An erection is an involuntary reaction in response to sexual stimulation

- A man cannot get an erection simply because he wants one
- Sexual stimulation and excitement cause the brain, nerves, the heart, blood vessels and hormones to work together to produce a rapid increase in the amount of blood flowing to the penis
- The blood becomes trapped and held in the two spongy chambers in the shaft of the penis
- As the chambers rapidly fill with blood, they expand, and the penis becomes firm and elongated
- The result is an erection

Erectile Dysfunction

Vascular and Sinusoid Anatomy

1. Sexual stimulation and excitement cause the brain, nerves, the heart, blood vessels and hormones to work together to produce a rapid increase in the amount of blood flowing to the penis.
2. The blood becomes trapped and held in the two spongy chambers in the shaft of the penis.
3. As the chambers rapidly fill with blood, they expand, and the penis becomes firm and elongated. The result is an erection.
What Is Erectile Dysfunction (ED)?
- “The consistent or recurrent inability of a man to attain and/or maintain a penile erection sufficient for sexual performance.”

E.D. Facts
- Approximately 30 million American men suffer from E.D.
- E.D. is not normal, and is by no means an inevitable consequence of aging
- Most men at one time or another during their sexual life, are unable to get or keep an erection. This is normal and does not indicate a problem, but millions of men experience this inability as a continuing problem.
- In most cases can be treated

What is E.D.?
- E.D. can be:
  - A total inability to achieve an erection
  - An inconsistent ability to do so; or
  - A tendency to sustain only brief erections

Causes of Erectile Dysfunction
ERECTILE DYSFUNCTION

Risk Factors

• Age (Biggest Risk)*
• Diabetes*
• Hypertension*
• Elevated Total or Low HDL Cholesterol*
• Medicines (hypoglycemic agents, vasodilators, anti-hypertensives, antidepressants)*
• Smoking**
• Depression
• Obesity
• Prostate disease

* Massachusetts Male Aging Study
** Mannino et. al. Am. J. Epidemiol. 140(11):1003-8

Risk Factors for E.D.: Chronic Diseases

<table>
<thead>
<tr>
<th>Chronic Disease</th>
<th>Increased ED Risks*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes1,2</td>
<td>×4.1</td>
</tr>
<tr>
<td>Prostate disease1,2</td>
<td>×2.9</td>
</tr>
<tr>
<td>Peripheral vascular disease1,2</td>
<td>×2.6</td>
</tr>
<tr>
<td>Cardiac problems1</td>
<td>×1.8</td>
</tr>
<tr>
<td>Hyperlipidemia1</td>
<td>×1.7</td>
</tr>
<tr>
<td>Hypertension1,2</td>
<td>×1.6</td>
</tr>
</tbody>
</table>

*L: age-adjusted odds ratio.
*1: prostatic symptoms on the International Prostate Symptom Score questionnaire.

Erectile Dysfunction

Vascular Causes

Structural Changes
- Atherosclerosis
- Hypertension
- Hypercholesterolemia
- Diabetes

Functional Changes
- Impairment of endothelium-dependent relaxations
- Arterial insufficiency
- Reduced inflow
- Excessive outflow
- Corporal-veno-occlusive diseases

Drug Causes

Prescription medicines
- Antihypertensives
- Antidepressants
- Antihistamines
- Anti-androgens
- H2-blockers
- 5α-Reductase inhibitors
- Lipid-lowering agents
- Recreational drugs
- Tobacco
- Alcohol
- Cocaine
- Heroin
- Methadone
- Ecstasy (MDMA)
- Marijuana

Hormonal Causes

• Primary hypogonadism
• Secondary hypogonadism
  - Gonadotropin deficiency
  - Chronic illness
  - Hyperprolactinemia
• Hypothyroidism
• Hyperthyroidism
• Other endocrine disorders

Neurogenic Causes

<table>
<thead>
<tr>
<th>Periphera</th>
<th>Central</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcoholism/ drug use</td>
<td>X</td>
</tr>
<tr>
<td>Diabetes</td>
<td>X</td>
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<tr>
<td>Disk disease</td>
<td>X</td>
</tr>
<tr>
<td>Multiple sclerosis</td>
<td>X</td>
</tr>
<tr>
<td>Multiple system atrophy</td>
<td>X</td>
</tr>
<tr>
<td>Parkinsonism</td>
<td>X</td>
</tr>
<tr>
<td>Polyneuropathy</td>
<td>X</td>
</tr>
<tr>
<td>Spinal cord disorders</td>
<td>X</td>
</tr>
<tr>
<td>Stroke</td>
<td>X</td>
</tr>
<tr>
<td>Trauma/ surgery</td>
<td>X</td>
</tr>
<tr>
<td>Tumors</td>
<td>X</td>
</tr>
<tr>
<td>Uremia</td>
<td>X</td>
</tr>
</tbody>
</table>

Obstructive Sleep Apnea

Severe obstructive sleep apnea syndrome (OSAS) is associated with ED (p<0.05)

Mild or moderate OSAS is not clearly associated with ED


The Sex-Health Link

• Sex has positive effects on
  – Improved Heart Function?
  – Pain Relief
  – Immune system
  – Psychological Well-being

Is it a window into a man’s health??

E.D. as a Marker of Cardiovascular Disease

Review

Erectile dysfunction as a predictor of cardiovascular disease
R A Klontz, MD
Heart Institute, Good Samaritan Hospital, Los Angeles, CA, USA
Division of Cardiovascular Medicine, Department of Medicine, Keck School of Medicine, University of Southern California, Los Angeles, CA, USA

R A Klontz, MD
Heart Institute, Good Samaritan Hospital, Los Angeles, CA, USA
Division of Cardiovascular Medicine, Department of Medicine, Keck School of Medicine, University of Southern California, Los Angeles, CA, USA

...these new studies suggest that when a patient presents with ED, the patient should be questioned about cardiac health and cardiovascular risk factors. If cardiovascular risk factors are identified, they should be worked up and aggressively treated—as treatment of these risk factors may be life-saving."

Erectile Dysfunction and Subsequent Cardiovascular Disease

Erectile dysfunction is a harbinger of cardiovascular clinical events in some men. Erectile dysfunction should prompt investigation and intervention for cardiovascular risk factors...
Conclusions. The CHD risk factors measured in mid-life, including age, current cigarette smoking, obesity, hypercholesterolemia, and hypertriglyceridemia, were associated with incident ED 25 years later. This long interval allows time for modification of CHD risk factors, which could decrease the risk of ED as well as CHD. To test this hypothesis, ED should be included as an outcome in future CHD prevention trials.

**Shared Risk Factors**

E.D. Cardiovascular Disease and Depression share the same risk factors.

- Many men with established cardiovascular disease have ED.
- Specific guidelines for the management of ED in these patients have been produced by an expert panel.
- Cardiovascular risk stratification is an important initial step in managing such patients.
- In cardiac patients considered to have low cardiovascular risk, the management of ED can be safe and effective.

**Degree of ED related to extent of CAD**

Sexual activity in previous month (N = 40)

- Frequency of any erection
- Number of erections sufficient to have intercourse
- Difficulty achieving erection

**Erectile dysfunction = endothelial dysfunction**

"The same vascular/endothelial injuries that occur in the coronary arteries are likely to occur in the cavernosal arteries, the primary arteries supplying penile erectile tissue."
**Diagnosis and Treatment**

**Sexual History: SHIM score**

**Other self-report questionnaires:**
- The International Index of Erectile Function (IIEF)
- Sexual Health Inventory for Men (SHIM)
- Brief Sexual Function Inventory for Urology
- Male Sexual Health Questionnaire (MSHQ)

**Office Assessment of Vascular Issues**

**Workup:**
1. Duplex Doppler Ultrasound
2. Dynamic infusion Cavernosometry and Cavernosography (DICC)
3. Arteriography with selective pudendal arteriography

**Duplex Doppler Ultrasound**
- Measure size of artery and its integrity
- Measure peak systolic velocity
- Poor systolic velocity <25cm/sec

**DICC (Dynamic Intracavernosal Cavernometry/Cavernosography)**
- Infusion pump is used for cavernosometry and cavernosography
- The other needle is connected to a pressure transducer
- Normal veno-occlusive function as demonstrated by pharmacocavernosography
- There is no venous drainage, and a rigid corpus cavernosum is filled completely with contrast material
Assessment of Arterial Flow
Selective Arteriogram

Lab Testing:
- Cholesterol, triglycerides, blood sugar, cardiac stress testing
- PSA
- Free and total testosterone

Testing Neurologic Status *
- Measurement of nerve conduction: bulbocavernous reflex - determine if there is lag time
- Penile biothesiometry: an electromagnetic vibrating device is placed on skin of penis, patient reports findings

Nocturnal Tumescence
- Differentiates between physiologic and psychogenic causes of ED
- Penile injection would achieve the same thing
- Inquiring about erections with masturbation vs with partner are helpful

Current ED Treatment Options
- Lifestyle Changes/Education
- Risk factor management
- Sexual education/counseling
- Oral Agents (PDE5 inhibitors)
  - Viagra (sildenafil citrate)
  - Levitra (vardenafil HCl)
  - Cialis (tadalafil)
- Devices
  - Vacuum constriction devices
- Injectable Agents
  - Intracavernosal injections (alprostadil)
  - Intraurethral medications (alprostadil)
- Surgical Options
  - Penile implants
  - Vascular surgery

Patient Preferences for ED Treatment Options

Oral therapies are the preferred treatment option by patients with ED

First-Line Treatment for ED: How PDE5 Inhibitors Work

PDE-5 Side Effects

- Headache - 13%
- Flushing - 11%
- Dyspepsia - 7%
- Nasal Stuffiness - 4%
- Vision Changes - 3%

PDE5 Inhibitors

*Nonadrenergic, noncholinergic nerve.*

• No adverse cardiovascular effects of oral sildenafil were detected in men with severe coronary artery disease

Alternative Medicine

- ED Natriceutical Marketplace is huge
  - Men’s Magazines
  - Late-Night Cable TV
  - Expensive
  - Class action suit
- Generics/Impostors
  - Untested
  - Unstandardized
  - Can be harmful
  - In Mexico contains cyanide
Testosterone Supplementation

- Erections are androgen dependent: men w/severe hypogonadism have marked decrease in rigidity of erections
- However, when a threshold is testosterone is reached, additional amounts are not thought to increase frequency/rigidity of erections
- Low testosterone still only linked to libido, sexual thoughts, fantasies, energy, mood, lean body mass

Options for Office Management of Low T

- Androgel/Testim
- Testopel
- Testosterone cypionate injections

Testopel

- Done as an office “procedure”
- Every 4-6 months
- Check PSA and testosterone before

Testopel

- Be specific with coding:
  - 11980 (insertion of Testopel) I give 10 pellets initially and nearly every time
  - 12001 (suture code)
  - S0189 for non-medicare
  - J3490 for medicare
  - 25 modifier with established (level 3) if also a separate visit

Intraurethral Suppository

- Why choose injections over pills:
  - Lack of response or contraindications to oral drugs
  - Reliable, instant, predictable erection
  - Patient preference

Drug Therapy-Injection

How to Manage Office Injections

• Give a “test dose” in the office. I use 30mg papavarine, 2mg phentolamine, 40iu of PGE-1
• Have a spectrum of starting doses: range is low end: 0.05cc to .40cc. Inject with 1/2cc syringe.
• Have them wait in the office to gauge response

Be specific with codes:

• 54235 (intracavernosal injection)
• J2440 (Papavarine)
• J2760 (Phentolamine)
• J0270 (Alptostadil)

• In addition to established visit for ED with 25 modifier if a separate visit was done.

Successful injection practice is critical

Vacuum Therapy

• Considered a 1st line therapy
• Success rates approach 80%
• Drop out rates approach 80% as well
• Patient Education is extremely important
• Requires manual dexterity
• Requires partner patience and assistance

Vacuum therapy patients

• Have an industry representative come to the office to do teaching at a separate session
• The session can provide both teaching as well as deliver the device

Penile Implants

• Ideal for men who have tried other treatments without success or lack of efficacy.
• On the market for over 30 years
• 425,000 penile implants per year
• Over 13,000,000 implants to date
• Highest patient and partner satisfaction
Conclusions:

- Well established link between cardiovascular disease, endothelial dysfunction, and E.D.
- E.D. may be an early predictor of CV disease (and vice versa)
- Office testing can differentiate between neurologic, anatomic, vascular, hormonal
- There are several office directed therapies, such as injections and Testopel