



Erectile Dysfunction: A Barometer for Overall Health

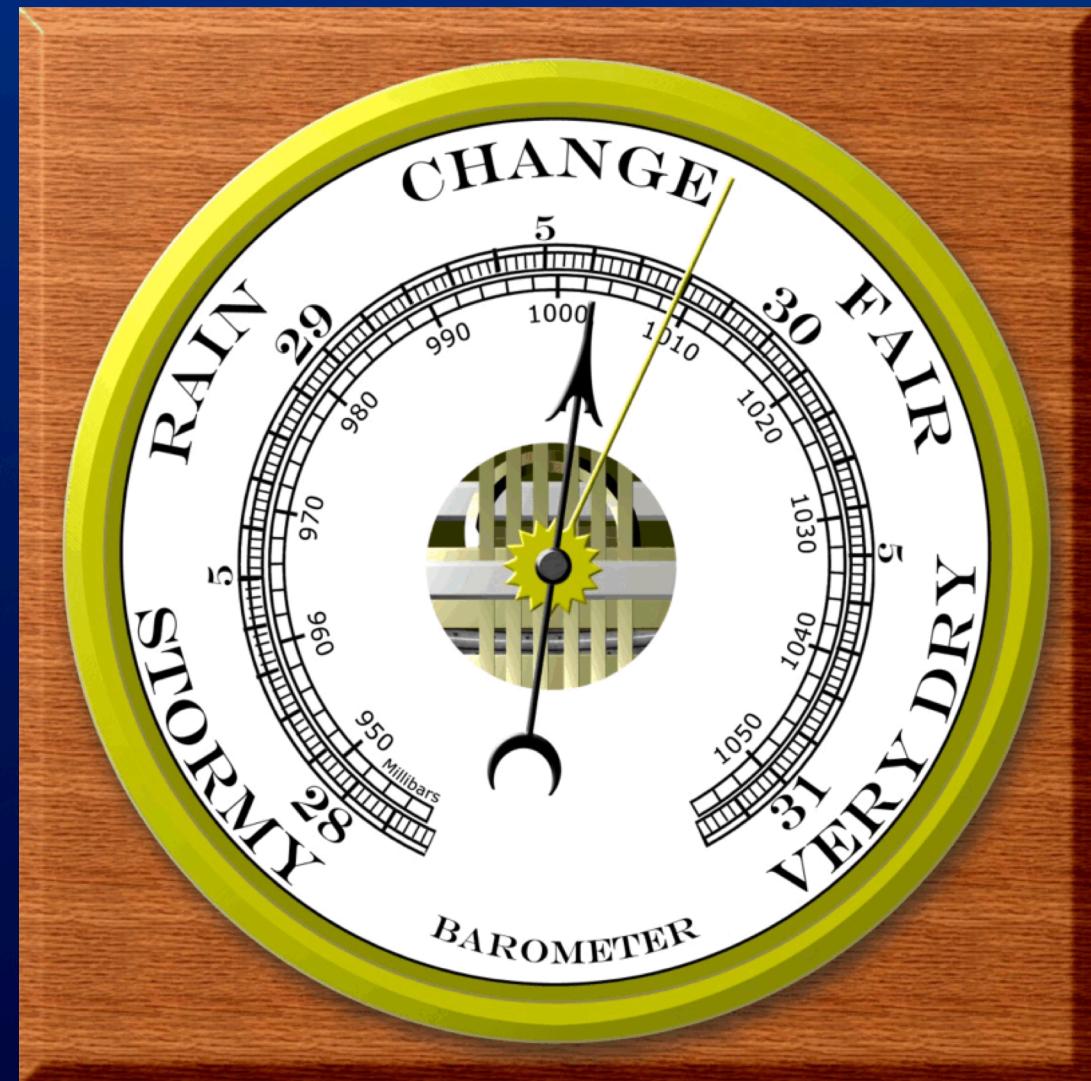
Igor Frank, MD
Professor of Urology
Mayo Clinic, Rochester, MN





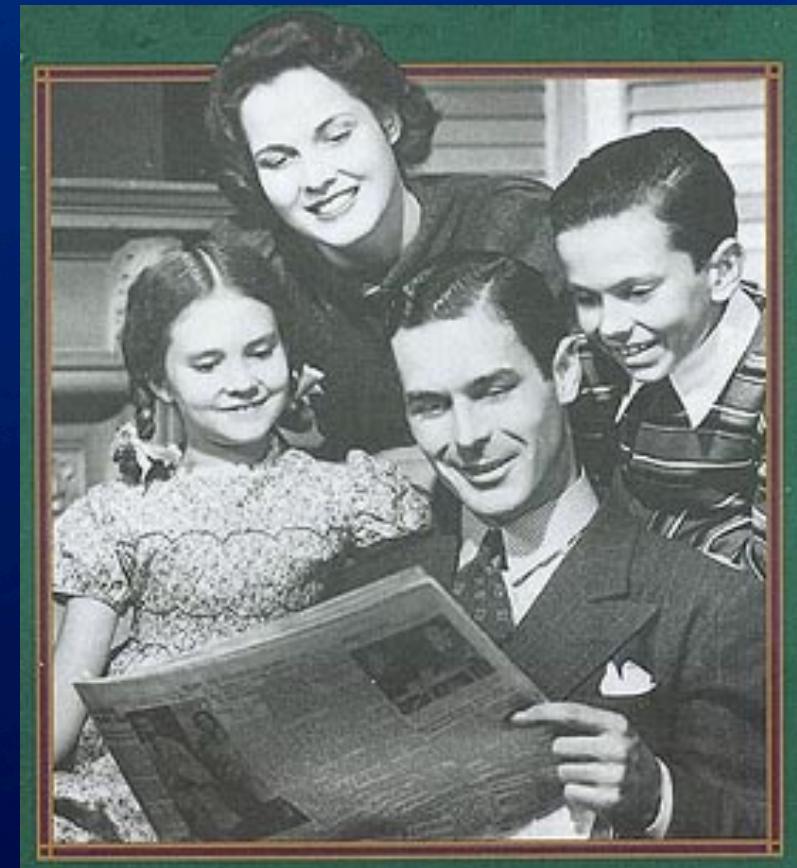
Barometer

- Compares changes in air pressure
- As pressure goes down, storms will arrive
- Similarly, as penile pressure decreases, future storms are more likely



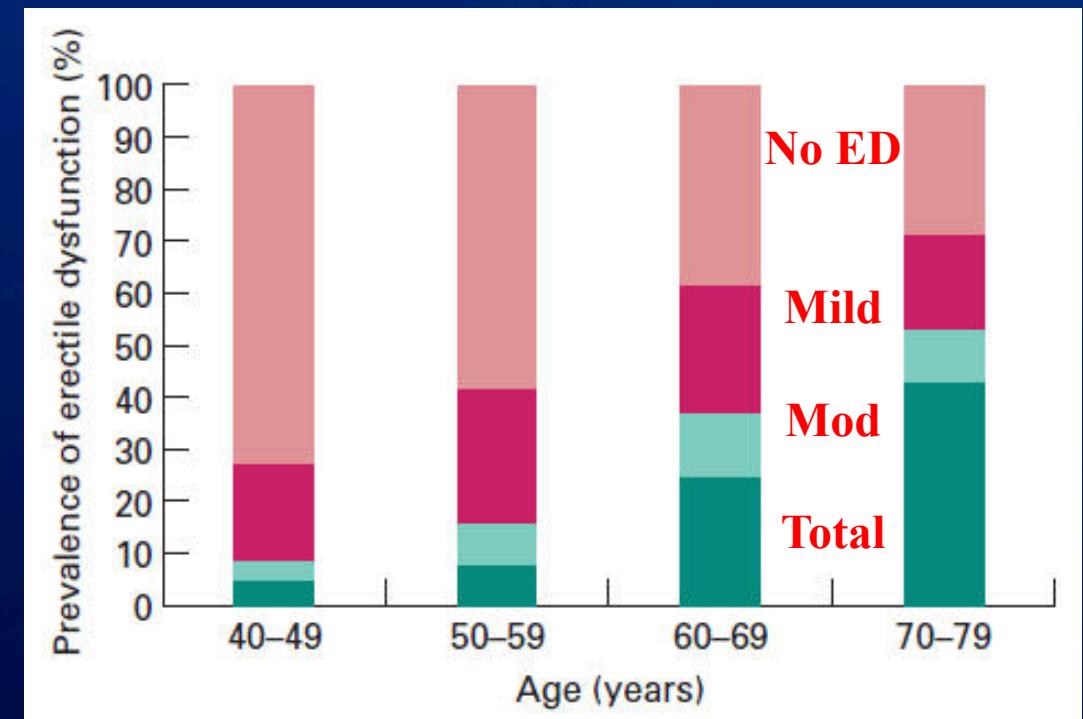
Overview - Epidemiology

- 52% of men age 40-70¹
 - Complete:
 - 5% @ 40 yo
 - 15% @ 70 yo
 - Mild / moderate:
 - 17% @ 40 yo
 - 25% @ 70 yo



Overview - Epidemiology

- 4x increase from 40's to 60's¹
- 25.9 cases per 1000 man years
- World-wide projection 322 million cases 2025²



1 - O'Donnell AB, et al: 2004. Exp Gerontol.

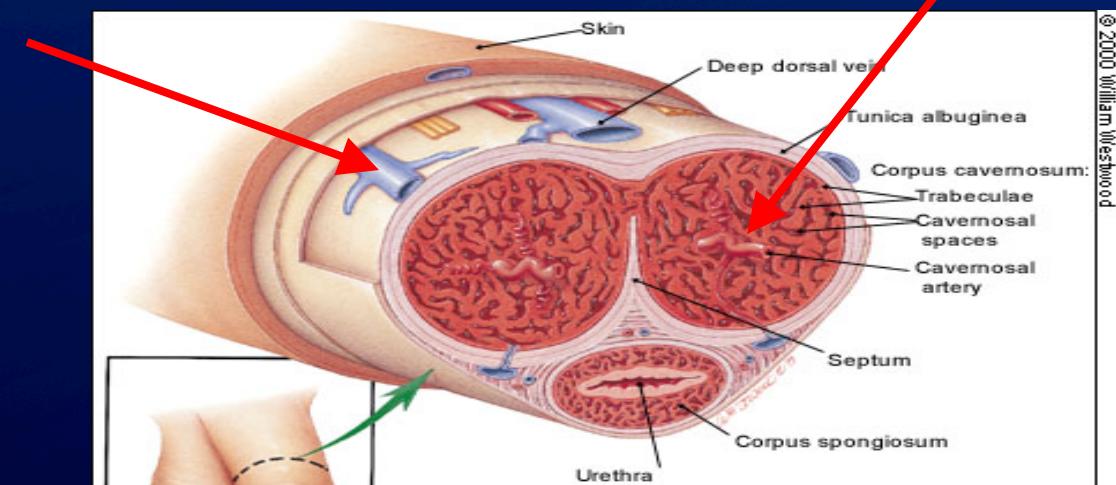
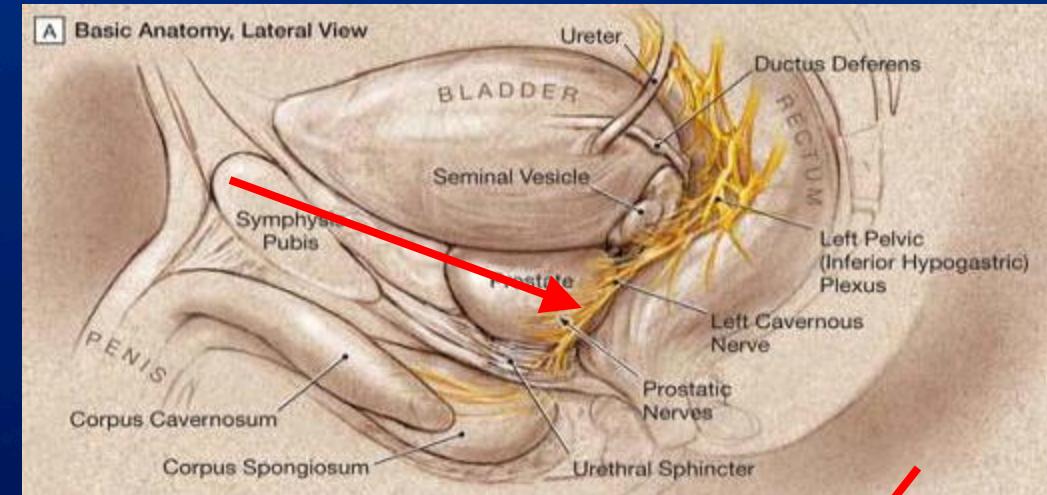
2 - Ayta IA, et al: 1999. BJU Int.

Erectile Dysfunction - Pathophysiology

1 – Neurogenic:
no signal

2 - Vasculogenic:
endothelial damage
(common),
inadequate inflow
(uncommon)

3 - Venous leak:
excessive outflow



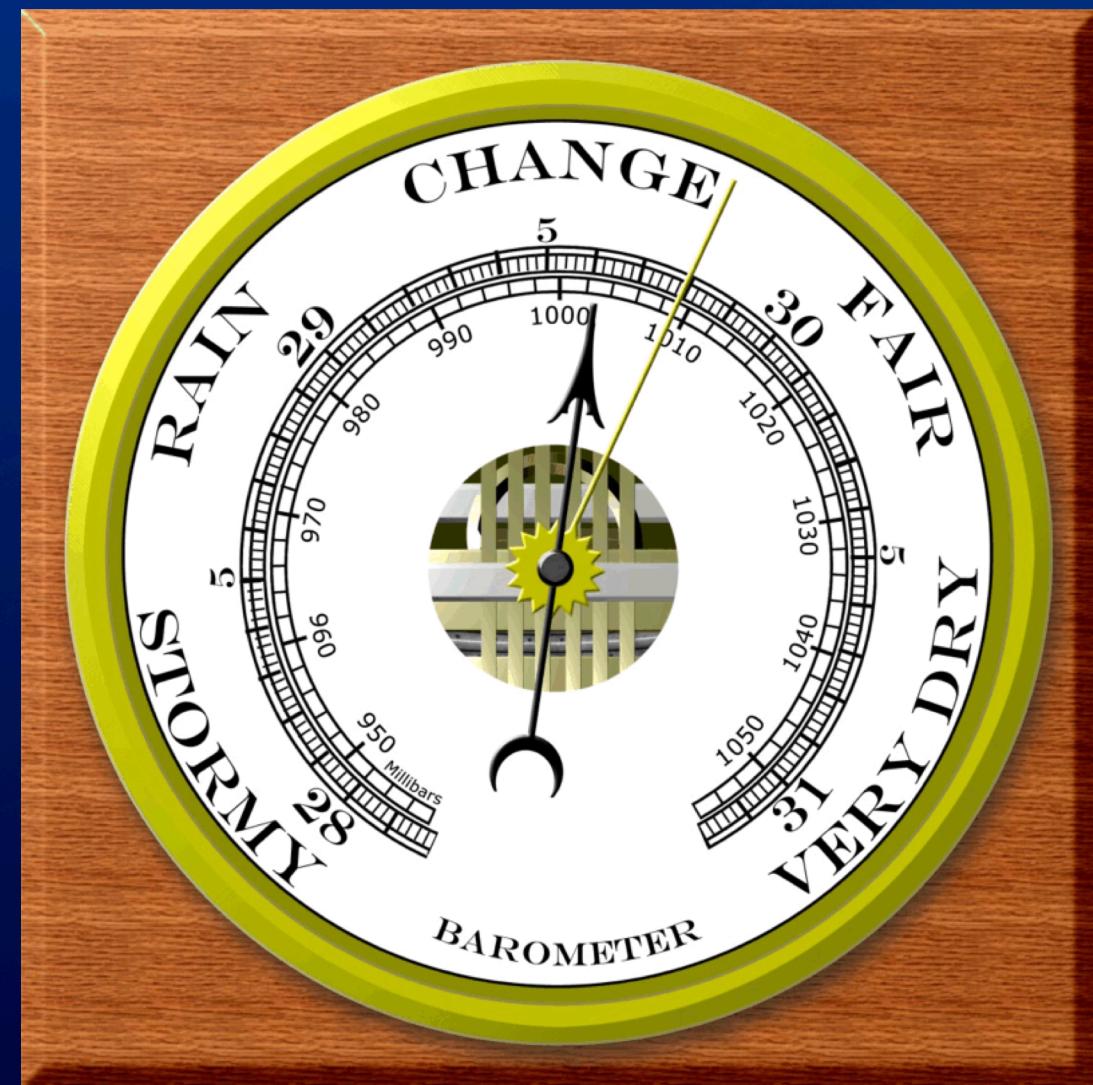
1 – ©2000 American Academy of Family Physicians (all rights reserved). 2000. Am Fam Physician.

2 – ©2005 American Medical Association (all rights reserved). 2005. JAMA.



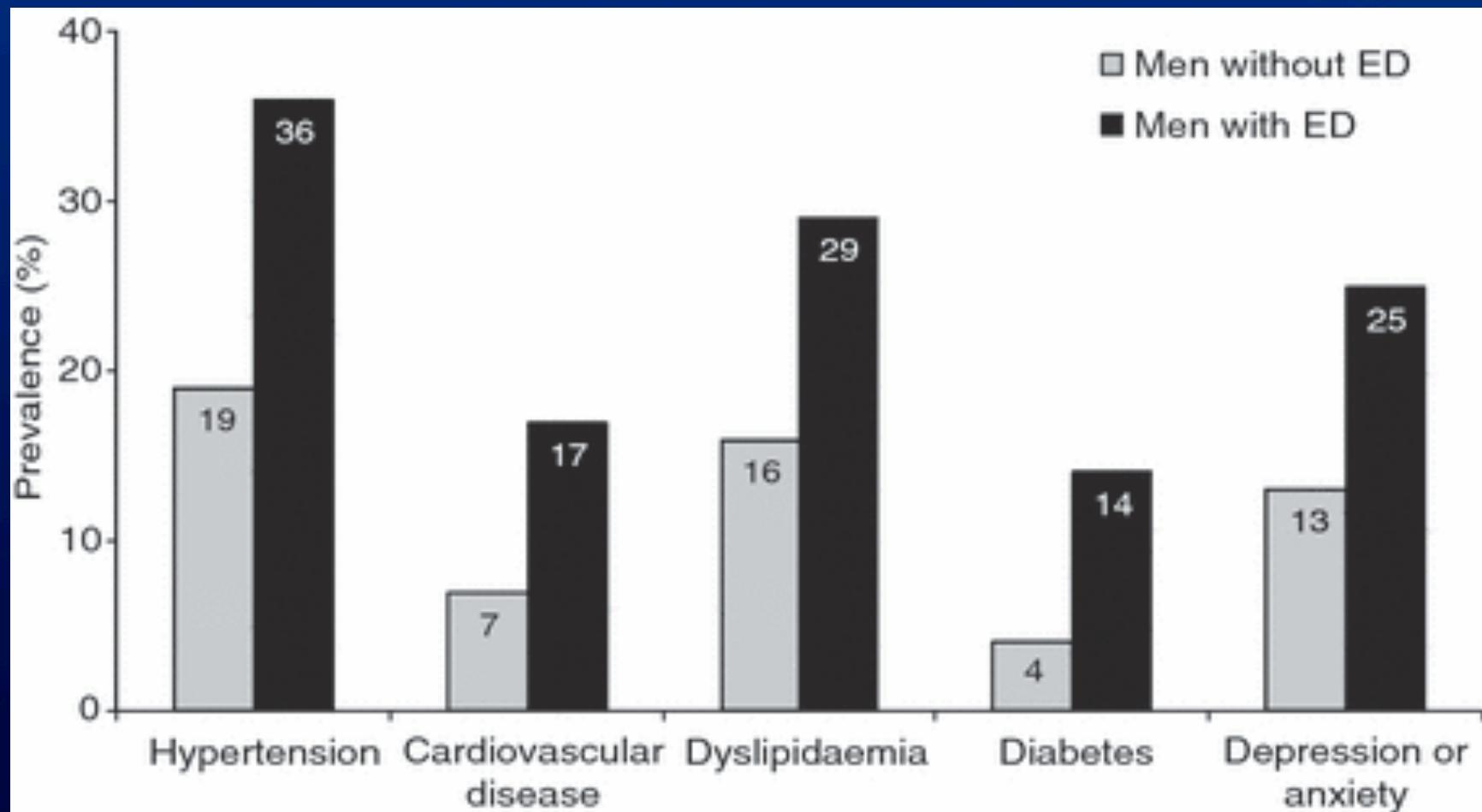
Barometer

Why is ED a barometer of health?





Barometer for Overall Health



1 – Rosen RC, Fisher WA, Eardley I et al. 2004. Curr Med Res Opin.



ED as a Risk Factor for CVE

- Thompson, et al:¹
- Men aged >55 yrs, randomized to placebo in Prostate Ca Prevention Trial
- Eval q3 mo for ED and CVD
- Controlled for age, BMI, BP, Lipids, DM, FH of MI, race, Tob, activity, QOL
- N=9457, 85% w/ no CVD at entry
- 47% had ED at entry
- Within 5 yrs, 57% of remaining reported ED



Comparison of ED to other Comorbid Conditions

Covariates (multivariable)	Hazard Ratio	P-value
Age (5 yr inc)	1.31 (CVE)	<0.001
BMI (5 unit)	1.14 (CVE)	0.02
Chol (20 mg/dL inc)	1.05 (CVE)	0.07
Smoking (y/n)	1.57 (CVE)	0.004
Family history of MI	1.36 (CVE)	0.009
DM	1.78 (CVE)	0.004
Using antihypertensives	1.39 (CVE)	0.003
ED	1.45	<0.001

*Thompson IM, et al: 2005 JAMA.



Relationship of ED (baseline or incident) and CVE - adjusted

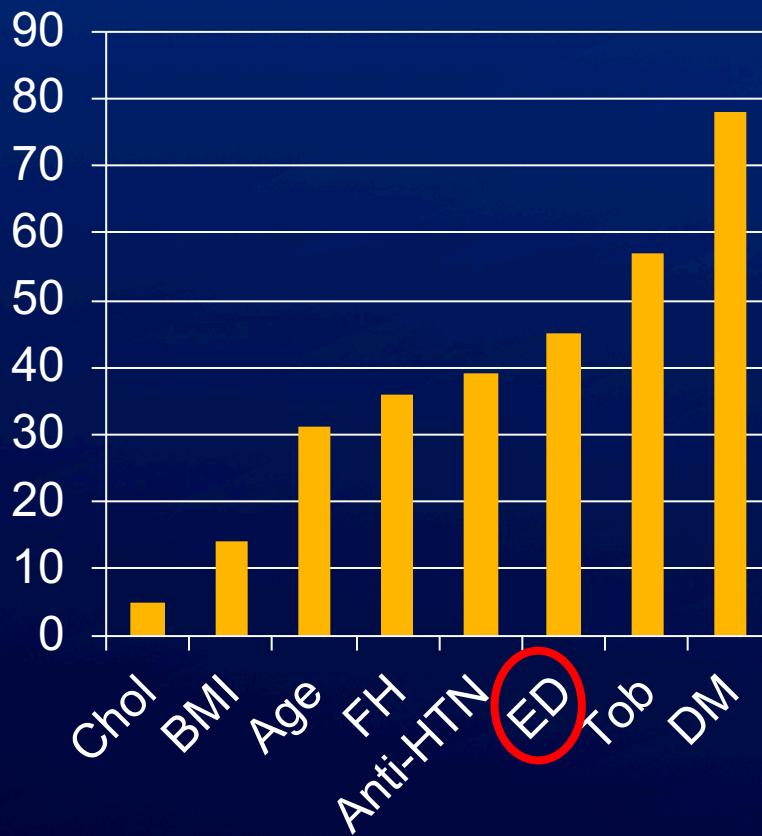
End Points	Hazard Ratio	P-value
MI	1.50	<0.001
Stroke	1.79	0.01
TIA	1.92	0.02
First CV event	1.45	<0.001
Death of any cause	1.22	0.13

*Thompson IM, et al: 2005 JAMA.

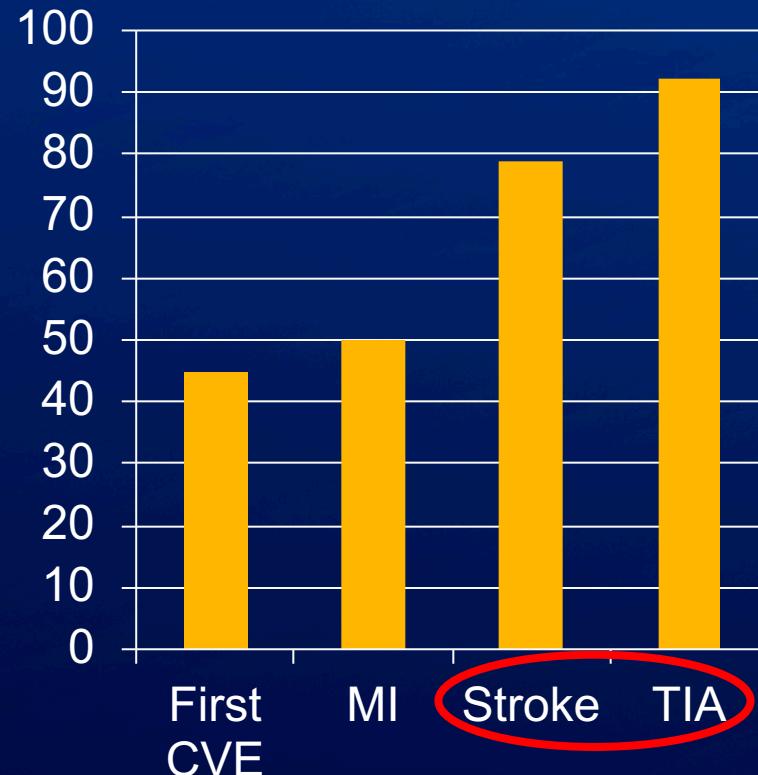


Graphed Data

% Increased risk of
CVE



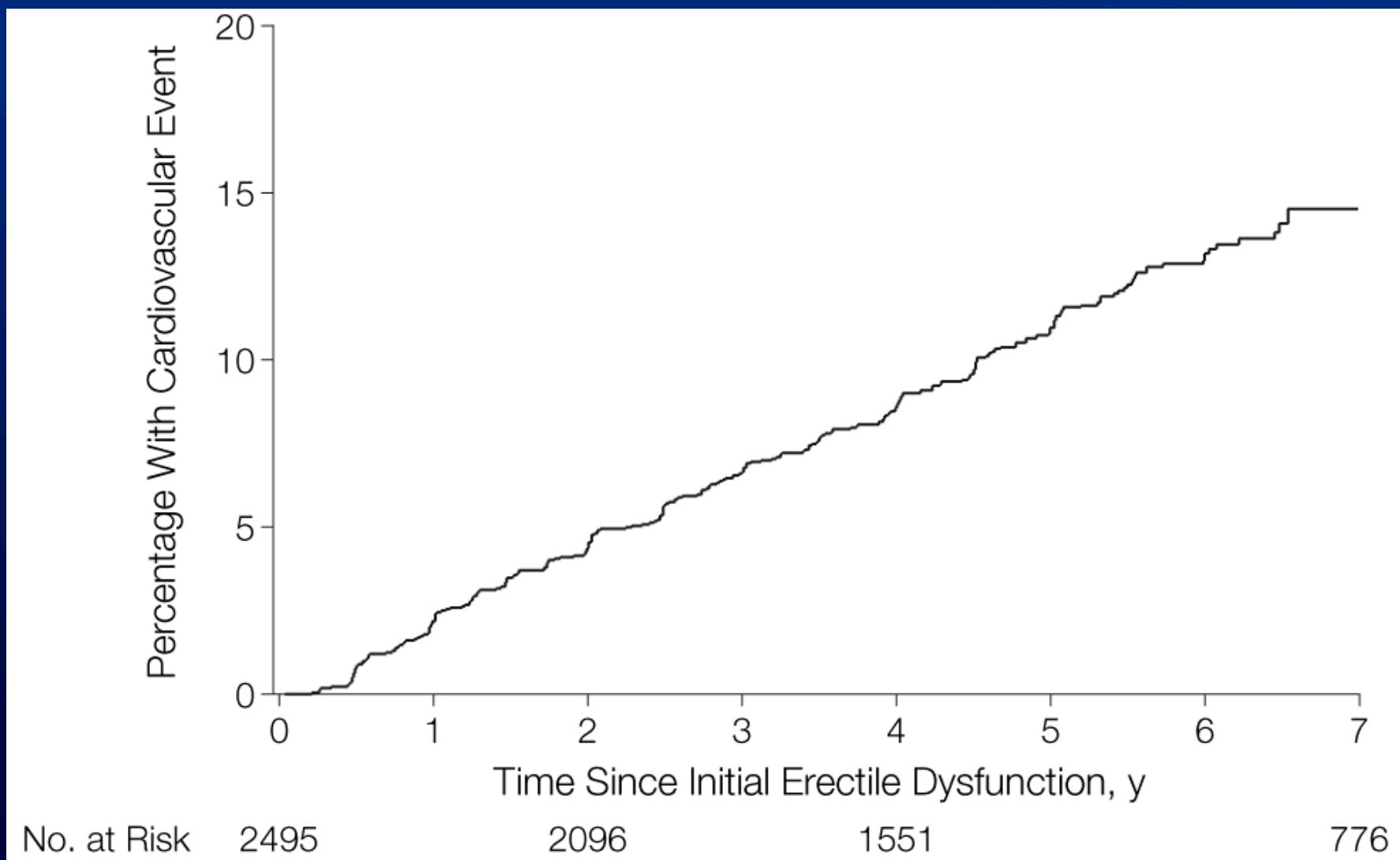
% Increased risk with
ED



*Thompson IM, et al: 2005 JAMA.



Time to CVE since ED Onset



*Thompson IM, et al: 2005 JAMA.

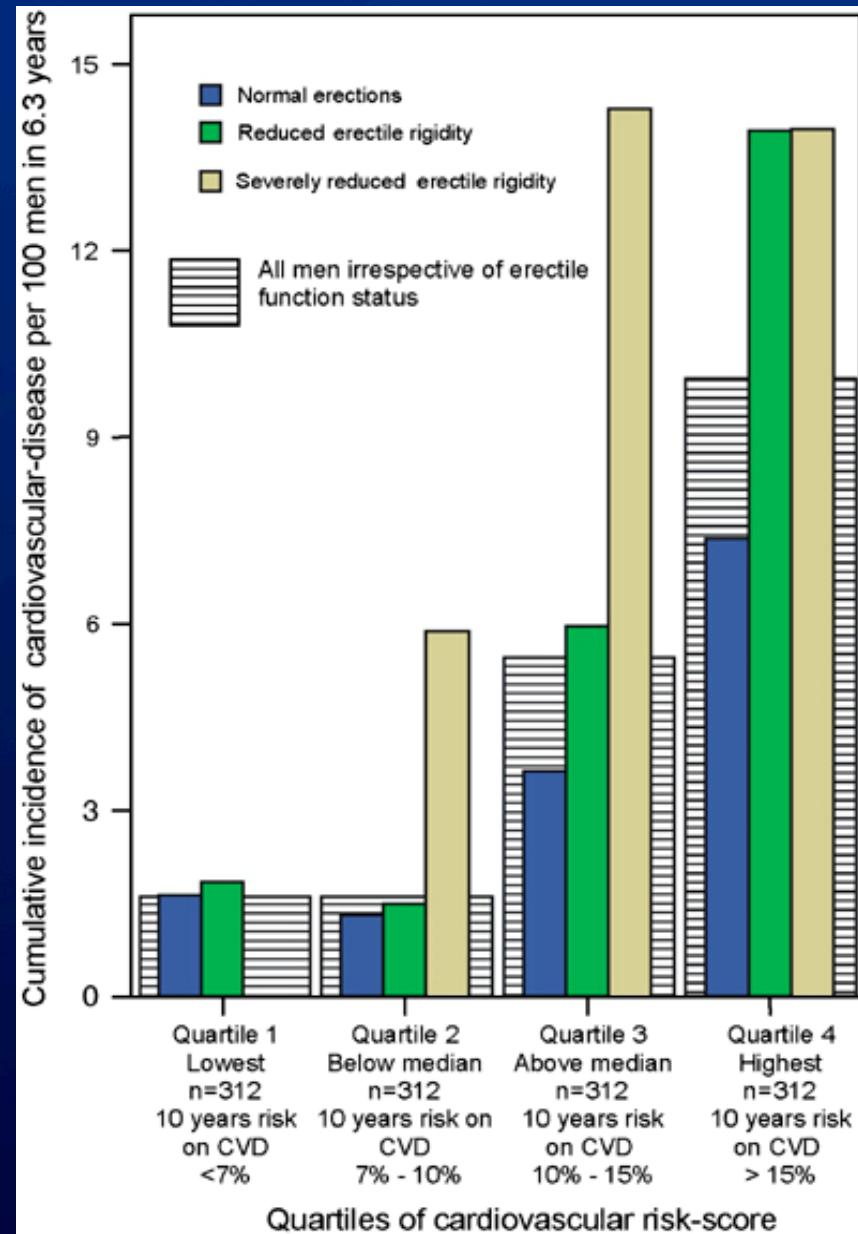


ED as a Risk Factor for CVE

- Schouten BW, et al:¹
- Population based study, Netherlands
- 50-75 yo men
- Mean 6.3 year follow-up
- N=1248 w/ no CVD at baseline
- N=258 with reduced erections, 108 with severe ED

ED as a Risk Factor for CVE

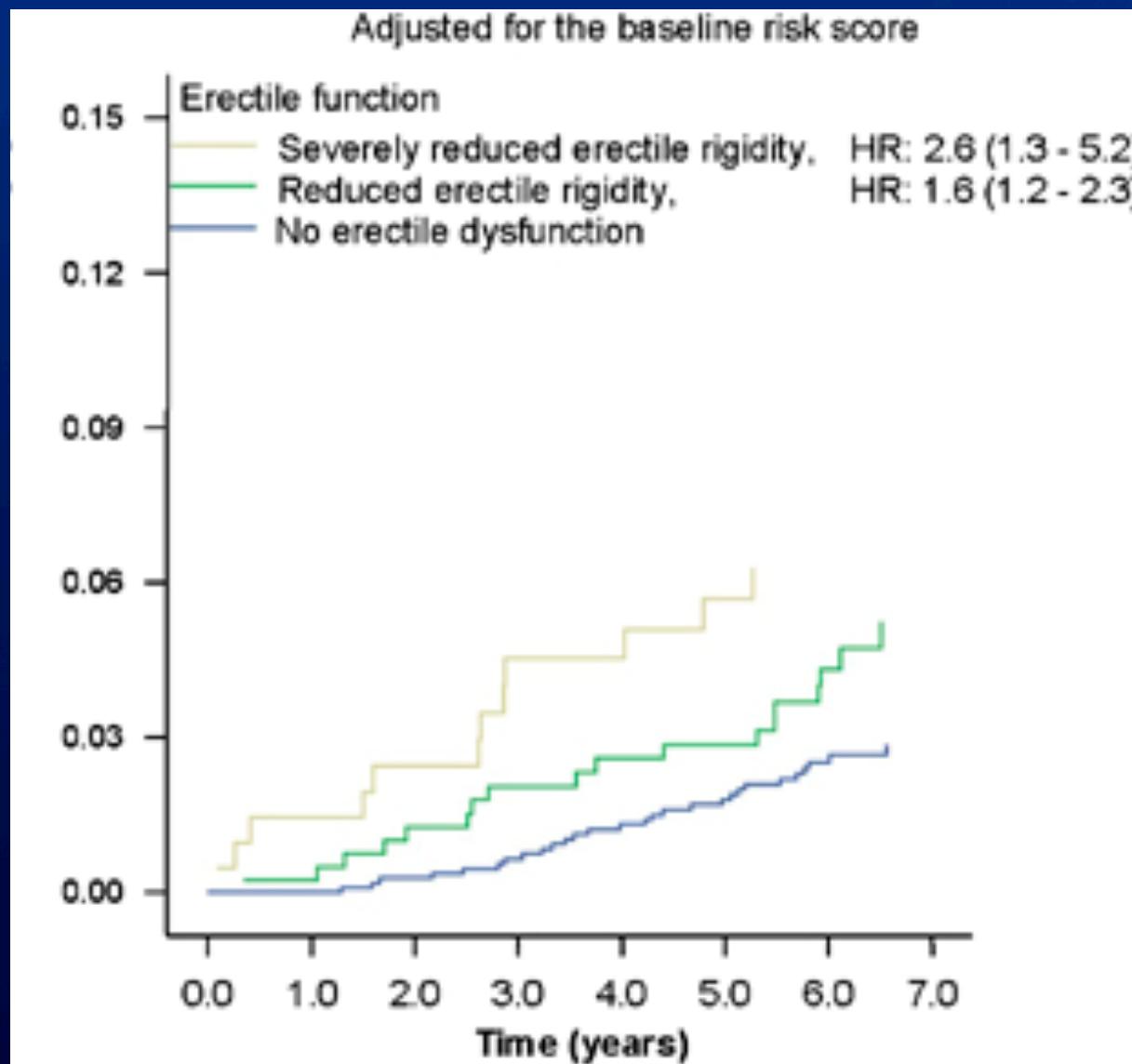
- Based on Framingham risk stratification
- Higher risk for CVE, erectile function better predictor
- Severity of ED may also independently predict



*Schouten BW, et al: 2008 IJIR.



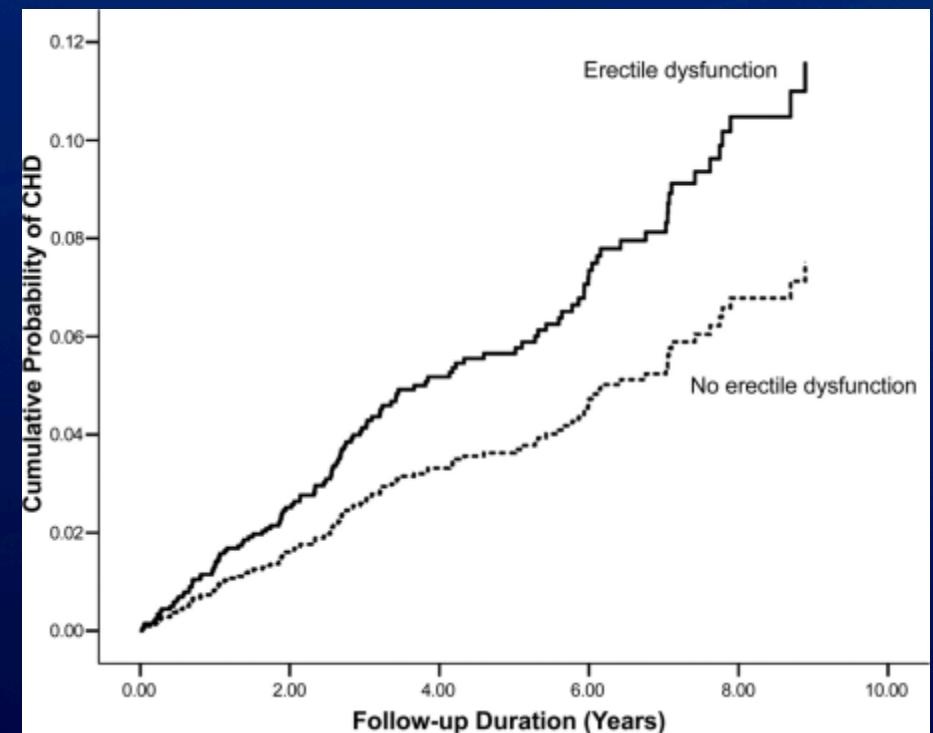
ED as a Risk Factor for CVE



*Schouten BW, et al: 2008 IJIR.

ED as a Risk Factor for CVE

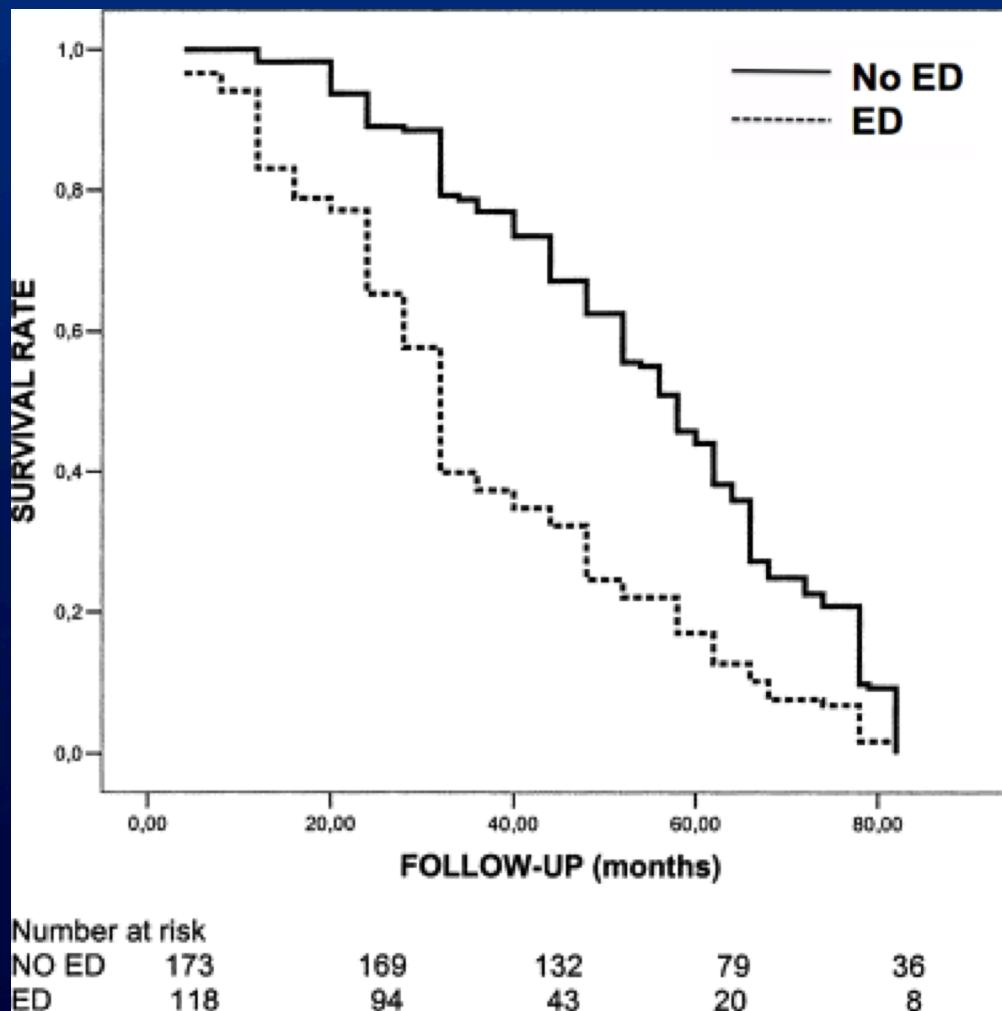
- Multiple other studies confirming ED as a major risk factor
- ED predicted MACE – HR 2.1 ($p < 0.001$)¹
- DM men – ED independent predictor of coronary heart disease (HR 1.58, $p=0.018$)²



1 – Gazzarus C, et al: 2008 J Am Coll Cardiol

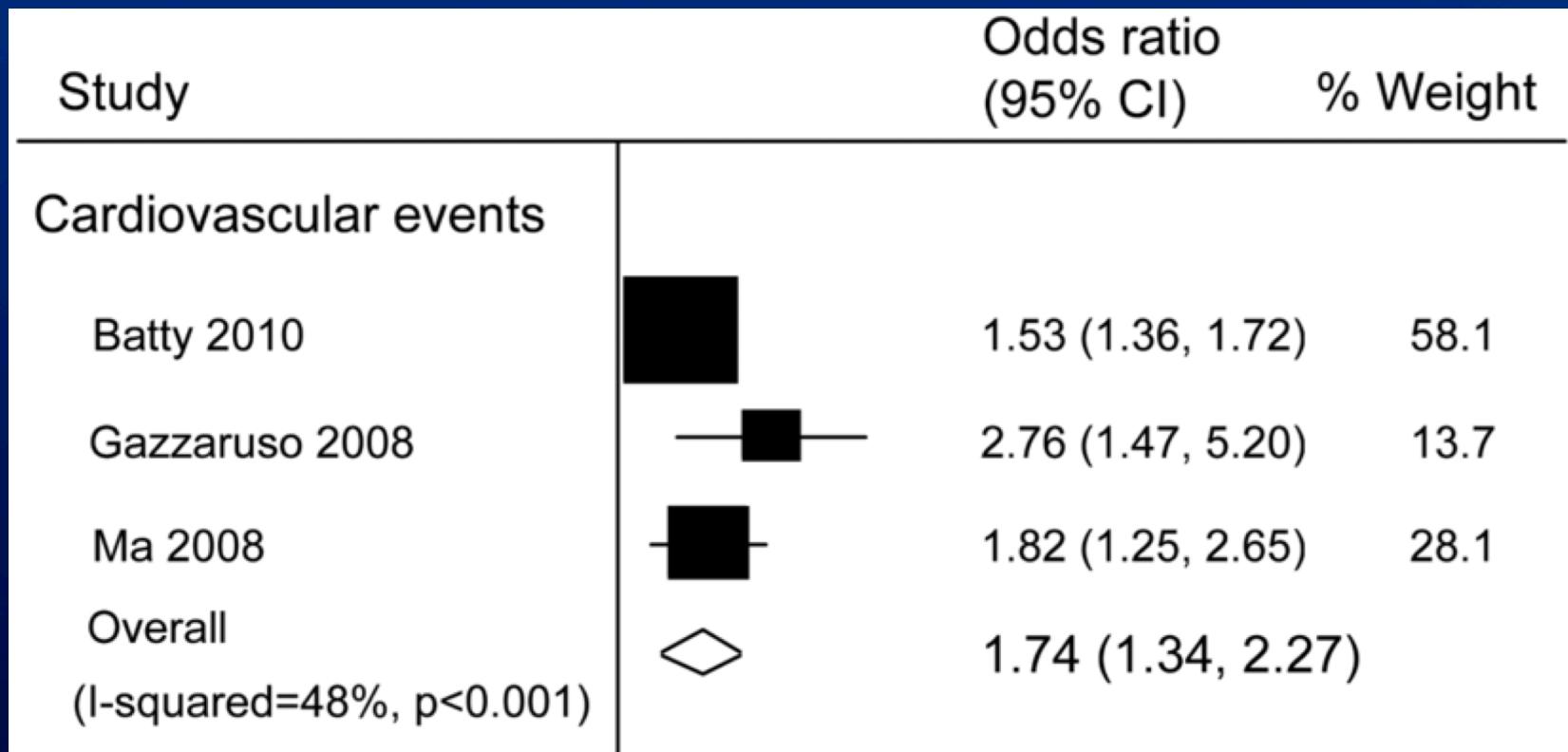
2 – Ma RC, et al: 2008 J Am Coll Cardiol. *and picture

ED in Men with Diabetes with Silent CAD



- ❖ Included 291 men with diabetes and silent coronary artery disease
- ❖ Followed for an average of 47 months
- ❖ 49 men experienced major adverse cardiac event
- ❖ ED rates
 - Those with CV events 61%
 - Those with No CV event 36%
- Those with diabetes & ED have a lower survival rate

ED as a Risk Factor for a CVE



- ❖ Men with diabetes and ED were 1.74 times more likely to have a CVE



The Temporal Relationship Between ED and Acute Coronary Syndromes

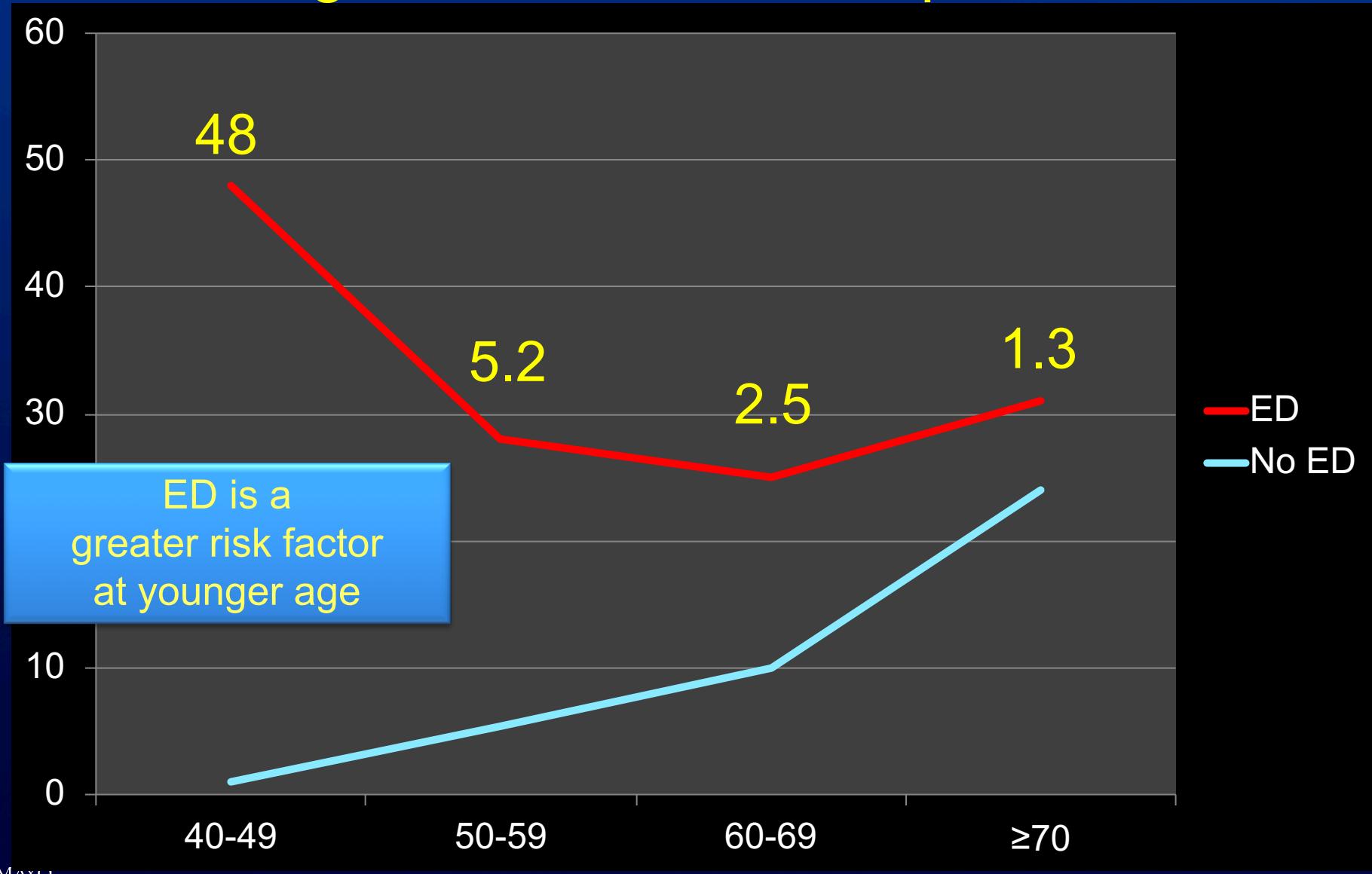
- ❖ 300 Consecutive male patients with acute chest pain, asked about ED and when it occurred
 - 2/3 of patient with 1st onset of acute chest pain had ED 39 months prior¹

**ED is an early warning sign
of heart disease ²**

1 Montorsi et al. Erectile dysfunction prevalence, time of onset and association with risk factors in 300 consecutive patients with acute chest pain and angiographically documented coronary artery disease. Eur Urol. 2003;44:360-364. 2 Meldrum et al. The link between erectile and cardiovascular health: The canary in the coal mine. Am J Cardiol. 2011;108:599-606.



Age of ED Is MOST Important





Can you think of any other test that is as
easy, cheap, and effective at predicting
future vacular related events?



Questionnaires

- International Index of Erectile Function (IIEF)
- Not required, but more accurate
- 15 items; erectile function domain questions 1-5, 15
- Scores:
 - 26-30 = no ED
 - 22-25 = mild ED
 - 17-21 = mild to mod ED
 - 11-16 = mod ED
 - <11 = severe ED

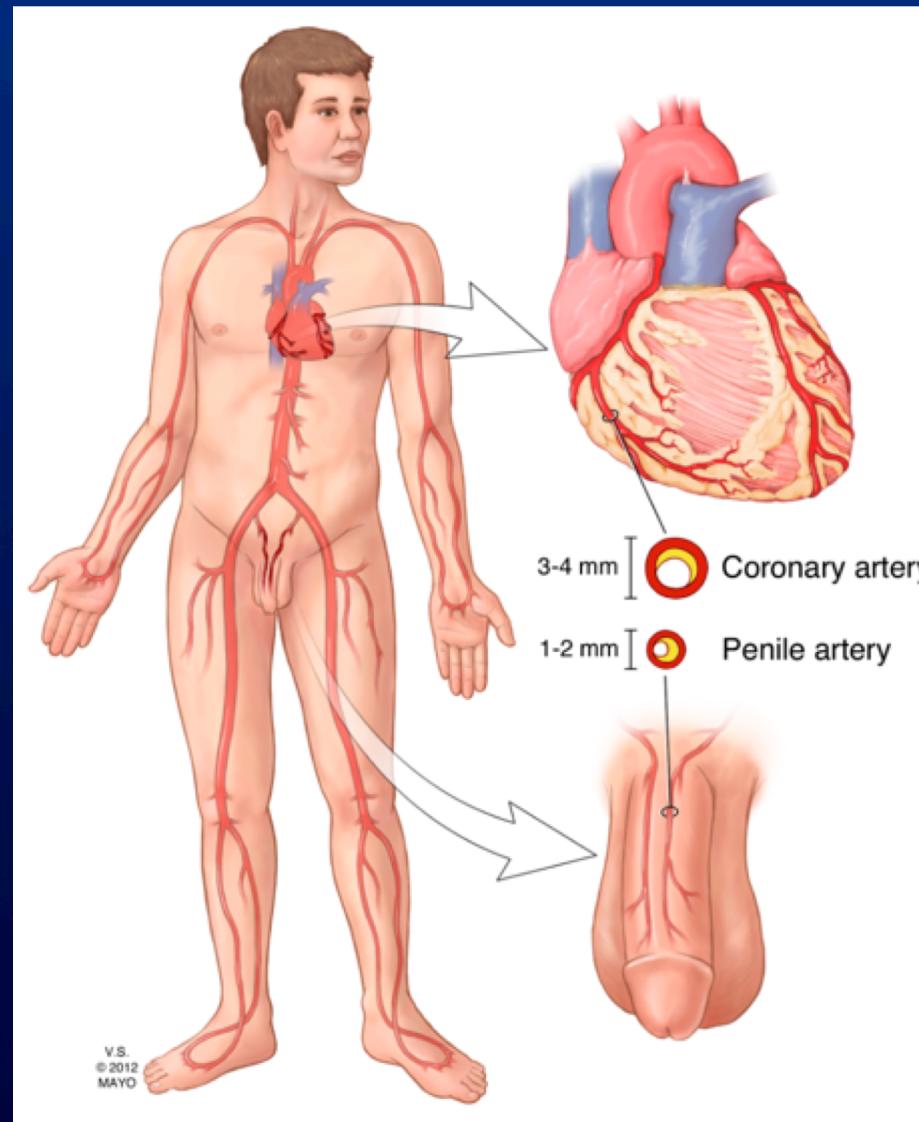
MAYO CLINIC *International Index of Erectile Function (IIEF) Questionnaire* **TO BE SCANNED**

This form collects information that is part of the medical record. Route to Scanning.

Mayo Clinic Number	Date Today (Month DD, YYYY)
Patient Name (First, Middle, Last)	
1. Over the past 4 weeks, How often were you able to get an erection during sexual activity?	
<input type="checkbox"/> 0 = No sexual activity <input type="checkbox"/> 1 = Almost never/never <input type="checkbox"/> 2 = A few times (much less than half the time) <input type="checkbox"/> 3 = Sometimes (about half the time) <input type="checkbox"/> 4 = Most times (much more than half the time) <input type="checkbox"/> 5 = Almost always/always	
2. Over the past 4 weeks, When you had erections with sexual stimulation, how often were your erections hard enough for penetration?	
<input type="checkbox"/> 0 = No sexual activity <input type="checkbox"/> 1 = Almost never/never <input type="checkbox"/> 2 = A few times (much less than half the time) <input type="checkbox"/> 3 = Sometimes (about half the time) <input type="checkbox"/> 4 = Most times (much more than half the time) <input type="checkbox"/> 5 = Almost always/always	
3. Over the past 4 weeks, When you attempted sexual intercourse, how often were you able to penetrate (enter) your partner?	
<input type="checkbox"/> 0 = Did not attempt intercourse <input type="checkbox"/> 1 = Almost never/never <input type="checkbox"/> 2 = A few times (much less than half the time) <input type="checkbox"/> 3 = Sometimes (about half the time) <input type="checkbox"/> 4 = Most times (much more than half the time) <input type="checkbox"/> 5 = Almost always/always	
4. Over the past 4 weeks, During sexual intercourse, how often were you able to maintain your erection after you had penetrated (entered) your partner?	
<input type="checkbox"/> 0 = Did not attempt intercourse <input type="checkbox"/> 1 = Almost never/never <input type="checkbox"/> 2 = A few times (much less than half the time) <input type="checkbox"/> 3 = Sometimes (about half the time) <input type="checkbox"/> 4 = Most times (much more than half the time) <input type="checkbox"/> 5 = Almost always/always	
5. Over the past 4 weeks, During sexual intercourse, how difficult was it to maintain your erection to completion of intercourse?	
<input type="checkbox"/> 0 = Did not attempt intercourse <input type="checkbox"/> 1 = Extremely difficult <input type="checkbox"/> 2 = Very difficult <input type="checkbox"/> 3 = Difficult <input type="checkbox"/> 4 = Slightly difficult <input type="checkbox"/> 5 = Not difficult	



The Link Between the Two?





Shared Risk Factors

Coronary artery disease	Erectile Dysfunction
• Age	• Age
• Dyslipidemia	• Dyslipidemia
• Hypertension	• Hypertension
• Diabetes	• Diabetes
• Smoking	• Smoking
• Sedentary lifestyle	• Sedentary lifestyle
• Obesity	• Obesity
• Depression	• Depression
• Male gender	• Coronary artery disease, peripheral vascular disease

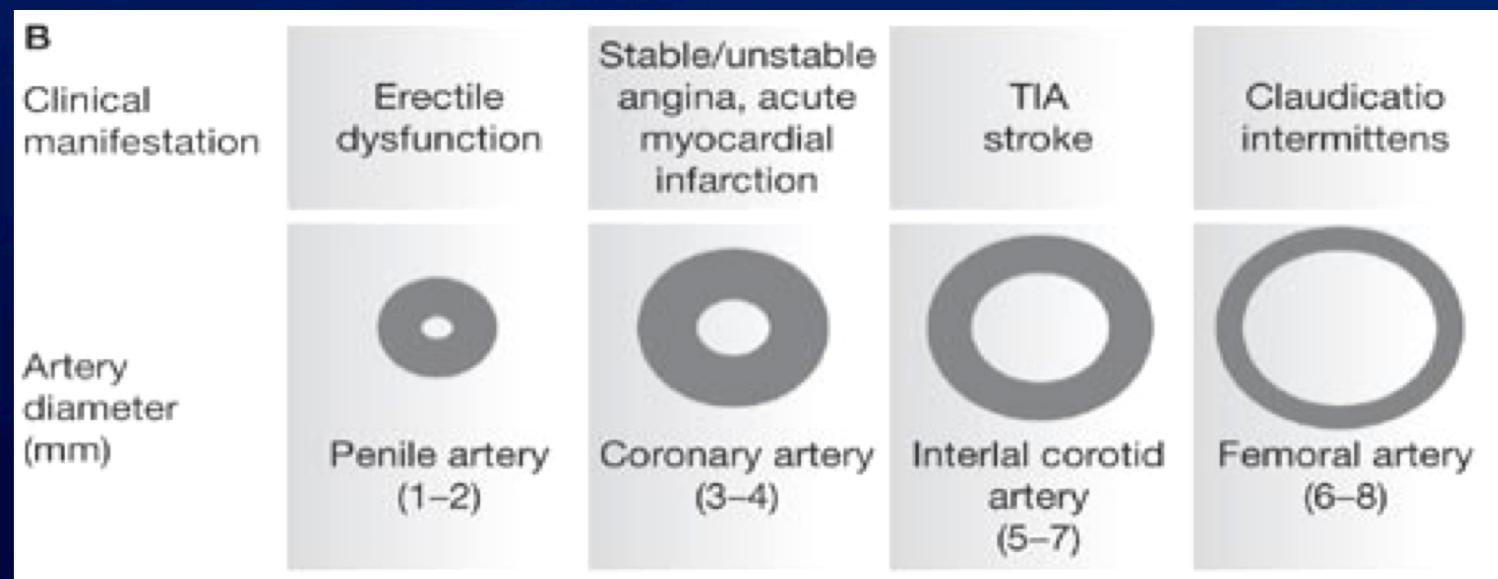


“Erectile dysfunction is related to diseases of the vascular bed.”

V. Michael, Prague 1973

Vasculogenic Hypothesis

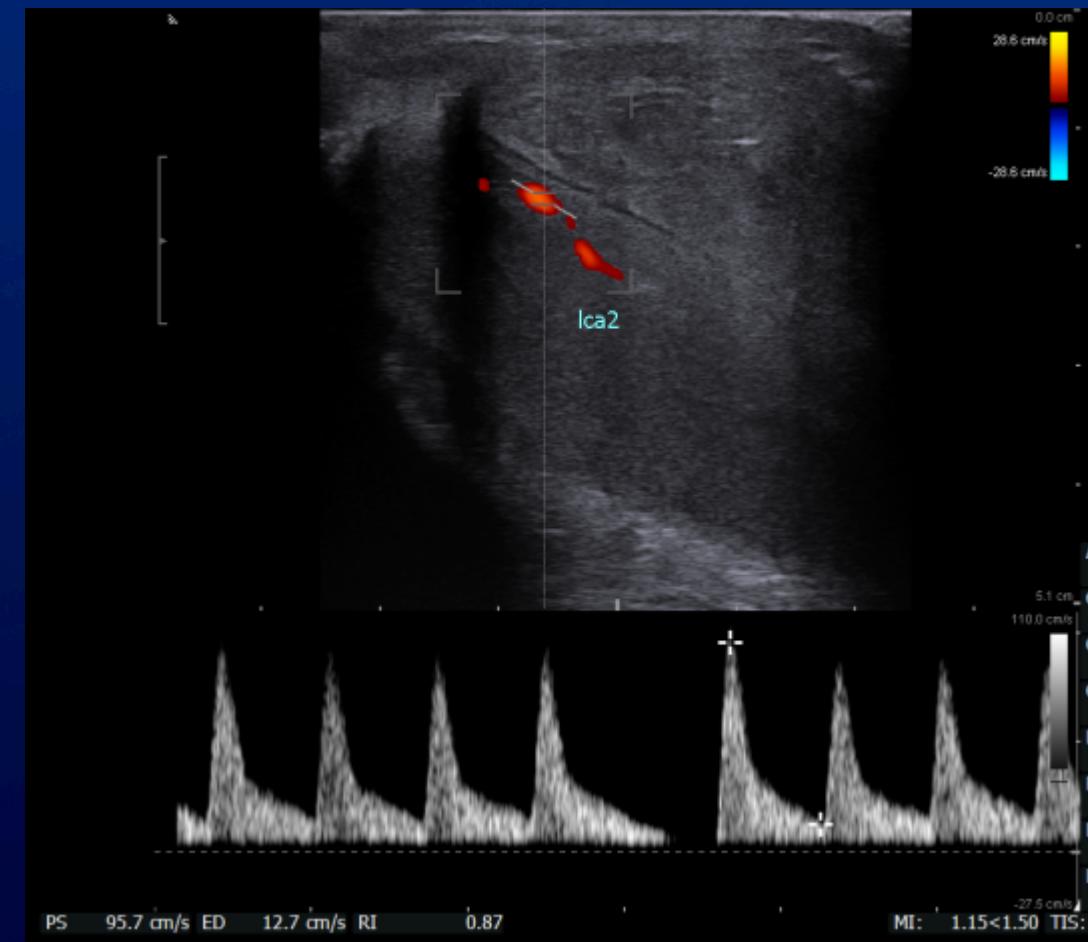
- Earlier ED due to more significant changes in flow from early plaque deposition in the penile arteries (greater relative narrowing)





Problems with Vasculogenic Hypothesis

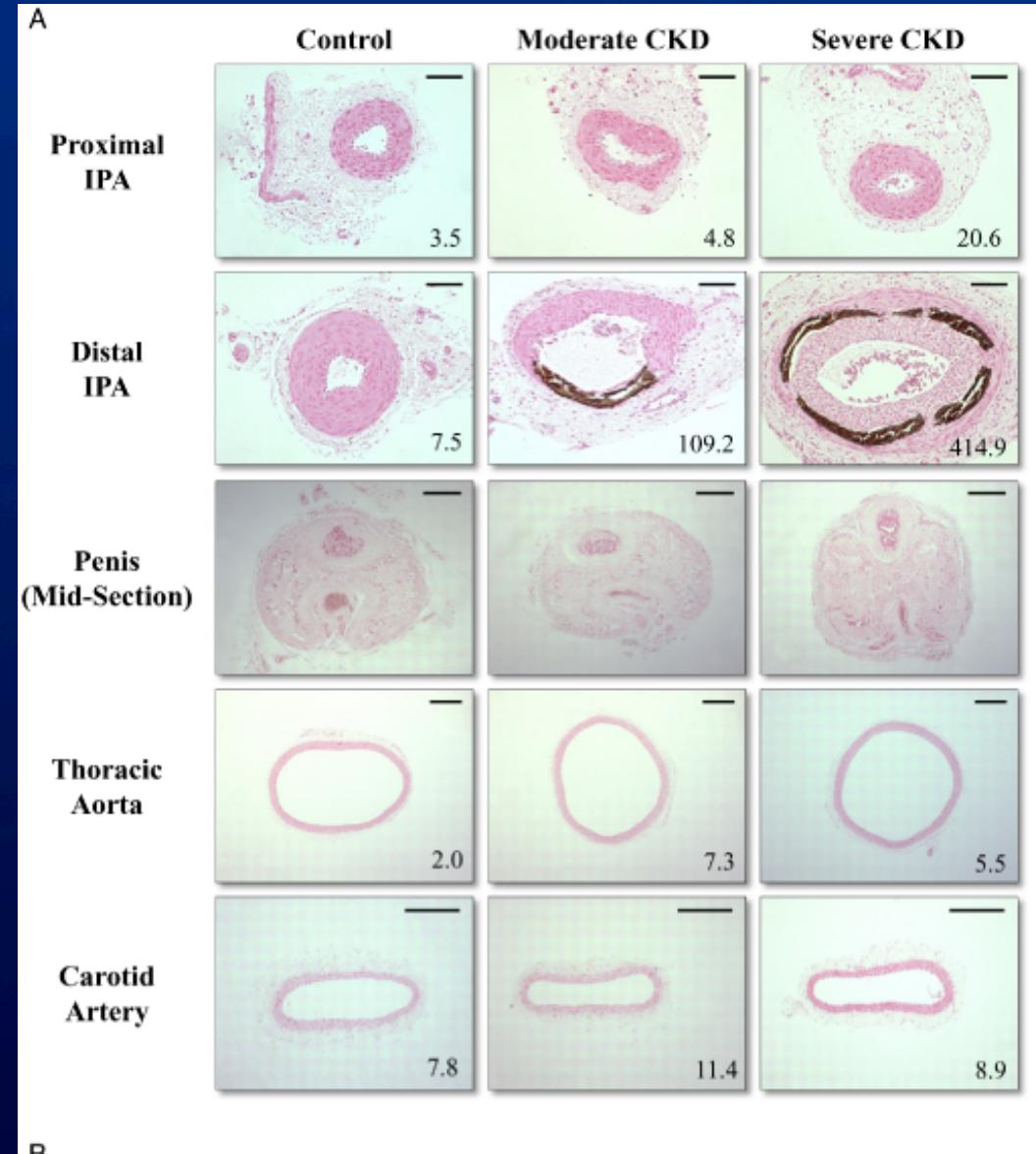
- Penile U/S demonstrate adequate flow in nearly all men with established CAD
- Higher rate of veno-occlusive dysfunction
- Endothelial dysfunction, calcification, remodeling occur at similar rates between pudendal and cardiac arteries



Problems with Vasculogenic Hypothesis

Compared to carotid and thoracic aorta, pudendal artery:

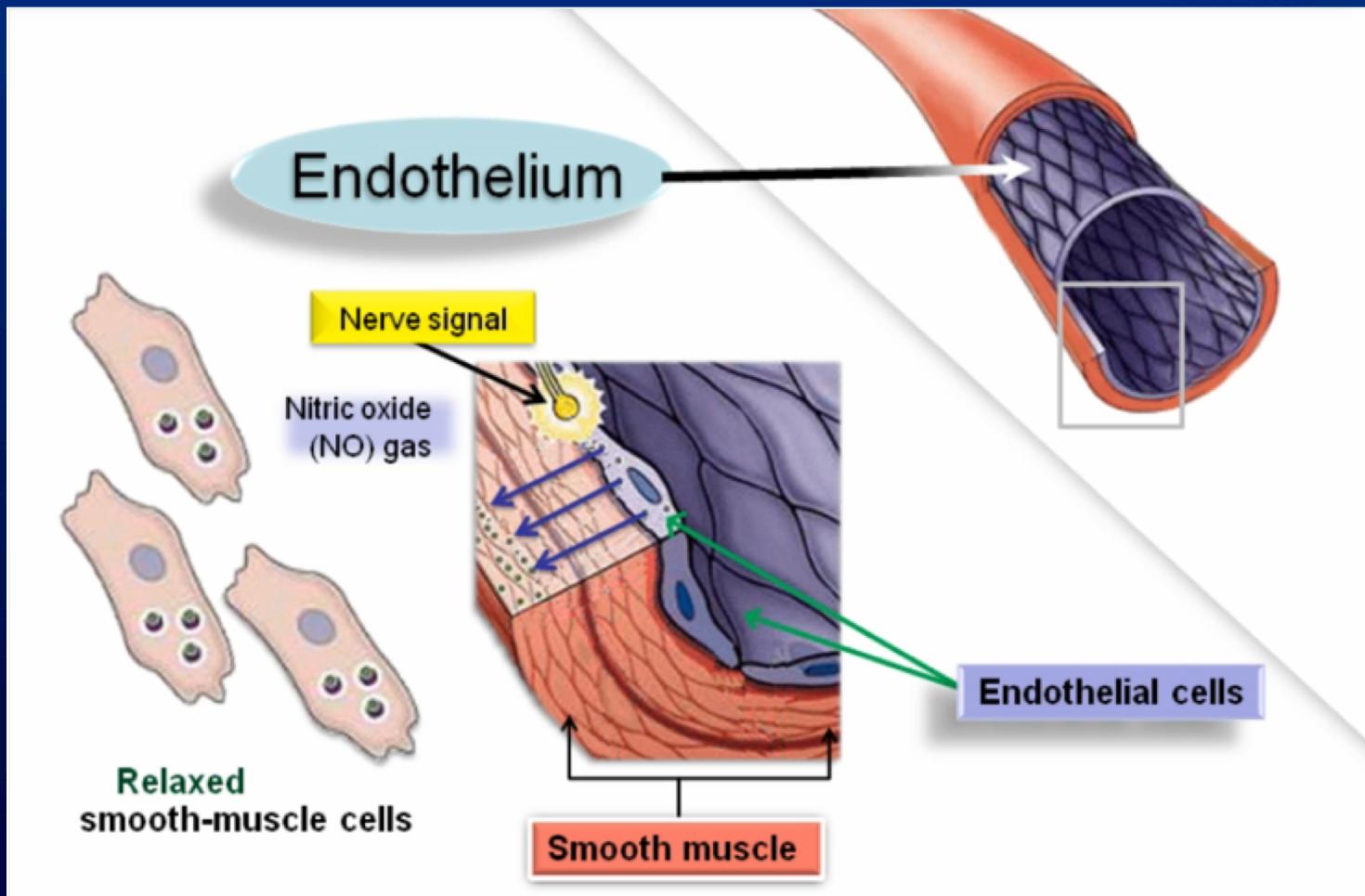
- Arterial size actually increases
- Pudendal earlier wall calcification
- Pudendal earlier endothelial dysfunction



*Maio MT, et al: 2014 JSM.



Nitric Oxide





Summary

- ED – Barometer of health
- ED = early death
- Men with ED are at higher risk for CVE
- ED is an independent predictor for cardio and cerebrovascular events
- Special message for anesthesiologists:
 - Consider ED screening as part of preop assessment
 - In men with premature ED without a clear underlying cause (especially younger than 55), consideration should be given to cardiovascular evaluation



Thank You

Email: frank.igor@mayo.edu

https://youtu.be/OM3_zeWxRsc