

세미나 II : 운동과 질병

성기능 개선을 위한 운동

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인제의대



Erectile dysfunction (ED)

- 3천만 (미국)
- 그중 57%가 55세 미만
- ED : 심혈관계 질환의 조기 마커
- ED 환자는 심혈관질환 유무 평가 받아야

ED의 중요성  
사망률 높다



Mod/complete ED vs none/minimal

- Massachusetts Male Aging Study (MMAS)
- 40-70세 1,709명 남자, 15년 추적
- 1,284 명 생존 403명 사망
- All cause 1.26 (1.01-1.57) P=0.04
- Cardiovascular 1.43 (1.00-2.05) p=0.05
- ED ; 사망률 높다.

Araujo AB, Travison TG, Ganz P, Chiu GR, Kupelian V, Rosen R, Hall SA, and McKinlay JB. Erectile dysfunction and mortality. J Sex Med 2009;6:2445-2454.

ED와 CVD 밀접

- 위험 요인 유사
- ED에서 CVD 다발
- CVD에서 ED 다발

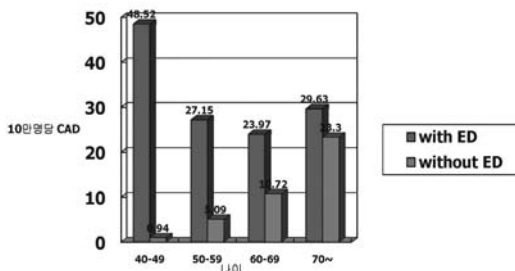


## ED와 심혈관질환

➢ 위험요인 유사

- Smoking
- Hypertension
- Diabetes
- Dyslipidemia
- Obesity
- Metabolic syndrome

## 관상동맥질환과 ED



■ Inman BA, Sauver JL, Jacobson DJ, McGree ME, Nehra A, Lieber MM et al. A population-based, longitudinal study of erectile dysfunction and future coronary artery disease. *Mayo Clin Proc* 2009; 84: 108-113.  
 ■ ED is a stronger marker for vascular disease in men < 60 years.

## Penile circulation과 CVD : 밀접

**TABLE II Penile Brachial Pressure Index (PBPI) in Patients with and without Myocardial Infarction (MI)**

	MI	No MI
Right PBPI, lying	0.679 ± 0.054	0.786 ± 0.014
Left PBPI, lying	0.680 ± 0.048	0.803 ± 0.016*
Right PBPI, standing	0.669 ± 0.080	0.847 ± 0.018*
Left PBPI, standing	0.749 ± 0.099	0.871 ± 0.022
Right PBPI, exercise	0.607 ± 0.100	0.738 ± 0.017
Left PBPI, exercise	0.656 ± 0.085	0.744 ± 0.018

\* p < 0.05.

Morley JE, Korenman SG, Kaiser FE, Mooradian AD, Viosca SP.  
 Relationship of penile brachial pressure index to myocardial infarction and cerebrovascular accidents in older men.  
*Am J Med* 1988; 84: 445-448.

## ED에서 CAD 다발

■ ED 환자 혈관조영술

무증상 관상동맥질환

19% (9 of 47), 40%(20/50)

Schwartz BG, Kloner RA.  
 How to save a life during a clinic visit for erectile dysfunction by modifying cardiovascular risk factors.  
*International J of Impotence Research* 2009 ;38:1-9

## 심장환자에 ED 다수

■ Kloner et al.

■ 안정 협심증 76세 남자의 75%가

발기부전

Schwartz BG, Kloner RA.  
 How to save a life during a clinic visit for erectile dysfunction by modifying cardiovascular risk factors.  
*International J of Impotence Research* 2009 ;38:1-9

## ED는 CVD의 조기 마커 이유

■ Penile erection : neurovascular event

■ 혈액 수배 증가

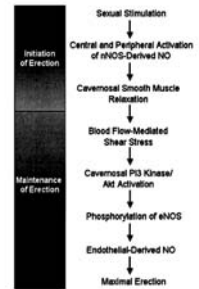


## Endothelial cells

- 혈량이 증가함에 따라 혈관 확장시킴
- 대부분 동맥 15% 확장
- Cavernosal and helicine arteries 80%

## Erection

- 신경 자극으로 인한 동맥 혈량 증가
- cavernosal smooth muscle 이완
- restriction of venous outflow from the penis



## ED는 CVD의 조기 마커 이유

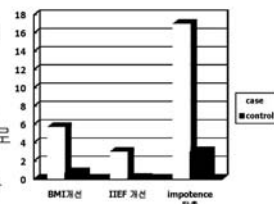
- 동맥경화는 전신 현상
- 동맥이 50-75% 막혀야 순환 장애 시작
- 혈관 크기에 따라 증상 시작 시기 다름
- penile : epicardial coronary arteries = 0.5-2mm : 3-4mm in diameter

## ■ 운동으로 ED 개선되나?



## BMI, PA vs ED

- randomized, single-blind
- 110명 비만 남성, 35-55세
- 2년간 운동 식사 관리 프로그램 vs 단순교육
- PA 증가 147 분/주(vs 33)
- BMI, PA 변화는 독립적으로 IIEF score 개선
- 1/3 obese men with ED 가 생활습관 변화로 개선



Esposito K, Giugliano F, Di Palo C, Giugliano G, Marfella R, D'Andrea F et al. Effect of lifestyle changes on erectile dysfunction in obese men: a randomized controlled trial. JAMA 2004; 291: 2978-2984.

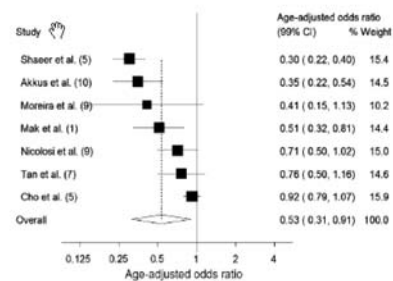
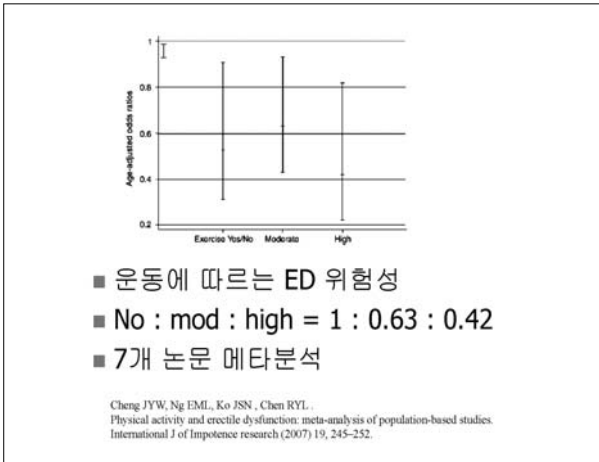
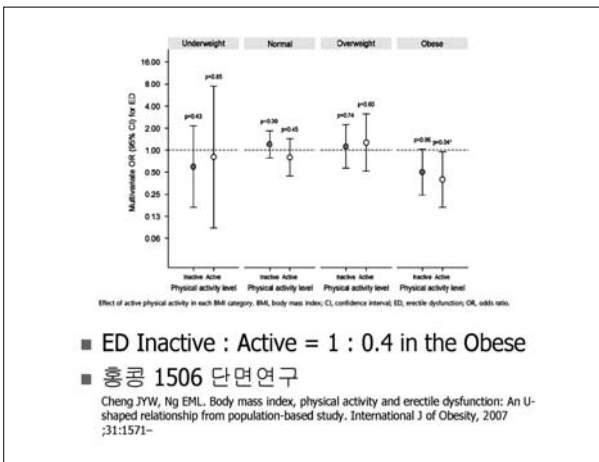
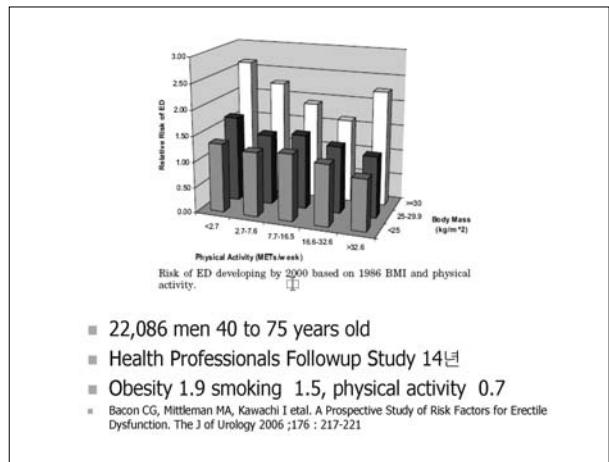
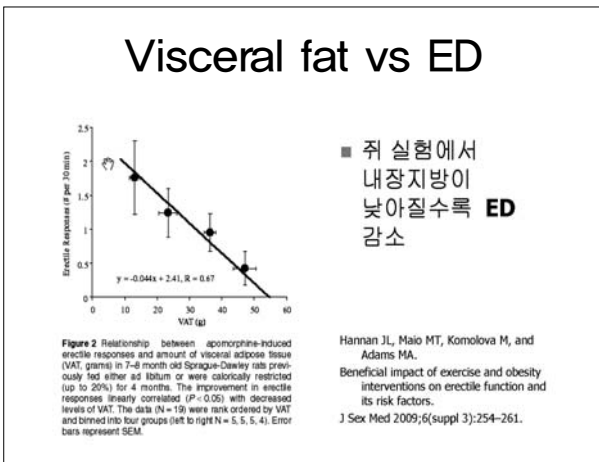


Figure 1 Risk of ED for above average physical activity (Yes/No). Number of variables adjusted for in parentheses.

Cheng JYW, Ng EML, Ko JSN, Chen RYL. Physical activity and erectile dysfunction: meta-analysis of population-based studies. International J of Impotence research (2007) 19, 245-252.



## 비만과 신체활동 vs ED



## 얼마나 운동해야?



## 9개월 운동으로 ED 호전

Table IV. Frequency of Coitus and Orgasms (Per Week) Following 9 Months of Exercise\*

Group/test	Intercourse with cohabitants		2 Orgasms within 30 min	3 Orgasms within 60 min
	Before	Following	Before	Following
Control	2.4 (1.2)	2.6 (1.3)	0.47 (0.65)	0.17 (0.30)
Exercise	2.4 (1.3)	2.7 (1.4)	0.56 (0.71)	0.19 (0.29)
Before	2.3 (1.4)	2.7 (1.7)	0.54 (0.85)	0.11 (0.26)
Following	3.0 (1.7)	3.4 (2.2)	0.93 (1.3)	0.19 (0.34)
r statistic (ΔE vs. ΔC)	4.1*	3.3*	1.7	0.85
r statistic (ΔE Exercise vs. ΔE Control)	0.43*	0.50*	0.44*	0.49*

\*Numbers in parentheses are the standard deviations.

\*p < 0.01.

- \*78 sedentary but healthy men (평균 48세).
- \*9개월 운동
- : 60 분/일, ~3.5 일/주, 운동능력의 75~80% vs 걸기

White JR, Case DA, McWhirter D, Mattison AM. Enhanced sexual behavior in exercising men. Arch Sex Behav 1990;19:193-209.

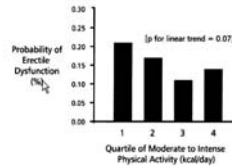
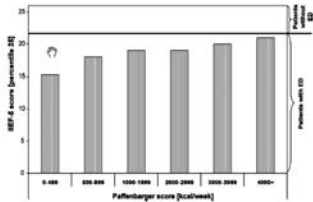


FIGURE 2. Probability of developing erectile dysfunction in 8 years of follow-up by quartile (Q) of follow-up physical activity level (Q1 = 0 to 168, Q2 = 169 to 590, Q3 = 596 to 840, Q4 = greater than 842 kcal/day). Probabilities from logistic regression model adjusted for baseline physical activity, age, and antihypertensive medication use, depression, and/or low testosterone at either baseline or follow-up (Massachusetts Male Aging Study 1987 to 1997). P value from test for linear trend across quartiles.

- 593명 8년 코호트
- 칼로리 소모량별 ED
- 1:0.8:0.5:0.6

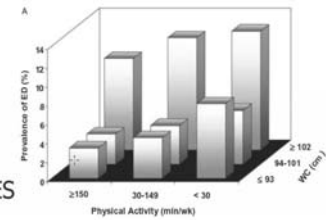
Derby CA, Mohr BA, Goldstein I, Feldman HA, Johannes CB, McKinlay JB. Modifiable risk factors and erectile dysfunction: Can lifestyle changes modify risk? Urology 56: 302-306, 2000.

## 신체활동양과 ED



674 men aged 45-60 yr

Christian W, Kratzik A, Jakob E et al. How Much Physical Activity Is Needed To Maintain Erectile Function? Results of the Androx Vienna Municipality Study. European urology 2009 ; 55 ; 509-517



- 3,941
- 2001-2004 NHANES
- WC 1.5,
- Inactive : active = 1.4~1.6 : 1
- Inactive 30분 미만/주, Moderate 30-149
- Active 150분 이상/주

Janiszewski PM, Janssen I, and Ross R. Abdominal obesity and physical inactivity are associated with erectile dysfunction independent of body mass index. J Sex Med 2009;6:1990-1998.

- 209명 남자, 2년
- 운동, 영양, 체중 조절
- ED 정도별로 나누었을 때 생활습관 조절로 ED 개선

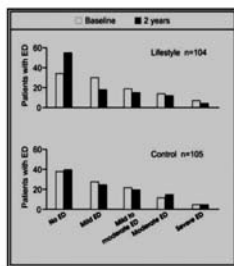


Figure 1 Changes in IIEF score in 209 men assigned to lifestyle changes or control. Level 1: no erectile dysfunction (ED), score 22-25; Level 2: mild erectile dysfunction, score 17-21; Level 3: mild to moderate erectile dysfunction, score 12-16; Level 4: moderate erectile dysfunction, score 8-11; Level 5: severe erectile dysfunction, score 5-7.

Esposito K, Ciotola M, Giugliano EAL. Effects of intensive lifestyle changes on erectile dysfunction in men. J Sex Med 2009;6:243-250.

## 운동량과 ED

- 운동량이 많을수록 즉 강도와 시간이 크고 길수록 ED는 감소
- 하지만 열량소모가 가장 큰 군에서 ED 감소 정도가 낮아짐
- 좀 더 많은 연구가 필요





## 운동이 ED에 좋은 이유

- 동맥경화 억제
- 지질 대사 개선
- 혈액 전달 개선
- 혈전 감소
- 심리호전

## 운동방법

### 1) 유산소운동

중간 강도 운동 : 평소보다 숨이 조금 더 차는 정도	격렬한 운동 : 평소보다 숨이 많이 가쁜 정도
걷기, 자전거 천천히 타기, 복식테니스, 배구, 배드민턴, 탁구, 수영, 요가, 미용체조	조깅, 달리기, 자전거 빨리 타기, 에어로빅, 등산, 축구, 농구, 줄넘기, 단식테니스, 스쿼시
30분 이상	20분 이상
일주일에 5회 이상	일주일에 3-5회

- 2) 근력 운동 : 주 2~3회
- 3) 유연성 운동 : 스트레칭 거의 매일
- 4) 가급적 많이 움직입니다.
- 5) 활동하지 않는 여가 시간을 하루 2시간 이내로 줄입니다