

# UNDERSTANDING AND MANAGING ERECTILE DYSFUNCTION (ED)

## ACTIVITY DESCRIPTION

Erectile dysfunction (ED) is a common (affecting up to 50% of American men over the age of 40 at least to some extent) and multi-factorial disease caused by a variety of organic and/or psychological factors. ED is defined as the persistent inability to attain and maintain an erection sufficient to permit satisfactory sexual performance. As such, ED has a significant impact on the quality of life of both sufferers and their partners. A variety of pharmaceutical and non-pharmaceutical approaches are used to treat ED, as well as psychological counseling and lifestyle modification.

## TARGET AUDIENCE

The target audience for this activity is **pharmacists** and **pharmacy technicians** in hospital, community, and retail pharmacy settings.

## LEARNING OBJECTIVES

After completing this activity, the **pharmacist** will be able to:

- Describe the cause, frequency and implications of erectile dysfunction
- Outline the non-pharmacological methods used to treat erectile dysfunction
- Compare and contrast the most common pharmaceuticals used to treat erectile dysfunction, including mechanisms of action and potential side effects

After completing this activity, the **pharmacy technician** will be able to:

- List common drugs used to treat erectile dysfunction

## ACCREDITATION

### PHARMACY



PharmCon, Inc. is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing pharmacy education.

### NURSING

PharmCon, Inc. is approved by the California Board of Registered Nursing (Provider Number CEP 13649) and the Florida Board of Nursing (Provider Number 50-3515). Activities approved by the CA BRN and the FL BN are accepted by most State Boards of Nursing.

CE hours provided by PharmCon, Inc. meet the ANCC criteria for formally approved continuing education hours. The ACPE is listed by the AANP as an acceptable, accredited continuing education organization for applicants seeking renewal through continuing education credit. For additional information, please visit

<http://www.nursecredentialing.org/RenewalRequirements.aspx>

**Universal Activity No.** 0798-0000-13-145-L01-P&T

**Credits:** 1 contact hour (0.1 CEU)

**Release Date:** April 9, 2013

**Expiration Date:** April 9, 2016

## ACTIVITY TYPE

Knowledge-Based Live Webinar

## ABOUT THE AUTHOR

J. Dufton M.D. is a physician and previously was employed at Queen's University, Ontario, Canada in the Department of Radiology. He is also on the Editorial Board of the Journal of the Canadian Chiropractic Association (JCCA) where his roles include editing and reviewing text books. He is a researcher who enjoys writing and speaking about the pathophysiology and pharmacological treatment of diseases and conditions.



**J Dufton, MD**  
Medical Writer & Speaker  
Wellness Partners

## FACULTY DISCLOSURE

It is the policy of PharmCon, Inc. to require the disclosure of the existence of any significant financial interest or any other relationship a faculty member or a sponsor has with the manufacturer of any commercial product(s) and/or service(s) discussed in an educational activity. **J Dufton** reports no actual or potential conflict of interest in relation to this activity.

Peer review of the material in this CE activity was conducted to assess and resolve potential conflict of interest. Reviewers unanimously found that the activity is fair balanced and lacks commercial bias.

Please Note: PharmCon, Inc. does not view the existence of relationships as an implication of bias or that the value of the material is decreased. The content of the activity was planned to be balanced and objective. Occasionally, authors may express opinions that represent their own viewpoint. Participants have an implied responsibility to use the newly acquired information to enhance patient outcomes and their own professional development. The information presented in this activity is not meant to serve as a guideline for patient or pharmacy management. Conclusions drawn by participants should be derived from objective analysis of scientific data presented from this monograph and other unrelated sources.

# Understanding & Managing Erectile Dysfunction (ED)



J. Dufton, MD



# Understanding & Managing Erectile Dysfunction (ED)

## Accreditation

Pharmacists: 0798-0000-13-145-Lo+P  
Pharmacy Technicians: 0798-0000-13-145-Lo+T  
Nurses: N-826

## Faculty



J. Dufton, MD  
Wellness Partners

## Faculty Disclosure

Dr. Dufton has no actual or potential conflicts of interest relation to this program.

## CE Credit(s)

1.0 contact hour(s)

## Learning Objectives

- Describe the cause, frequency and implications of ED.
- Outline the non-pharmacological methods used to treat ED.
- Compare and contrast the most common medications used to manage ED, including mechanisms of action and potential side effects.

## Legal Disclaimer

The material presented here does not necessarily reflect the views of Pharmaceutical Education Consultants (PharmCon) or the companies that support educational programming. A qualified healthcare professional should always be consulted before using any therapeutic product discussed. Participants should verify all information and data before treating patients or employing any therapies described in this educational activity.



# Understanding & Managing Erectile Dysfunction (ED)

**OBJECTIVES:** after the completion of this one hour presentation, the viewer should be able to:

- Describe the cause, frequency and implications of ED.
- Outline the non-pharmacological methods used to treat ED.
- Compare and contrast the most common medications used to manage ED, including mechanisms of action and potential side effects.



PharmCon is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing education.



# Introduction

- Erectile dysfunction, ED, **impotency** is the chronic inability to achieve or sustain an erection firm enough for sexual intercourse
- Sexual dysfunction is not considered normal at any age
- Significant impact on the quality of life
- Different from other sexual issues such as no libido or difficulty ejaculating

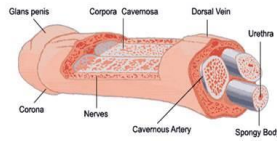


PharmCon is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing education.



## Mechanics of an Erection

- To achieve an erection, the following actions must occur:
  - ✓ there must be a stimulus from the brain (and chemical cascade)
  - ✓ nerves supplying the penis must function properly
  - ✓ the arterial blood supply to the penis must be adequate
  - ✓ the veins must be able to “trap” the blood inside the penis
- If there is something interfering with any of these, then a firm erection is prevented




---



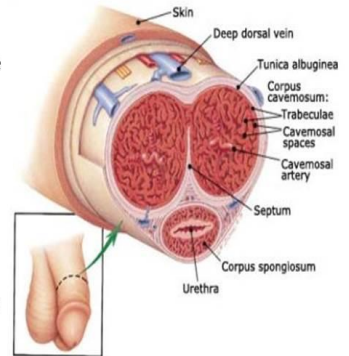
---



---

## Further Detail

- An erection occurs when two tubular structures that run the length of the penis (**corpus cavernosum**) become engorged with blood
- The **corpus spongiosum** (a single tube located below the corpora cavernosa that contains the urethra) may also become engorged with blood




---



---



---

## Physical Causes of ED

- ✓ blood vessel diseases (**atherosclerosis**, venous leakage)
- ✓ nerve damage (spinal trauma, stroke) & diseases (MS, ALS, Alzheimer’s, Parkinson’s)
- ✓ chronic illness (cancer, **diabetes**, kidney & liver disease)
- ✓ side effect from medications / alcoholism
- ✓ damage to penis (blunt trauma, surgical side effect, Peyronie’s disease)
- ✓ obesity, hormonal imbalance, metabolic syndrome

---



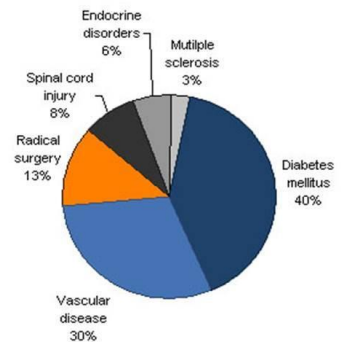
---



---

## Most Common Physical Causes

- Diabetes is most common physical cause
- Vascular disease - such as atherosclerosis - is 2<sup>nd</sup> most common physical cause of ED




---



---



---

## Psychological Causes of ED

➤ Psychological factors cause between 10 - 20% of ED and can compound physical causes

- ✓ excessive stress
- ✓ depression
- ✓ other mental health issues
- ✓ poor self-esteem
- ✓ performance anxiety



## Lifestyle / Risk Factors

- ✓ smoking
- ✓ binge drinking / alcoholism
- ✓ illicit drug abuse
- ✓ prescription medications
- ✓ obesity, lack of exercise
- ✓ cycling (avid cyclists suffer more ED because bike seat puts pressure on the perineum)
- ✓ lack of sleep – chronic fatigue

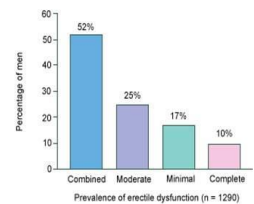
## Implications / Complications

- ✓ unsatisfactory sex life
- ✓ inability to get partner pregnant
- ✓ marital / relationship problems
- ✓ compounding stress & anxiety
- ✓ continual embarrassment
- ✓ low self-esteem
- ✓ increased risk drug / alcohol abuse



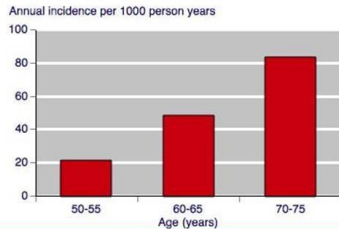
## Incidence / Prevalence

- According to the Massachusetts Male Aging Study, about 40% of men experience some degree of ED at age 40 compared with 70% of men at age 70
- Overall, 52% of American men have some sort of ED
  - ✓ 17% minimal ED - failure to achieve erection up to 50% of time
  - ✓ 25% moderate ED - failure to achieve erection >50% of time
  - ✓ 10% complete ED - total failure



## Incidence / Prevalence

- Moderate - severe ED dramatically increases with age
  - ✓ about 20% incidence for men between the ages of 50-55
  - ✓ about 48% incidence for men between the ages of 60-65
  - ✓ about 82% incidence for men between the ages of 70-75




---



---



---

## Ethnic Prevalence

- ✓ Hispanic and Asian men appear to have increased risk of moderate ED compared to African Americans or Caucasians of European ancestry
- ✓ Asian and African American men are least likely to have severe ED
- ✓ African American men are also least likely to report ED issues, so actual prevalence is difficult to gauge in relation to other ethnic groups

---



---



---

## Summary of Major Risk Factors

- ✓ age over 50
- ✓ diabetes
- ✓ high blood pressure
- ✓ high cholesterol
- ✓ low testosterone
- ✓ smoking
- ✓ cardiovascular disease
- ✓ depression




---



---



---

## Diagnosing ED

- Some doctors and men believe that any difficulty achieving and maintaining an erection is indicative of ED
- Other medical sources define ED as not being able to achieve or maintain an erection at least 75% of the time they attempt sex

Depends on the man when Dx or Tx is sought

---



---



---

## Testosterone Testing

- Testosterone blood test is ordered for infertile men and those with reduced libido or erectile dysfunction.
- Causes of low testosterone include:
  - ✓ hypothalamic or pituitary disease
  - ✓ genetic diseases such as Klinefelter's syndrome
  - ✓ damaged testes from trauma or infections such as mumps
- Other symptoms of low testosterone include:
  - ✓ lack of beard and body hair
  - ✓ decreased muscle mass and fatty around mid-section
  - ✓ development of breast tissue (gynecomastia)

## Standard Lab Tests

- Before ordering any tests, a medical history is taken and physical exam performed - possible psychological referral
- Because there are a variety of causes of ED, there are several different lab tests used to diagnose the condition:
  - ✓ **complete blood count (CBC):** looking for anemia and infection
  - ✓ **liver and kidney function tests**
  - ✓ **lipid profile:** high levels may indicate atherosclerosis
  - ✓ **thyroid function test:** thyroid hormones regulate production of sex hormones
  - ✓ **blood hormone study:** checking testosterone & prolactin levels
  - ✓ **urinalysis:** checking for protein, glucose, WBC & testosterone
  - ✓ **PSA:** prostate enlargement or infection can cause ED



## Specialized Testing for ED

- ✓ **Duplex ultrasound:** useful to evaluate blood flow and check for signs of a venous leak, atherosclerosis or tissue scarring.
- ✓ **Nocturnal penile tumescence (NPT):** measures erectile function while asleep.
- ✓ **Penile biothesiometry:** involves use of electromagnetic vibration to determine sensitivity and nerve function.
- ✓ **Vasoactive injection:** an erection is produced by injecting special solutions that cause the blood vessels to dilate, allowing blood to enter the penis. Often combined with ultrasound.
- ✓ **Dynamic infusion cavernosometry:** used for men with ED to determine severity of venous leak. Fluid is pumped into the penis at a predetermined rate. Dye can be added to the fluid and x-rays taken.

## Treating Erectile Dysfunction

- Erection problems < 20% of the time are not unusual and treatment is not typically recommended
- Erection problems > 50% of the time indicates there is a serious problem requiring treatment
- Treatment options include:
  - ✓ **psychotherapy** (counseling)
  - ✓ **natural remedies** (herbs, vitamins)
  - ✓ **vacuum devices** (pumps)
  - ✓ **drug therapy**
  - ✓ **surgical procedures**



## Psychotherapy / Counseling

- Psychological factors directly cause between 10 - 20% of ED, but physical causes eventually lead to psychological issues such as depression and anxiety.
- Psychological / counseling sessions typically focus on:
  - ✓ relationship difficulties
  - ✓ performance anxiety
  - ✓ work problems / stress
  - ✓ financial troubles
  - ✓ poor self-image
  - ✓ drug / alcohol dependency



PharmCon is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing education.



## Natural Remedies Overview

- ✓ **lifestyle change:** quit smoking, reduce intake of alcoholic beverages (2 max per day for men), exercise more, lose weight, control blood glucose levels, manage stress
- ✓ **herbal remedies:** none are accepted by mainstream medicine or the FDA, but many are safe, time proven and relatively inexpensive
- ✓ **homeopathic tinctures:** often based on herbs or minerals
- ✓ **nutritional supplements:** including amino acids, bioflavonoids, vitamins, minerals and hormones such as (DHEA)
- ✓ **acupuncture:** promotes healthy nerve and blood flow, which are 2 big factors in ED



PharmCon is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing education.



## Herbal Remedies

- Chinese, African and other cultures have long used herbs for ED, but they are usually not very well studied by American researchers. Common ones are:
  - ✓ **Korean red ginseng** (most potent form of ginseng): regulates “yang energy” in the body, which can boost vitality & stamina, combat fatigue, enhance libido and help with ED.
  - ✓ **Ashwagandha:** sometimes called Indian ginseng because it has similar effects, although no research regarding ED. Side effects include drowsiness, so it shouldn't be combined with sedatives.
  - ✓ **Ginkgo biloba:** a vasodilator and blood thinner that increases blood flow and relaxes smooth muscle. Also an antioxidant. Some studies show that ginkgo is particularly effective for ED caused by antidepressant drug use.



PharmCon is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing education.



## Herbal Remedies cont'd

- ✓ **Yohimbe bark:** contains about 6% yohimbine, which stimulates pelvic nerves, dilates blood vessels and increases heart rate. A 1998 *Journal of Urology* meta-analysis found yohimbine induces erections in 30% of men w/ ED by increasing blood flow to the penis and stimulating libido. Yohimbe bark is potentially dangerous in larger doses because it can cause severe drop in BP, dizziness, hallucinations and paralysis.
- ✓ **Horny goat weed:** mainly an aphrodisiac, but also used for ED. The leaves contain flavonoids, polysaccharides, sterols and an alkaloid called magnafloine . Horny goat weed's mechanism of action is unknown.



PharmCon is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing education.





## Homeopathic Tinctures

- ✓ **Argentum nitricum:** most effective in men who are worried, anxious, hurried and very warm-blooded
- ✓ **Caladium:** indicated for men who are completely unable to get an erection despite a strong libido
- ✓ **Selenium metallicum:** indicated for men who experience ED after suffering a serious illness or fever
- ✓ **Staphysagria:** indicated for ED if physical or emotional abuse play an important role
- ✓ **Lycopodium:** may help older men, especially those w/ BPH
- ✓ **Baryta carbonica:** helpful for premature ejaculation and ED

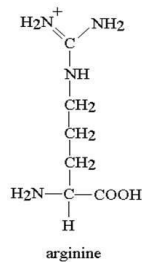
## Supplements - DHEA

- **DHEA:** steroid hormone produced by the adrenal glands. The body converts DHEA into male and female sex hormones, such as testosterone and estrogen.
  - ✓ may help some men with ED, especially if they have low testosterone levels
  - ✓ some research shows that low DHEA levels are common among men with ED, particularly those younger than 60
  - ✓ does not appear to benefit ED caused by diabetes or nerve disorders
  - ✓ supplements made from diosgenin - found in soy and wild yams
  - ✓ supplements taken off the market in 1985 because of concerns of false claims, but reintroduced as nutritional supplements in 1994
  - ✓ long-term safety of DHEA is unknown



## Supplements - Arginine

- **Arginine:** an amino acid used to make nitric oxide, which signals smooth muscle to relax and dilates blood vessels.
  - ✓ some research has concluded that arginine (at doses between 1,500 and 5,000 mg daily for up to 6 weeks) improves ED, which is why it's sometimes called natural Viagra
  - ✓ high doses may stimulate the body's production of gastrin, a hormone that increases stomach acid
  - ✓ may also alter potassium levels, especially in people with liver disease
  - ✓ found naturally in foods such as meat, dairy, poultry and fish



## Supplements cont'd

- **Carnitine:** a substance that helps turn fat into energy and a powerful antioxidant that combats atherosclerosis.
  - ✓ studies suggest that supplemental forms of carnitine (propionyl-L-carnitine and acetyl-L-carnitine) enhance the effectiveness of Viagra, resulting in improved erectile function
  - ✓ propionyl-L-carnitine plus Viagra may be significantly more effective than Viagra alone
  - ✓ also effective for ED caused by diabetes
  - ✓ doses are about 2,000 mg daily for up to 6 months
- **Other nutritional supplements:** bioflavonoids, zinc, magnesium, vitamins C & E, and flaxseed are also used in supportive roles to help improve erectile function.



## Vacuum Devices

- about 80% of men who use vacuum devices correctly are able to obtain an erection hard enough for sexual intercourse - improve firmness by increasing blood flow to the penis
- vacuum erection devices (VED), are typically made of three parts:
  - ✓ clear plastic tube that slides over the penis
  - ✓ manual or battery-operated pump that sucks air out of the cylinder, which draws in more blood to the penis
  - ✓ an elastic ring placed around the base of the penis after an erection is obtained, which prevents blood from escaping
- cumbersome and compromise spontaneity ; the elastic ring may lead to irritation, bruising or pain

## Drug Therapy

- Phosphodiesterase-type 5 (PDE-5) inhibitors, including:
  - ✓ sildenafil (**Viagra**)
  - ✓ tadalafil (**Cialis**) – longest half-life
  - ✓ vardenafil (**Levitra, Staxyn**)
  - ✓ avanafil (**Stendra**) – FDA approved 2012, fastest onset
- Other less common and less effective oral meds include antidepressants such as trazodone.
- The main non-oral alternative is alprostadil, which is available as an injection or suppository.



## PDE-5 Inhibitors

- All PDE-5 inhibitors enhance nitric oxide, which is a natural chemical that relaxes smooth muscles in the penis and increases blood flow.
  - ✓ About 80% of men who take PDE-5 inhibitors have firmer and longer-lasting erections.
  - ✓ They do not stimulate libido or impact testosterone levels.
- Typically taken by mouth about 1 hour or a little less before having sex and should not be used more than once a day.
- Viagra, Levitra and Stendra last about 5 hours, although Cialis can work up to 36 hours as its half-life is much longer.
- With the exception of Staxyn (which dissolves in the mouth and has quicker onset), the other PDE-5 inhibitors are swallowed.
- Combining PDE-5 inhibitors with blood pressure meds or nitrate drugs is dangerous due to a potential fatal drop in blood pressure.
- Most common side effects include headache, runny nose, dizziness, flushing (Viagra, Levitra), muscle aches and back pain (Cialis), and strange blue-green visual shading (Viagra, Levitra).

## Trazodone

- If depression is the predominant cause of ED, then various antidepressant meds may be indicated, although reduced libido is a common side effect of most antidepressants.
- Trazodone is a serotonin antagonist and reuptake inhibitor antidepressant that also appears to possess significant stimulating effects on libido and erectile functions.
- Some studies reported slightly better sexual function in men who took trazodone, but follow-up trials yield conflicting or unconvincing results.
- As such, current guidelines do not recommend trazodone for the treatment of ED.



## Alprostadil

- If oral PDE-5 inhibitors do not significantly impact ED (or they can't be taken for medical reasons) then alprostadil is usually recommended.
- Alprostadil is a powerful vasodilator that triggers an erection (lasting about 1 hour) within minutes, if blood flow is intact.
- Alprostadil is given in 2 different ways:
  - ✓ **Intracavernous injection:** self-injected directly into the base of the penis. 3X per week max. Increased risk of damage, scarring and priapism (prolonged painful erection lasting more than 4-5 hours).
  - ✓ **Intraurethral suppository:** pellets are placed into the urethra at the tip of the penis. Usually less successful than injections.

PharmCon is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing education.



---

---

---

## Testosterone

- Testosterone is a male hormone (androgen) produced mainly in the testicles.
- Helps maintain bone density, fat distribution, muscle strength and mass, RBC production, sex drive / libido and sperm production.
- Testosterone peaks during adolescence and early adulthood, and then gradually declines about 1% yearly after age 30. About 25% of men over 70 don't produce enough.
- Testosterone therapy (by injection or gel) is only recommended as a treatment for ED when levels are low.
- Testing blood levels between 7am and 10am is ideal.

PharmCon is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing education.



---

---

---

## Surgery for ED

- Usually only offered if ED is severe or complete and there's no response from psychological, natural or pharmaceutical treatments.
- ED surgery falls into two categories:
  - ✓ Placement of an implant (either inflatable or semi-rigid), usually on both sides of the penis.
  - ✓ Vascular reconstruction surgery to improve blood flow to or reduce blood leakage from the penis and surrounding structures.

PharmCon is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing education.



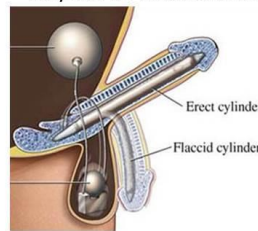
---

---

---

## Surgical Implants

- There are 2 types of penile implants: inflatable and semi-rigid rods.
- Inflatable implants are the most common type in the U.S.
- Inflatable devices are more natural than semi-rigid types because they can be inflated to create an erection and then deflated.



- The two-piece inflatable model works in a similar way to a three-piece design, but the fluid reservoir is part of the pump implanted in the scrotum.
- Semi-rigid rods are always firm and they are less complicated and prone to failure.

PharmCon is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing education.



---

---

---

## Vascular Reconstruction

- Vascular reconstruction surgery involves either repairing arterial blockages to improve blood flow to the penis or reducing venous leakage.
- ✓ **Penile arterial revascularization:** surgical procedure designed to keep blood flowing by rerouting it around blocked or injured vessels. Indicated only for young men (under 45) with no known risk factors for atherosclerosis. Aimed at correcting any vessel injury at the base of the penis caused by blunt trauma or pelvic fracture.
- ✓ **Venous ligation surgery:** focuses on binding leaky penile veins that are causing penile rigidity to diminish during erection. Venous occlusion (which is necessary for sufficient firmness) depends on arterial blood flow and relaxation of the spongy tissue in the penis. Long-term success rates are less than 50%.



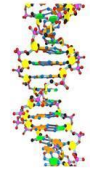
---

---

---

## Future Treatments for ED

- Gene therapy for ED is being widely studied and could provide a longer-lasting treatment for men.
- Scientists are also researching whether a substance made from spider venom could lead to the development of new drugs for ED because certain poisonous spider bites can trigger priapism, which is a painfully prolonged erection.



---

---

---

## Helpful Tips

- ✓ Exercise and maintain a healthy weight
- ✓ Stop smoking
- ✓ Avoid alcohol and substance abuse
- ✓ Maintain healthy blood glucose & cholesterol levels
- ✓ Control hypertension
- ✓ Take steps to reduce stress (yoga, meditation, fun hobby)
- ✓ Get restful sleeps
- ✓ Be cautious when bike riding long distances
- ✓ Get help for anxiety or depression



---

---

---

## Notes

