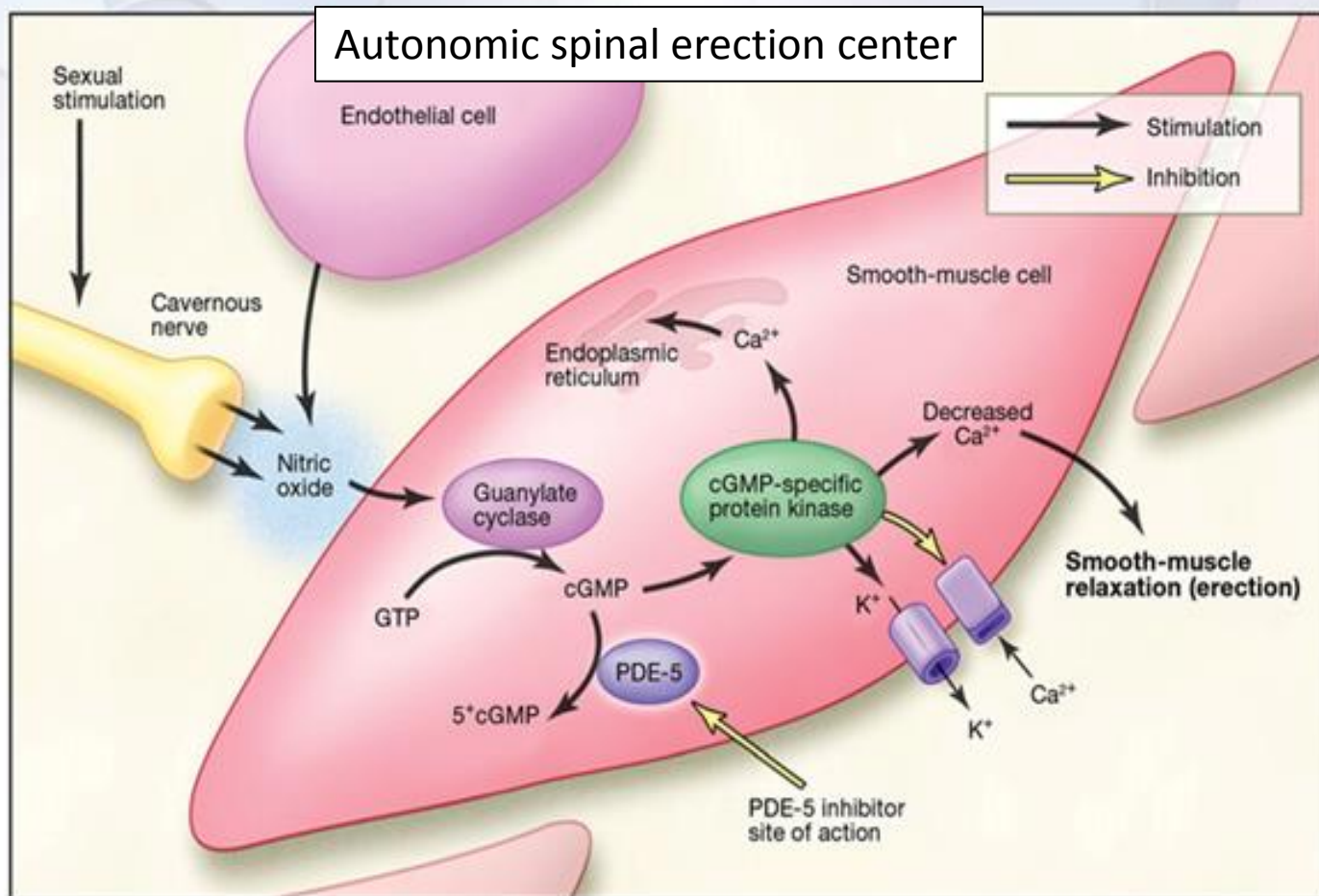


Pathophysiology: Mechanism of an erection

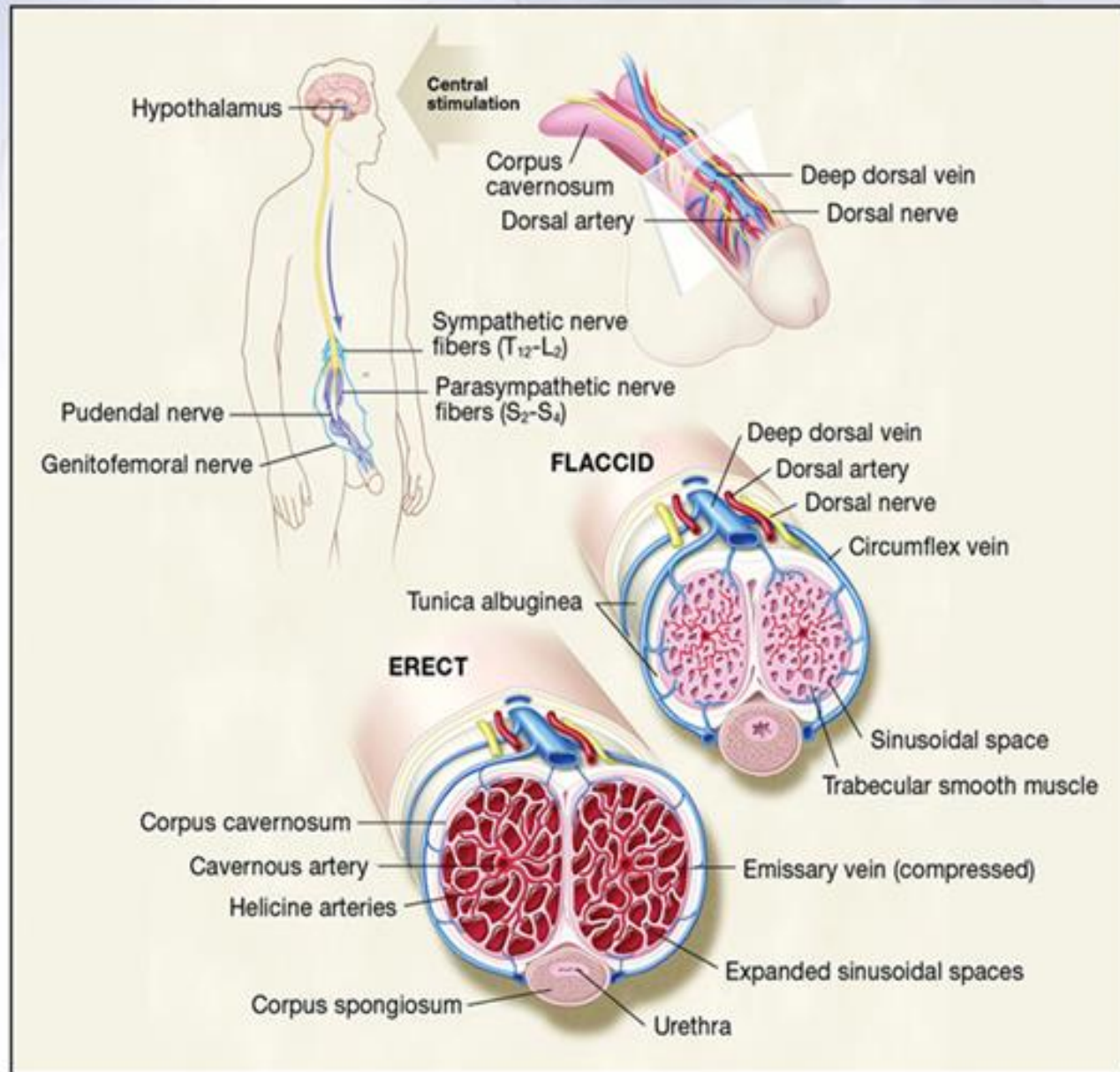
- ▣ A normal erection relies on the coordination:
 - Vascular
 - Neurological
 - Hormonal
 - Psychological
- ▣ An erection can occur following direct genital stimulation or auditory or visual stimulation, aspects that contribute to the influx of blood to the penis

Pathophysiology: Biochemical pathways of an erection



Fazio, Luke, Brock, Gerald Erectile dysfunction: management update *CMAJ* 2004
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Pathophysiology: Mechanism of an erection



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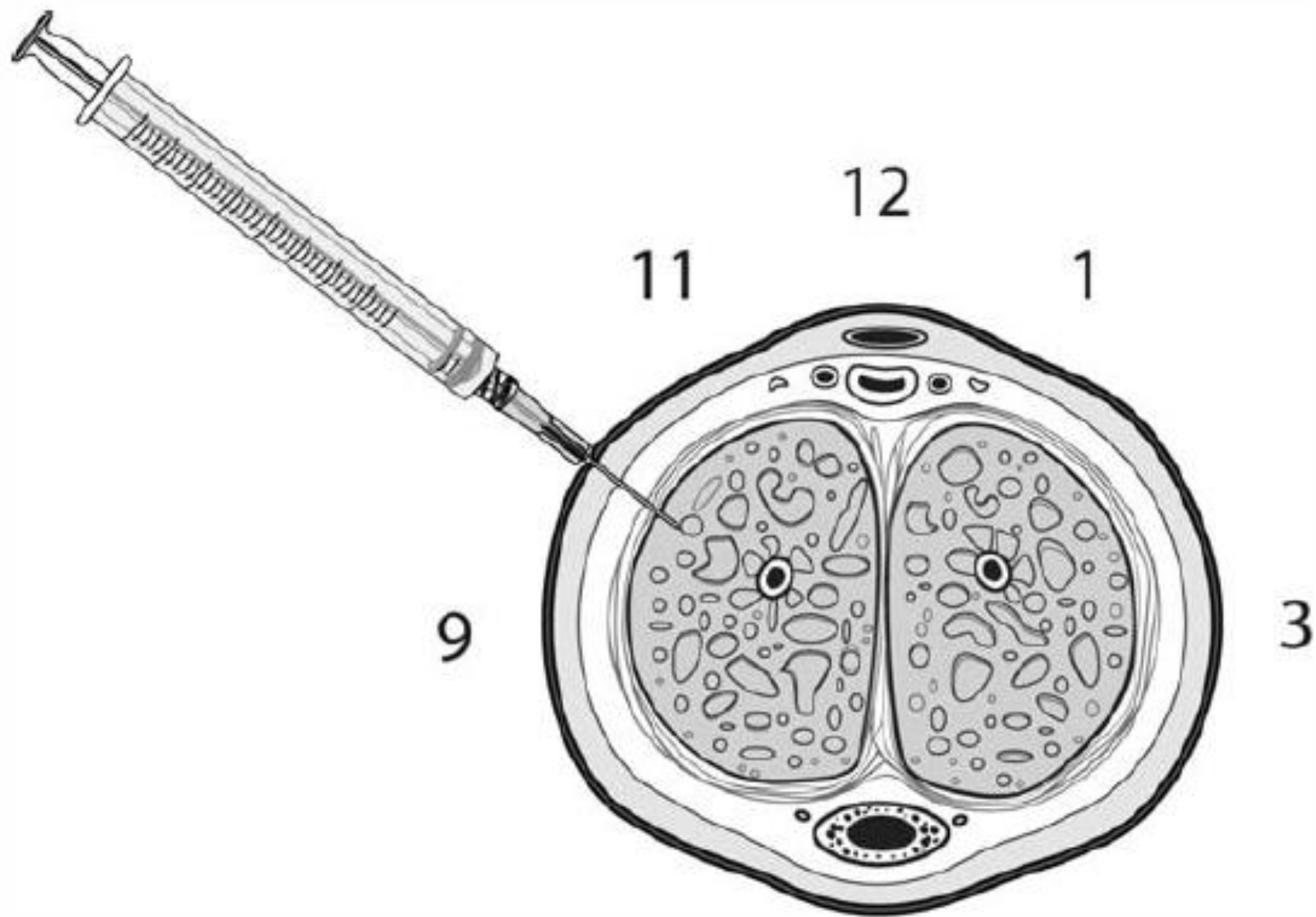
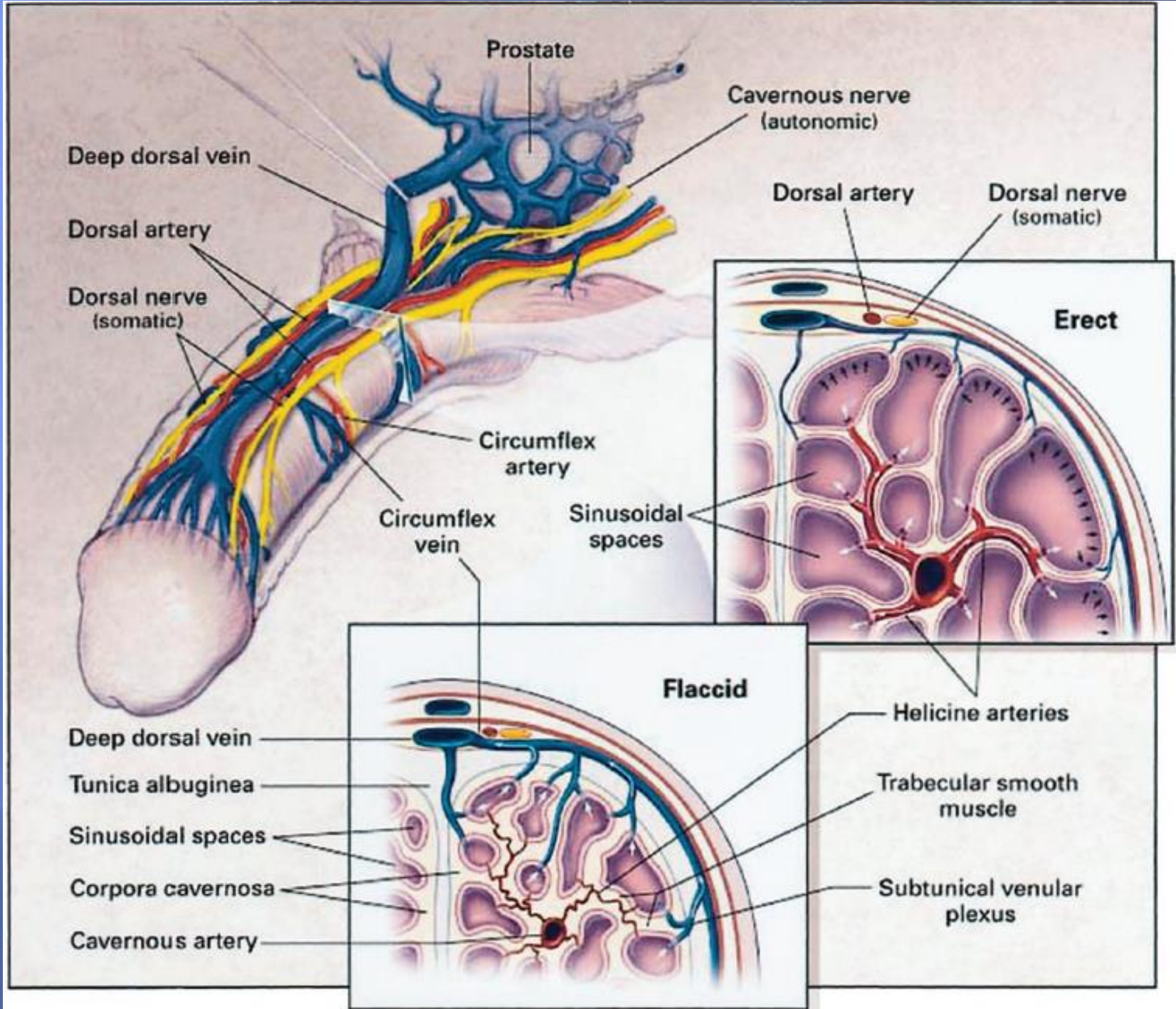
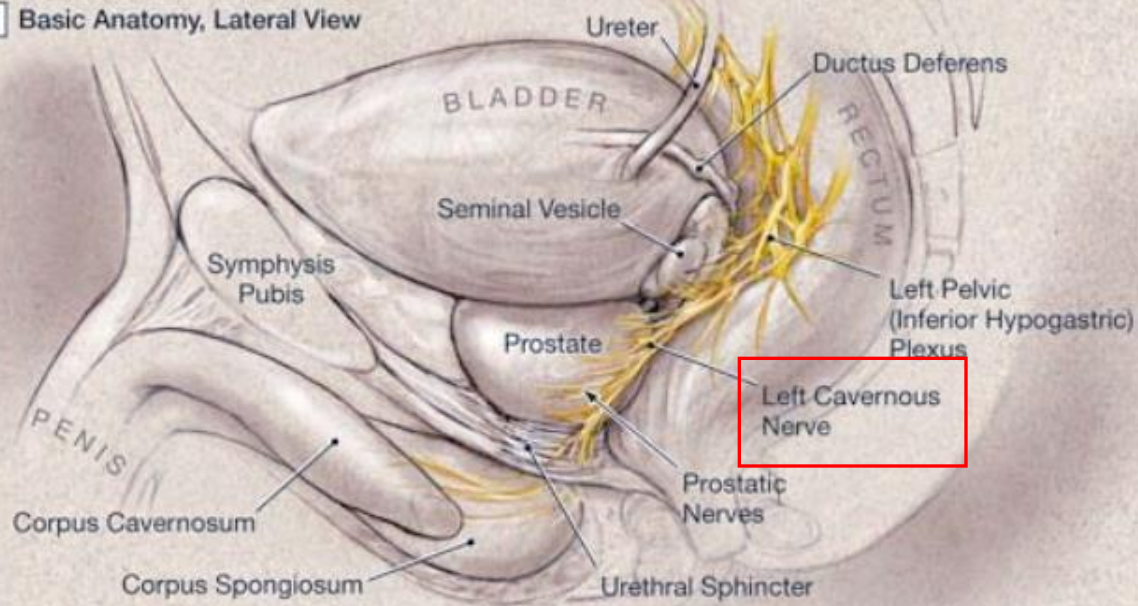


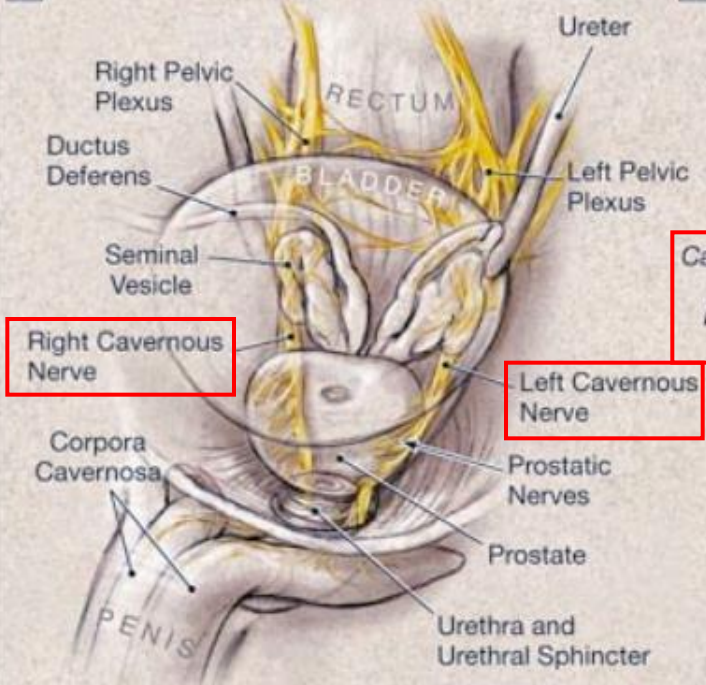
Figure 2 • Diagram illustrating the position and angle of needle placement during penile injection



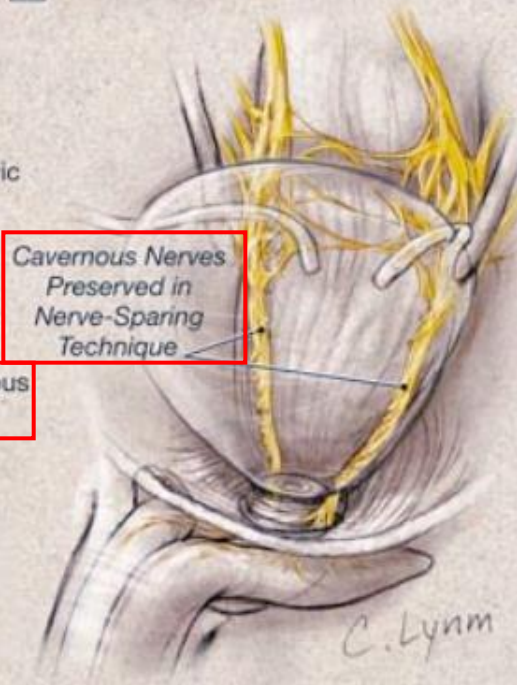
A Basic Anatomy, Lateral View



B Basic Anatomy, Oblique View

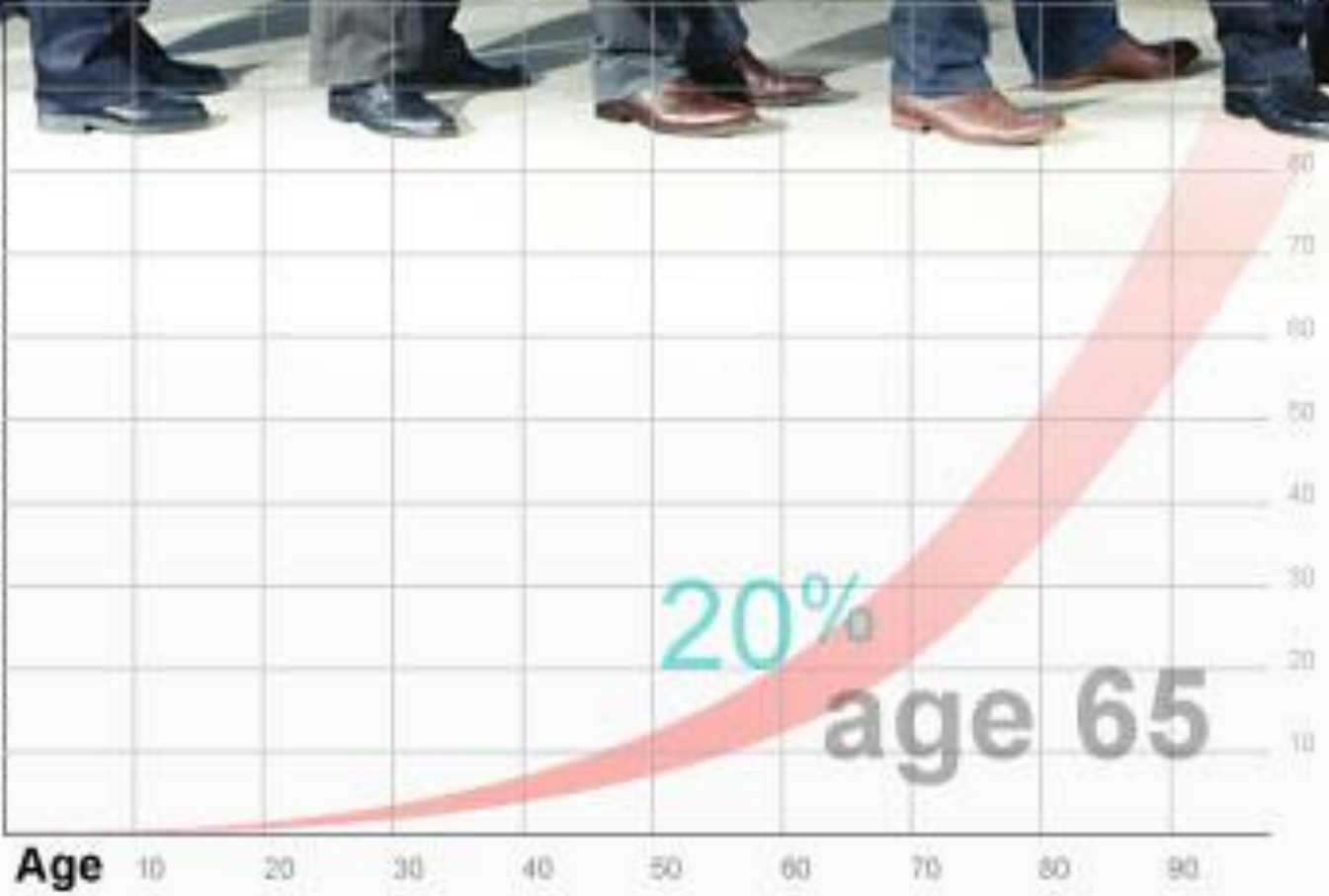


C Postsurgical Anatomy, Oblique View





Percent of Men Experiencing ED



20%

age 65

Diabetes ED

- About 35 – 75% of men with diabetes will experience at least some degree of ED (impotence) during their lifetime
- Men with diabetes develop ED 10 – 15 years earlier than men without diabetes
 - Often 1st symptom men notice even before they are diagnosed as a diabetic
- Above age of 50, the likelihood of having difficulties with an erection occurs in approximately 50 – 60% of men
- Above the age of 70, there is a 95% likelihood of having some difficulty with erection function

Diabetes ED

- ▣ To get an erection, men need healthy:
 - Blood vessels
 - Nerves
 - Muscle function
 - Desire to be sexually stimulated
- ▣ Elevated blood glucose levels can cause damage to blood vessels & nerves to the penis
- ▣ Men with coronary artery disease (CAD) & diabetes will be 9 times more likely to develop ED than men with just diabetes

Diabetes ED

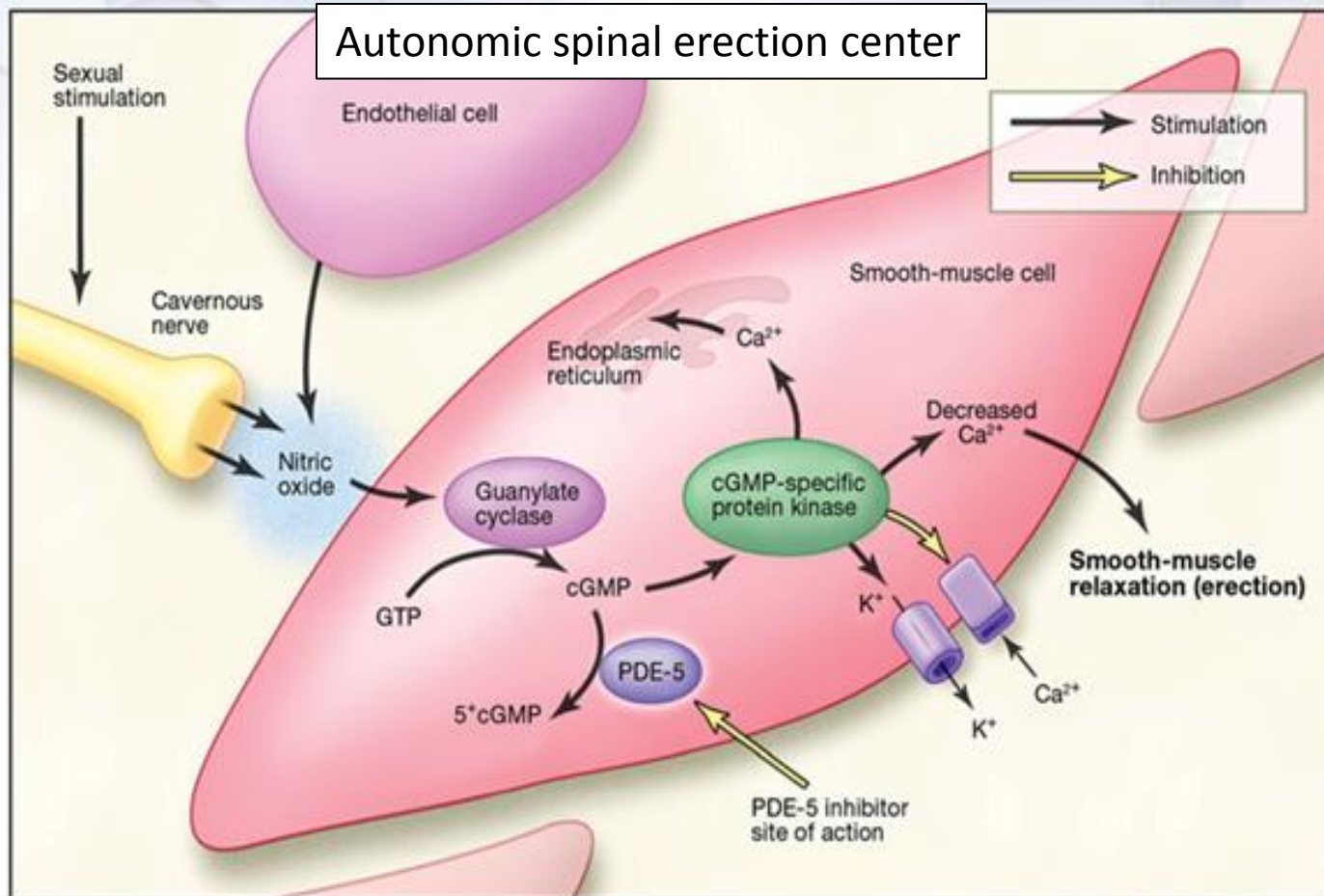
- ▣ Longer a man has diabetes with poor blood glucose levels, complications of accompanying heart disease such as high blood pressure & high cholesterol can also affect ED
- ▣ Diabetic men who smoke also have increased risk of developing ED

MEDICATIONS ASSOCIATED WITH ED	ALTERNATE SOLUTIONS	MEDICATIONS ASSOCIATED WITH ED	ALTERNATE SOLUTIONS
Cardiovascular		Antidepressants	
Betablockers Hydralazine Methyldopa Alpha-blockers	ACE inhibitors ACE II inhibitors Ca ⁺⁺ channel blockers	SSRI Tricyclic antidepressant MAOI	Bupropion Mirtazapine
Diuretics		Antipsychotic agents	
Thiazide diuretics Spironolactone	Furosemide (loop diurectics)	Conventional neuroleptics Risperidone	Quetiapine Olanzapine
Hormone agents		Gastroesophageal reflux & ulcers	
Anti-androgens (e.g. cyproterone) Corticosteroids	Varies depending on indication	Cimetidine	Other H2 antagonist or PPI?? (may ↓ NO levels)
Antiparkinsonian agents		Anticonvulsants	
Levodopa	At the neurologist's discretion	Carbamazepine Phenytoin	At the neurologist's discretion
Miscellaneous: Phenothiazine antiemetics, opioids (chronic use), digoxin, ketoconazole, lithium <i>Drug-induced male sexual dysfunction. Pharmacist's Letter/Prescriber's Letter 2006; 22(9):220907.</i>			

Treatment Options

1. PDE5 Inhibitors
 - a) Sildenafil - Viagra®
 - b) Vardenafil - Levitra®
 - c) Tadalafil - Cialis®
2. Intraurethral suppositories
 - a) Alprostadil - MUSE®
3. Intraurethral gel
4. Penile injections
5. Vacuum devices

Pathophysiology: Biochemical pathways of an erection



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Comparing PDE5 Inhibitors

	Sildenafil (Viagra)	Vardenafil (Levitra)	Vardenafil ODT (Staxyn)	Tadalafil (Cialis)
Time to onset	1 hour	1 hour	45 - 90 minutes	2 - 4 hours
Duration of action	8-12 hours	8-12 hours	8 hours	24-36 hours
Food interaction	Yes	Yes	No	No
Nitrates forbidden	Yes	Yes	Yes	Yes
Visual disturbances	+	+	+	-
Muscle aches	+	+	+	++
Headache	++	++	++	++
Nasal stuffiness	++	++	++	++
Heartburn	++	++	++	++

+++ common

++ occassional

+ rare

- none

Intraurethral Suppository

- ▣ MUSE®
 - 250ug, 500ug, **1000ug**
 - Medicated Urethral System for Erection
 - A choice for people:
 - ▣ Who do not respond to oral pills
 - ▣ Are afraid of injections
 - Suppository (about the size of a grain of rice) which is placed about 1" inside the urethra using a special applicator

Advantages with MUSE®

- ▣ Fool proof and low incidence of SE's
- ▣ Gives an erection similar to penile injection therapy
- ▣ Gives the most normal looking erection. The head of the penis doesn't swell in penile injections/PDE5 inhibitors but does with MUSE®

Disadvantages with MUSE®

- ▣ 50 – 75% of men don't respond well
- ▣ 50- 60% of men don't respond consistently
 - May get good erection one time but not the next
- ▣ May develop a lack of confidence because 1 out of every 2 or 3 uses doesn't work well
- ▣ 2% of men may have dizziness on 1st administration with 1000µg strength. May need to do the 1st dose in the Dr's office
 - Not with 250µg or 500µg dose

MUSE[®] Injector



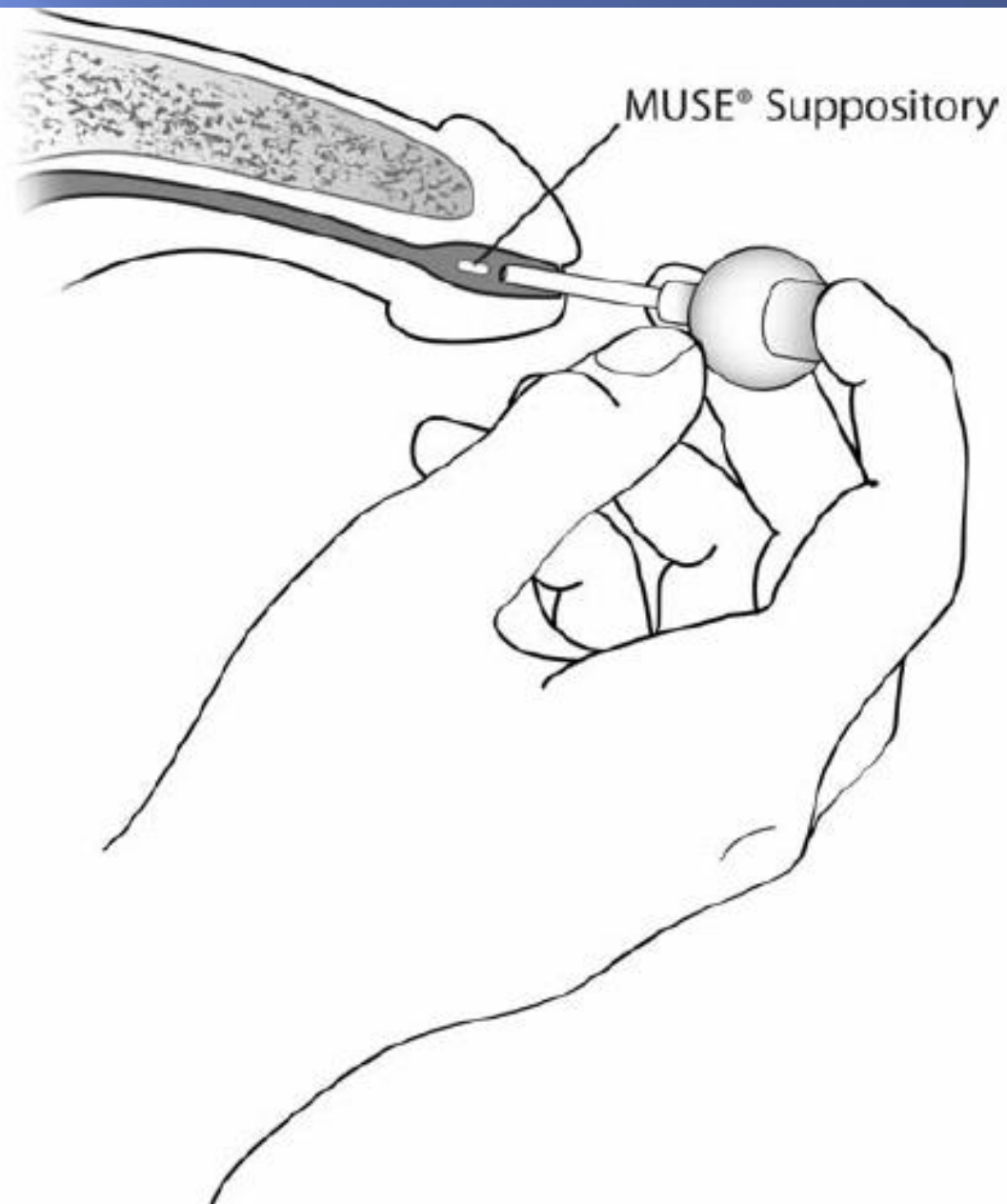


Figure 2 • Illustration of placement of applicator into urethra

Intraurethral Gels

- ▣ Fool proof and low incidence of SE's
- ▣ Gives an erection similar to penile injection therapy
- ▣ Possibly stronger than using MUSE®
- ▣ Must be kept in the fridge and has a 30 day expiry date

Penile Injections

- ▣ Intracavernosal injection therapy
 - Very safe & highly effective
- ▣ Around since 1983.
 - In 1982, a French surgeon injected a vasodilator into the pelvic artery & the patient obtained an erection
 - Shortly after, a British physician injected a drug directly into the penis

Caverject

- ▣ Alprostadil 20 μ g/0.5ml
 - ▣ Prefilled syringe
 - ▣ Dosage range 5 – 20 μ g
- ▣ Works in 60% with all men with ED
 - Will work better with milder erection problems
 - Can cause an aching or burning penile pain in some men with cavernous nerve injury

Caverject



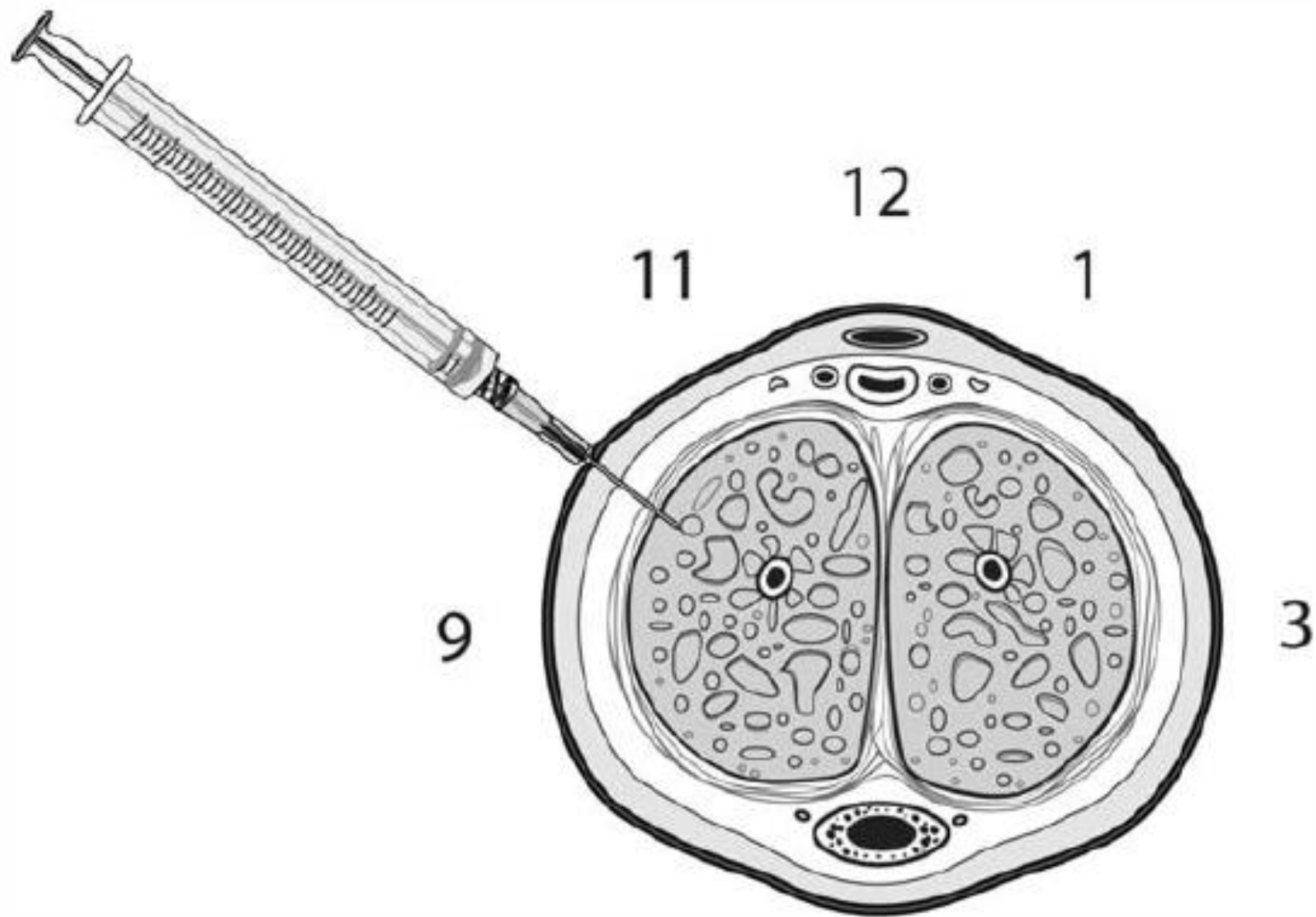


Figure 2 • Diagram illustrating the position and angle of needle placement during penile injection

Penile Injections

- ▣ **Alprostadil**
 - Prostaglandin E -1 → ↑ cAMP
 - Vasodilator & muscle relaxant of corpus cavernosum & trabecular smooth muscle
- ▣ **Papaverine**
 - Inhibits phosphodiesterase in smooth muscle cells, which ↑ cAMP & cGMP → relaxation of vascular smooth muscles
- ▣ **Phentolamine**
 - Blocks α -adrenergic receptors in penile blood vessels → relaxation of trabecular cavernous smooth muscles & dilatation of the penile arteries
 - Weak erectile-promoting effect when used alone.
 - Potentiates the effect of papaverine or PGE-1
- ▣ **Atropine**
 - Smooth muscle relaxation
- ▣ **Chlorpromazine**
 - α blocker activity
 - 1:1 mg interchangeability with phentolamine

Penile Injections

- ▣ Products require refrigeration
 - Caverject® is kept at room temperature
- ▣ After 18 months of radical prostatectomy more than 70% of people will ↓ the dose of their injection
 - Duration of injection will be a sign for this
i.e. 30 minutes → 45 minutes → 60 minutes

Autoject 2



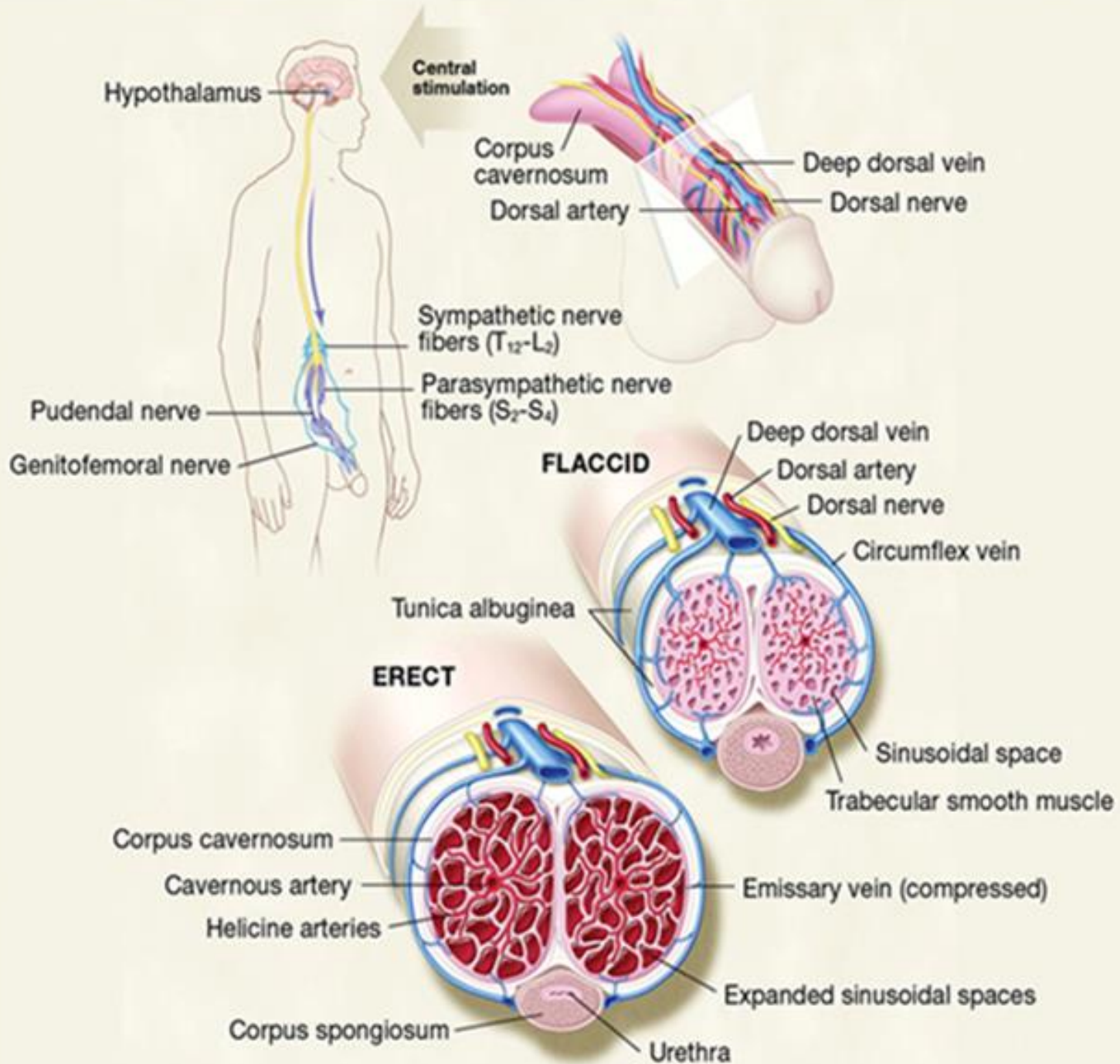
Does a complete injection

Vacuum Devices

- Have been used for more than a century
 - 1874 by Dr. John King
 - 1917 Dr. Otto Lederer developed constriction rings for maintenance of erections
 - 1960's Geddings Osborn developed his version of vacuum device
 - 1974 Osborn's product became commercially available
 - 1976 FDA withdrew it's approval
 - 1982 FDA reapproved product

Vacuum Devices

- ▣ Erect penis (especially Caucasian) appears blue or grey
 - 50% of blood from arteries → oxygenated
 - 50% of blood from veins → non-oxygenated
- ▣ Arterial blood is warmer than venous blood
 - Penis may not be as warm (1°-2° F lower)
 - Most common complaint of partners
 - ▣ Touch penis
 - ▣ Upon penetration



Vacuum Devices

- ▣ Takes 2-10 minutes to obtain a functional erection
- ▣ Take on average 4 attempts to use pumps to become proficient
- ▣ Need to place constriction ring as close as possible to base of penis. Penis will be hard on one side of ring and soft on the other side
 - Only wear for maximum 30 minutes

Vacuum Pumps

- ▣ 80-90% of men can obtain an erection
 - Overall patient satisfaction 60-80%
- ▣ In order to achieve enough pressure in the vacuum device, gel will have to be applied to the open end of the device
 - Some men will also have to trim the pubic hair to maximize seal

Vacuum Devices

▣ Certain groups of men should avoid using these devices

■ Blood thinners or history of bleeding disorders

▣ Coumadin® - Warfarin

▣ Plavix® - Clopidogrel



Not ASA 81mg

■ Diminished penile sensation

■ Spinal cord injury

■ Significant penile curvature

■ History of priapism

Vacuum Devices

- ▣ Bonro Medical
 - Vaculect®



Osbon Erecaid Constriction Rings

PINK = FIRM FIT

BEIGE = REGULAR FIT



Each colour comes in
2 sizes small and large