

# Canadian Undergraduate Urology Curriculum (CanUUC)



## ERECTILE DYSFUNCTION

# Objectives

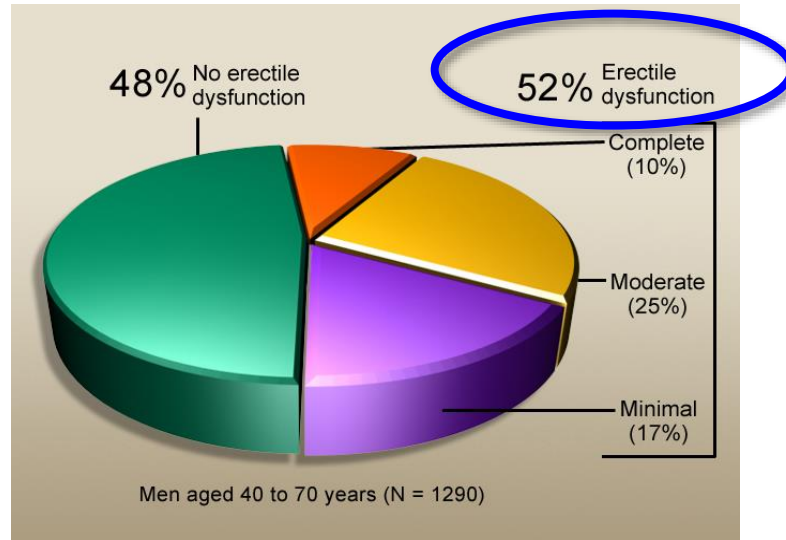
1. Define erectile dysfunction
2. List and classify the risk factors for erectile dysfunction (ED)
3. Describe the medical and surgical treatment options available for erectile dysfunction
4. List contra-indications to PDE-5 inhibitors

# Erectile Dysfunction (ED): Defined



*“The consistent or recurrent inability to obtain and/or maintain an erection sufficient for satisfactory sexual activity”*

# Prevalence of ED: Massachusetts Male Aging Study



Feldman HA, et al. J Urol. 1994;151:54-61.

# Causes of Erectile Dysfunction

- Vascular – arterial (cholesterol, diabetes, hypertension, trauma/surgery), venous leak
- Neurogenic (surgery/trauma, MS, diabetes)
- Psychologic (depression, anxiety, substance abuse)
- Hormonal (low testosterone, thyroid, prolactin)
- Anatomical (Peyronie's disease, phimosis)
- Medications (SSRIs)

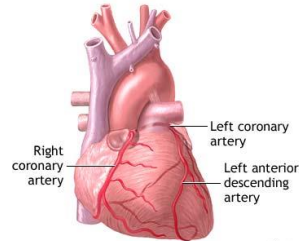
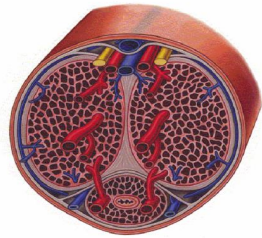
# Major Risk Factors for ED

- **CV Risk Factors:**
  - Smoking
  - Obesity
  - Sedentary
  - Hypertension
  - Diabetes
  - Hyperlipidemia
- **Cardiovascular Disease**
- **Peripheral VD**
- **Mental Illness**
- **Chronic Disease**

Martin-Morales A et al. J Urol. 2001;166:569-575.  
Laumann EO et al. JAMA. 1999;281:537-544.  
Braun M et al. Int J Impot Res. 2000;12:305-311.

# ED: A Canary in a Coal Mine

ED shares many risk factors for heart disease and warrants a cardiac risk assessment in most patients



# Evaluation & Diagnosis

## **Organic (90%):**

- Older adults
- Gradual onset
- Risk factors present
- Pervasive problem (nocturnal, intercourse, masturbation)

## **Psychogenic (10%):**

- Young
- Sudden onset
- Absence of risk factors
- Situational/intermittent problem
- Nocturnal or early morning erections maintained
- Psychological history



# Evaluation & Diagnosis

- **Medical, Sexual, Psychological History**
- **Validated Questionnaires**
  - International Index of Erectile Function (IIEF)
  - Sexual Health Inventory for Men (SHIM) – screen for testosterone deficiency
- **Physical Examination**
  - HR, BP, weight/BMI
  - Penis: size, plaques, foreskin
  - Testis: size, masses, consistency
  - Peripheral pulses, sensation
- **Laboratory Investigations**
  - Hg A1c/fasting glucose
  - Lipid profile
  - Testosterone (if signs/symptoms of low testosterone, especially low libido)

# Evaluation & Diagnosis

## Specialized Testing (not routinely used):

- **Penile Duplex US with injection of vasoactive agent**
  - Arterial inflow, venous outflow (leak), rigidity of erection
  - Not routinely required
- **Nocturnal Penile Tumescence**
  - Presence, frequency, rigidity of erections
  - Distinguish between organic vs. psychological cause
- **Angiography (internal pudendal system)**
  - Focal traumatic stenosis

# Treatment Options for ED

- **Lifestyle Modification**
- **Sex Therapy/Counseling**
- **Medical**
  - Phosphodiesterase Type 5 Inhibitors (PDE5i)
  - Androgens/testosterone
- **Vacuum Constriction Device**
- **Intraurethral Rx: MUSE**
- **Intracavernosal Injection: Caverject, Trimix**
- **Penile Prosthesis**

# Lifestyle Modification

- **Smoking Cessation**
- **Exercise**
- **Diet**
- **Limit Alcohol intake**
- **Control hypertension/cholesterol**



# Medical Therapy of ED

## PDE5i – On-demand

Approved 1998



2003



2003



**Contraindicated in men taking nitroglycerine (nitrates) or known hypersensitivity**

## Medical Therapy of ED PDE5i – Daily



2.5 mg (1/2 tab)  
may be all that  
is needed

**Contraindicated in men taking nitroglycerine  
(nitrates) or known hypersensitivity**

## PDE5 Inhibitors: Pharmacokinetic Comparison

	Sildenafil	Vardenafil	Tadalafil
	100 mg (fasted)	20 mg (fasted)	20 mg (fasted)
$T_{\max}$ (min)	70	48	120
$T_{1/2}$ (h)	4.0	4.0-5.0	17.5

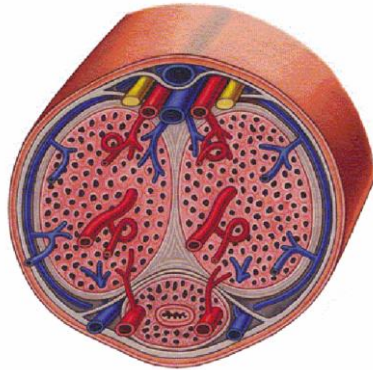
Data are shown as means

Tadalafil's longer  $T_{1/2}$   
allows for daily dosing  
option

1. Klotz et al, ACCP 2002
2. Sildenafil product monograph
3. Tadalafil B Pullman, IC351 (Tadalafil) Symposium, Indianapolis, Ind, June 7, 2001

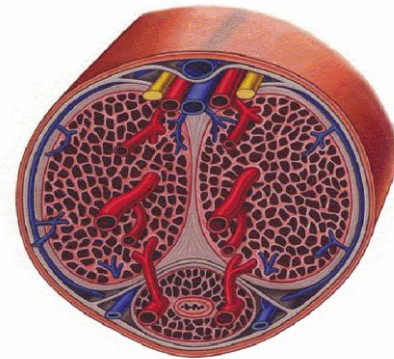
# Mechanism of Erections: Vascular Circulation

Smooth muscles contracted >  
vasoconstriction > low blood flow



Flaccid Penis

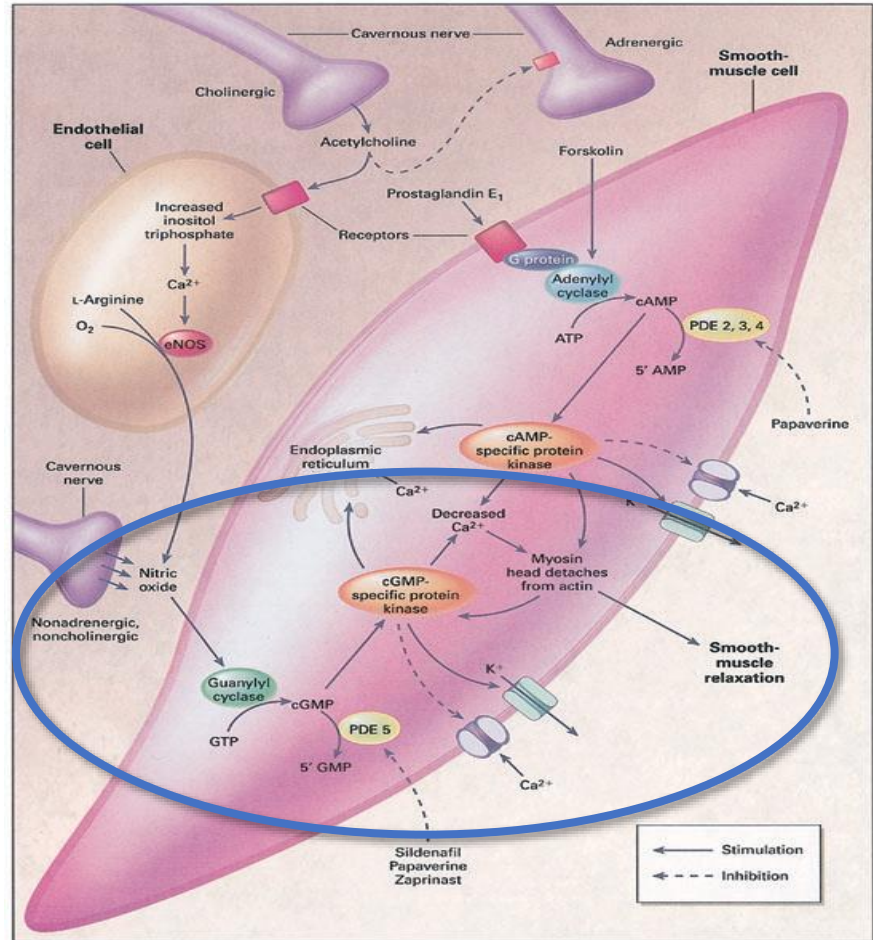
Smooth muscles relaxed >  
vasodilation > high flow



Erect Penis



# Mechanisms of Smooth Muscle Cell Relaxation with PDE5i



# Common Side Effects of PDE5i

- **Headache**
- **Dyspepsia**
- **Rhinitis**
- **Flushing of face/skin**
- **Vision changes (Viagra)**
- **Dizziness**
- **Myalgias/back pain (Cialis)**

# Contraindications to PDE5i

- **Absolute:**
  - Use of Nitrate medication

- **Relative:**

The package inserts of all three PDE5 inhibitors warn against the use in patients with severe cardiovascular diseases and left ventricular outflow obstruction (e.g., aortic stenosis, idiopathic subaortic stenosis), those with severely impaired autonomic control of blood pressure, and patients not studied in clinical trials (U.S. prescribing information of Viagra, Cialis, and Levitra, August 2009). These include patients with:

- Myocardial infarction, stroke, or life-threatening arrhythmia within the previous 6 mo
- New York Heart Association class II or greater heart failure or coronary artery disease causing unstable angina
- Resting hypotension (<90/50 mm Hg) or hypertension (>170/100 mm Hg)
- Known hereditary degenerative retinal disorders including retinitis pigmentosa
- Severe hepatic impairment (Child-Pugh C) or end-stage renal disease requiring dialysis

# Contraindications to PDE5i

- **NOT contraindicated in patients with:**
  - History of stable CV disease/MI (except if absolute or relative contraindications exist)
  - Patients on alpha-blockers for BPH (historical)
  - Young patients with psychogenic ED (may help)
- **Does NOT cause priapism**
  - Still mentioned on product monograph

# Patient Education: Keys to PDE-5i Success

- **Patient Education is critical to success**
  - Take 60 min in advance of sex
  - Sildenafil/Vardenafil: need to take on an empty stomach
  - Mental and physical stimulation required
    - Not a “magic” erection pill, best if partner aware
    - Anxiety can counteract effects of medication
  - Try medication several times before giving up on it
  - Efficacy of the 3 drugs varies from patient to patient
    - Try at least 2 drugs before declaring failure
  - Warn patient about side-effects and contraindications
  - Reassure patients regarding the safety of the medication

# Androgens and Testosterone Replacement

- May be useful in men with ED and low testosterone (especially if other symptoms of testosterone deficiency exist, i.e. low libido)
- Consider testing testosterone in men not responding to PDE5i
- Should **NEVER** be given to men trying to conceive (causes infertility)

# Testosterone Deficiency Syndrome

**TABLE 1.** Symptoms and signs suggestive of androgen deficiency in men

## A. More specific symptoms and signs

- Incomplete or delayed sexual development, eunuchoidism
- Reduced sexual desire (libido) and activity
- Decreased spontaneous erections
- Breast discomfort, gynecomastia
- Loss of body (axillary and pubic) hair, reduced shaving
- Very small (especially <5 ml) or shrinking testes
- Inability to father children, low or zero sperm count
- Height loss, low trauma fracture, low bone mineral density
- Hot flushes, sweats

## B. Other less specific symptoms and signs

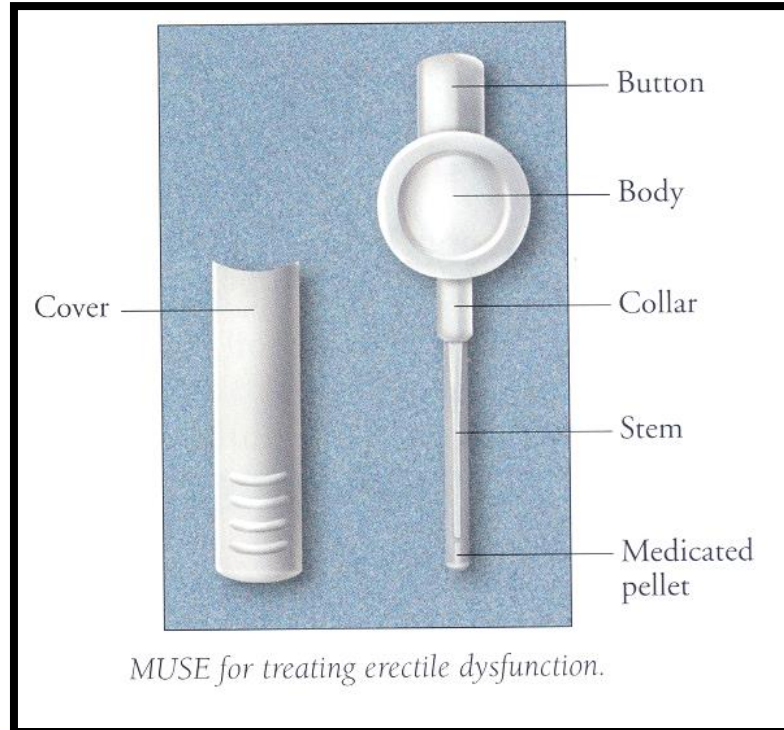
- Decreased energy, motivation, initiative, and self-confidence
- Feeling sad or blue, depressed mood, dysthymia
- Poor concentration and memory
- Sleep disturbance, increased sleepiness
- Mild anemia (normochromic, normocytic, in the female range)
- Reduced muscle bulk and strength
- Increased body fat, body mass index
- Diminished physical or work performance

# Testosterone Deficiency Syndrome

- **Initial Evaluation for TDS**
  - Morning serum Total T, FSH, LH, Prolactin
  - PSA, CBC, DRE if considering therapy
- **Treatment (indicated for symptoms of TDS + Low T)**
  - Topical gel (Androgel, Testim)
  - IM (injection every two weeks typically)
  - Other agents (Oral, Nasal, Patch)
- **Monitoring (q3-6 months initially)**
  - Symptom assessment and CBC, PSA, DRE



# MUSE Intraurethral Suppository (PGE-1)



# MUSE

Problems:

- Limited efficacy
- Pain
- Priapism



# Vacuum Erection Device

- **Cumbersome**
- **Limited efficacy**
- **Non-pharmacologic**
  - Can be used in patients on nitrates



OSBON  
**ERECAID®**  
Non-Prescription Vacuum Therapy System

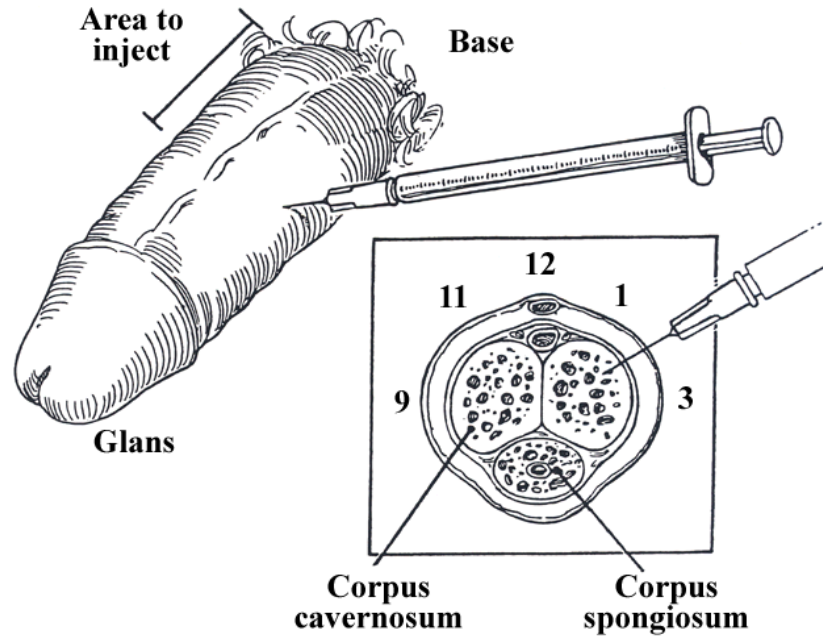


User Guide

NOW AVAILABLE WITHOUT  
PRESCRIPTION

 **timmm**  
medical technologies, inc.  
At your side with better solutions

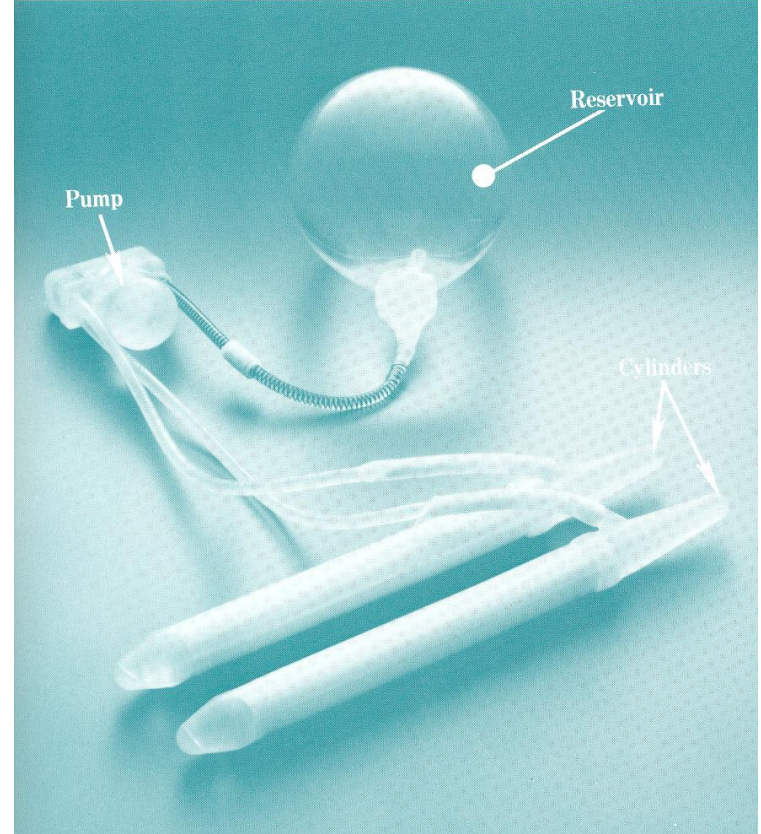
# Intracavernosal Injection Therapy (ICI)



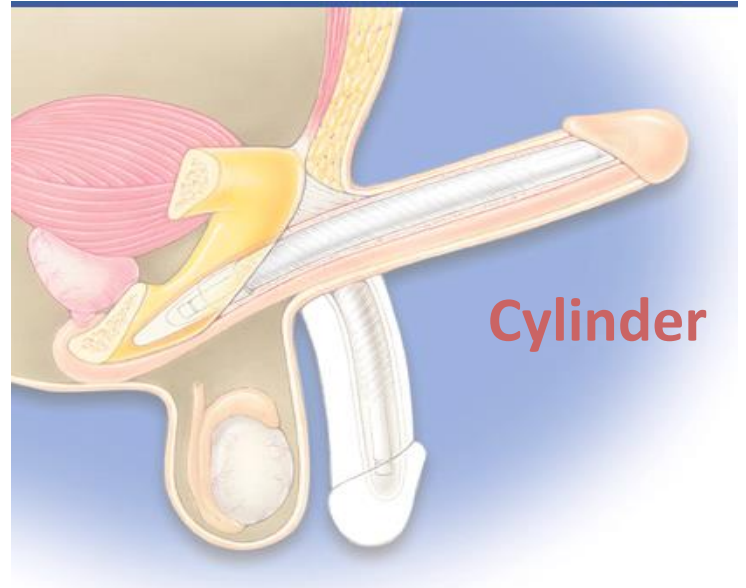
Caverject  
(Alprostadil)

Triple P/Trimix:  
PGE-1  
Phentolamine  
Papaverine

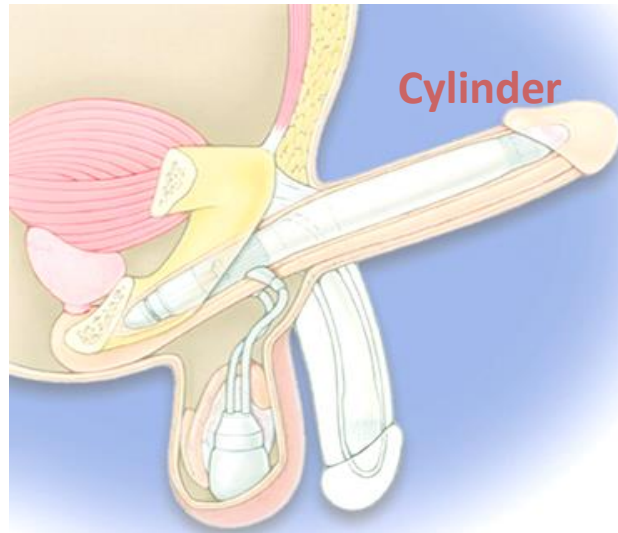
# Penile Implants/Prosthesis



# Non-inflatable (malleable) Penile Implant



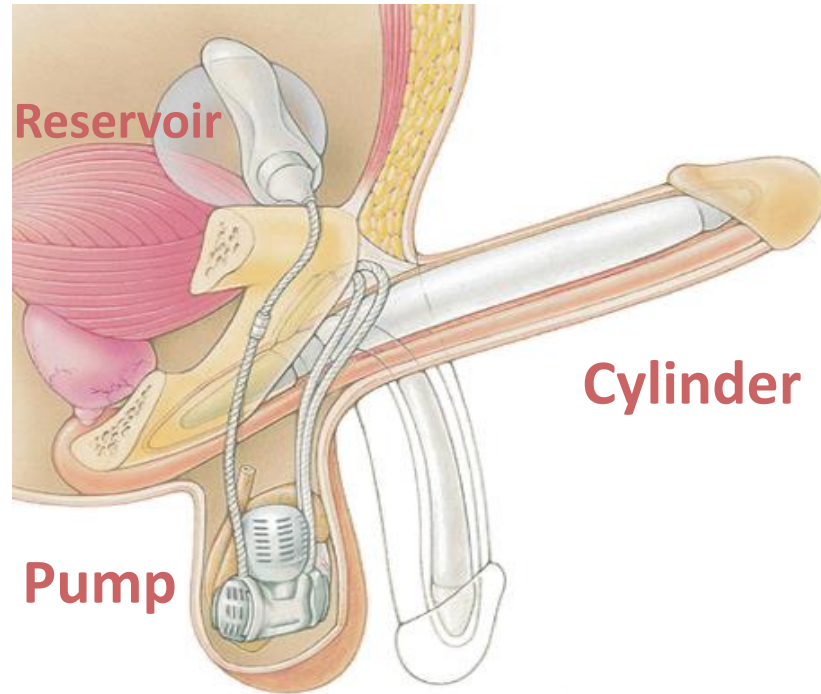
# Inflatable 2-Piece Penile Implant



Cylinder

Pump &  
Reservoir

# Inflatable 3-Piece Penile Implant





# Risks of Penile Implants

- **Infection:** usually requires complete removal
- **Perforation:** in the OR
- **Malfunction:** 5% in 10 years
- **Urethral injury**
- **Erosion**

# Novel Treatments

- Low Intensity Shockwave (widely available with some clinical studies)
- Stem Cells (experimental)
- Platelet Rich Plasma (experimental)

# Psychogenic ED

- Some component of psychogenic causes almost always present
- Secondary in men with organic ED (frustration, discouraged, performance anxiety)
- Primary in some men (10%)

# Summary

- ED is common, and usually has an organic component
- Always consider occult CV disease
- A variety of treatment options exist
  - PDE-5i therapy useful in most, patient education is key
- Urology referral appropriate for PDE-5i failures or if contraindications exist
- Testosterone therapy useful in select cases where patient has a symptoms and a low serum testosterone level