuncture**:
   - **Technique**: Traditional Chinese medicine practice involving needle insertion at specific points.
   - **Effectiveness**: Some find it helpful for reducing anxiety and improving sexual function.

5. Combination Therapy

- **Multimodal Approach**: Combining different treatments (e.g., oral medications with lifestyle changes or psychological therapy) can enhance effectiveness.
- **Customization**: Treatment plans should be tailored to the individual's specific needs, preferences, and health conditions.

References

https://thewaitingroom.karger.com/embarrassing-problems/basic-anatomy-the-penis/

https://vertica-labs.com/blog/hormonal-imbalance-and-ed/

https://www.webmd.com/a-to-z-guides/prolactin-test

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3108697/

https://www.webmd.com/hypertension-high-blood-pressure/high-blood-pressure-erectile-dysfunction

https://londonandrology.com/why-morning-erections-are-good-for-you/#:~:text=A%20healthy%20male%20reproductive%20system,that%20testosterone%20levels%20are%20healthy.

https://www.healthline.com/health/erectile-dysfunction/beta-blockers#what-are-beta-blockers

https://austinurologyinstitute.com/blog/the-link-between-high-cholesterol-and-ed/#:~:text=We%20have%20both%20'good%20cholesterol,or%20erection%20problems%20can%20occur

https://www.healthline.com/health/type-2-diabetes/type-2-and-erectile-dysfunction#treatment

https://www.merckmanuals.com/professional/genitourinary-disorders/male-sexual-function-and-dysfunction/erectile-dysfunction#Etiology_v115371

https://pubmed.ncbi.nlm.nih.gov/28722225/

https://pubmed.ncbi.nlm.nih.gov/10647654/

https://www.hopkinsmedicine.org/health/conditions-and-diseases/erectile-dysfunction