

2012 International Conference on
Diabetes and Metabolism
Diabetes Education Symposium

9 November, 2012
Grand Hilton Seoul Hotel, Seoul

Geriatric Syndrome and Diabetes in Older Adults

서울의대
분당서울대학교병원
내과 장학철



순서

- 노인에서 당뇨병이란?
- 노인증후군 (Geriatric syndrome)
- 노인 당뇨병에서 노인증후군 관리

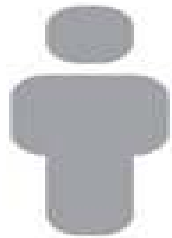
늘어가는 대한민국, 고령사회 진입

2050년 한국

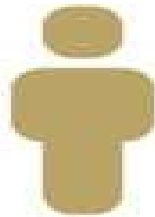
남북한 통합인구

7300만
남 4900만, 북 2400만

6700만명
남 4200만, 북 2500만



2009년



2050년

65세 이상 인구 비중

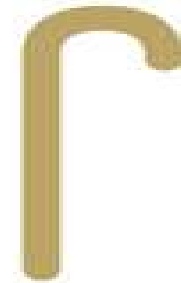
11



2010년



38.2%



2050년

연간 출생아 수

43만5000



2010년



19만3000명



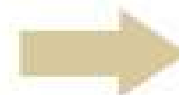
2050년

외국인 체류자 수

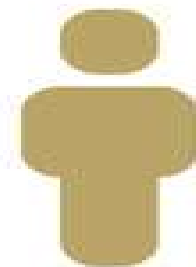
100만



2007년

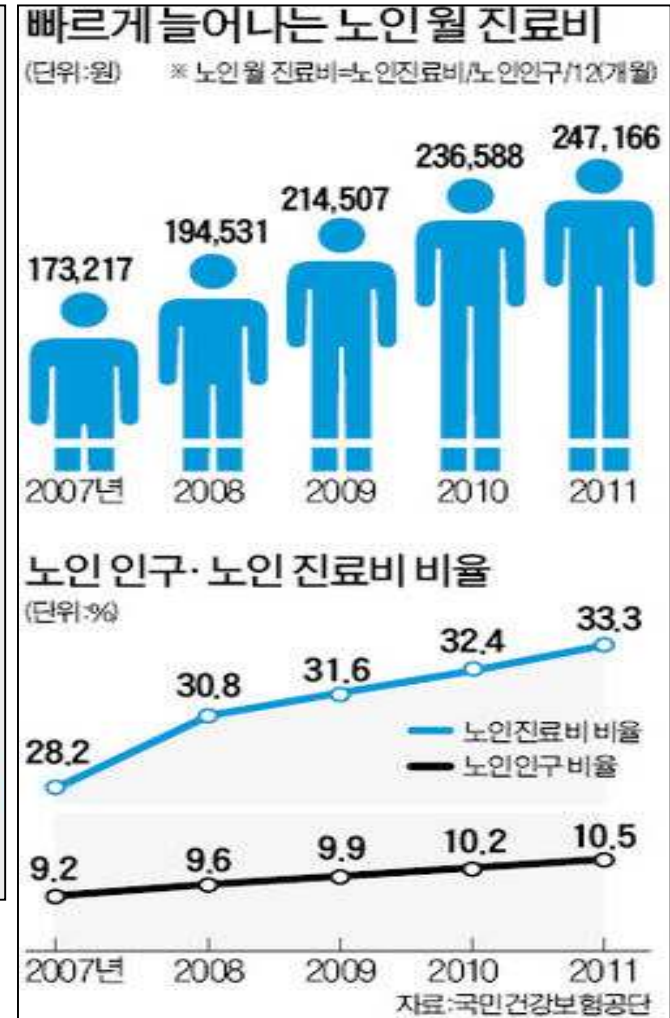


409만명

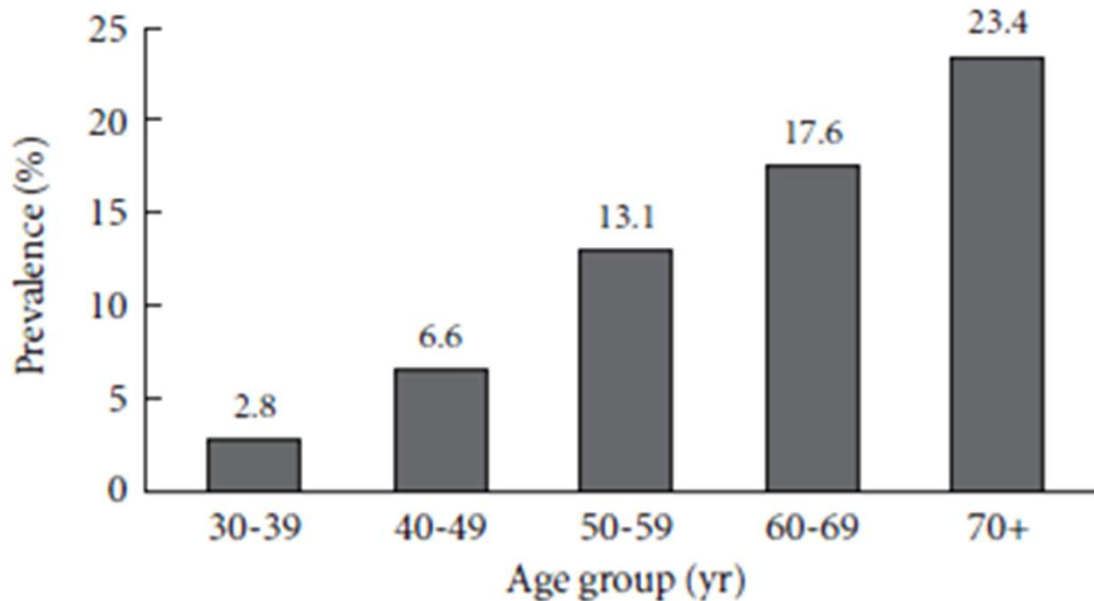


2050년

건강보험 적자: 노인의료비 급증이 원인



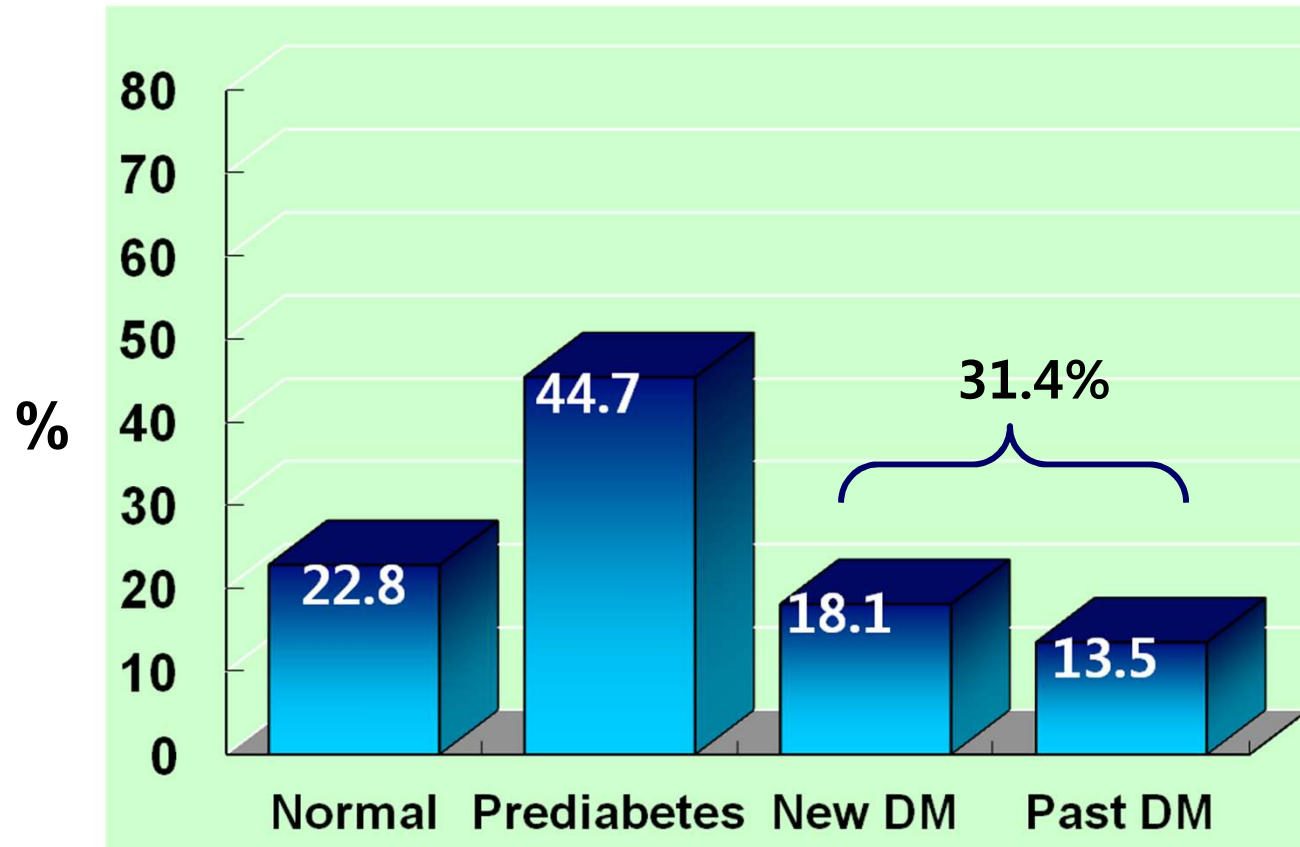
노인 당뇨병의 역학



Prevalence of diabetes mellitus according to age group among Korean adults in 2010. (KNHANES V-1) (DMJ 2012;36:336)

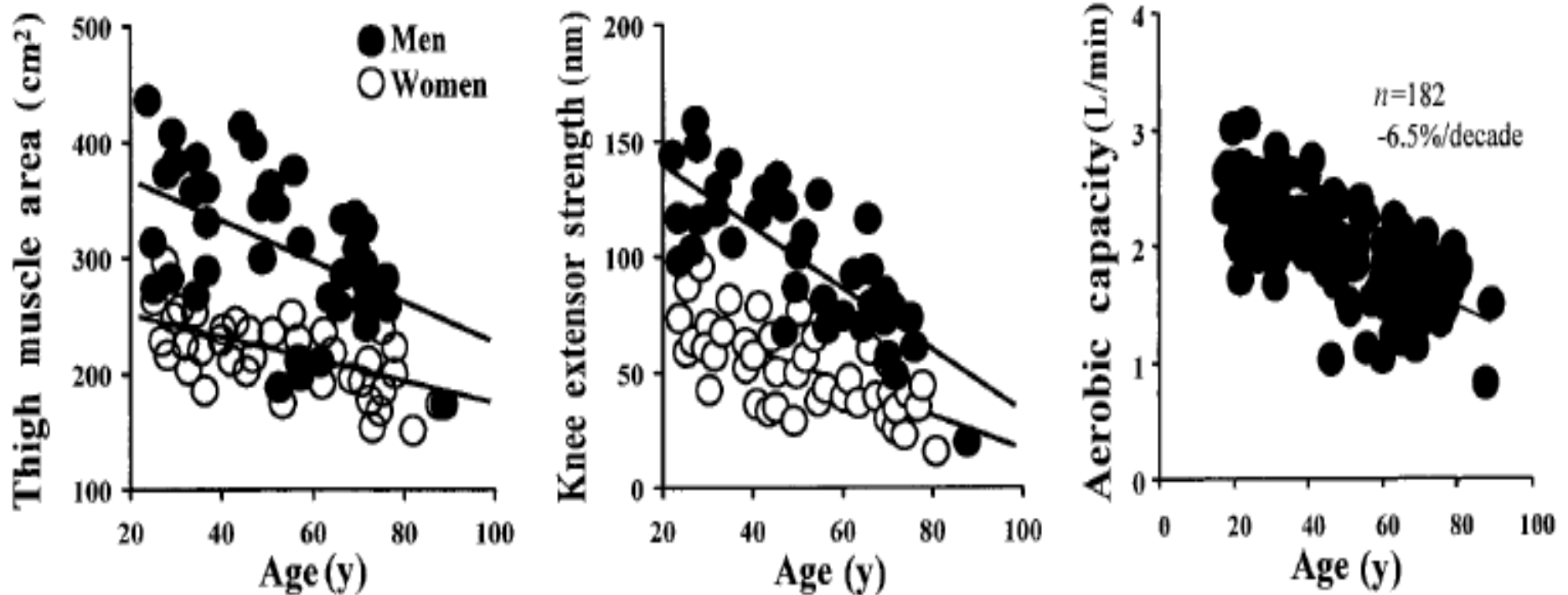
- Prevalence of diabetes in U.S. (aged ≥ 65 years): 22 to 33%
- The number of adults with diabetes. aged ≥ 65 years will increase by 4.5-fold (compared to 3-fold in the total population) between 2005 and 2050 .

노인 당뇨병의 역학: KLoSHA



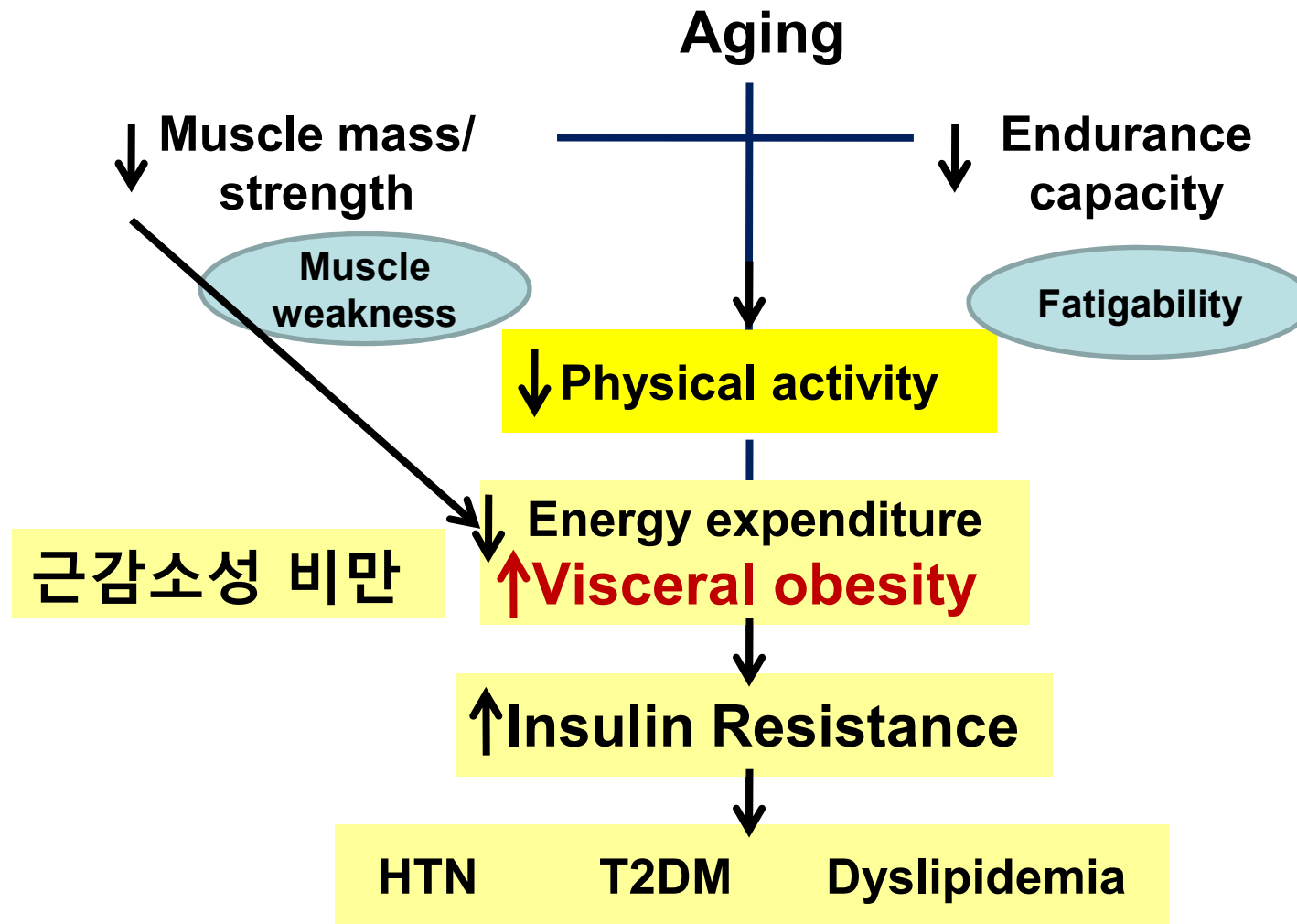
- 2005.8-2006.7 (성남시)
- 남자 439명 (75.9±8.6세), 여자 561명 (76.0±8.81세)
- 75 g OGTT/ WHO 진단기준

노화에 따른 근육량, 근력, 운동능력의 변화

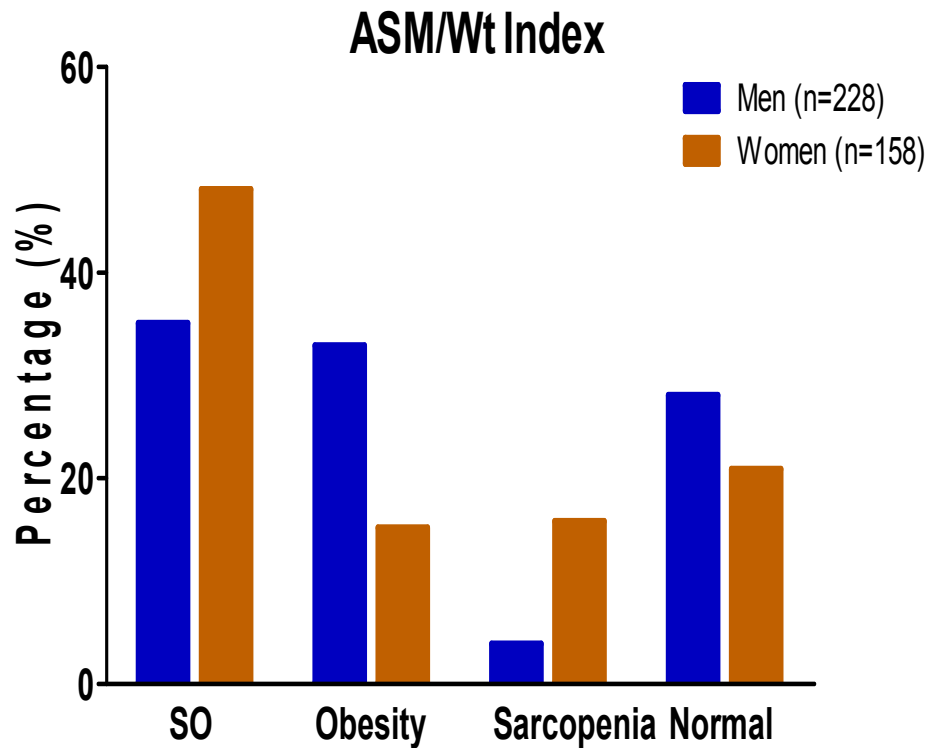


Short KR, Vittone J, Bigelow ML, Proctor DN, Nair KS. Age and aerobic exercise training effects on whole body and muscle protein metabolism. *Am J Physiol* 2004;286:E92-101.

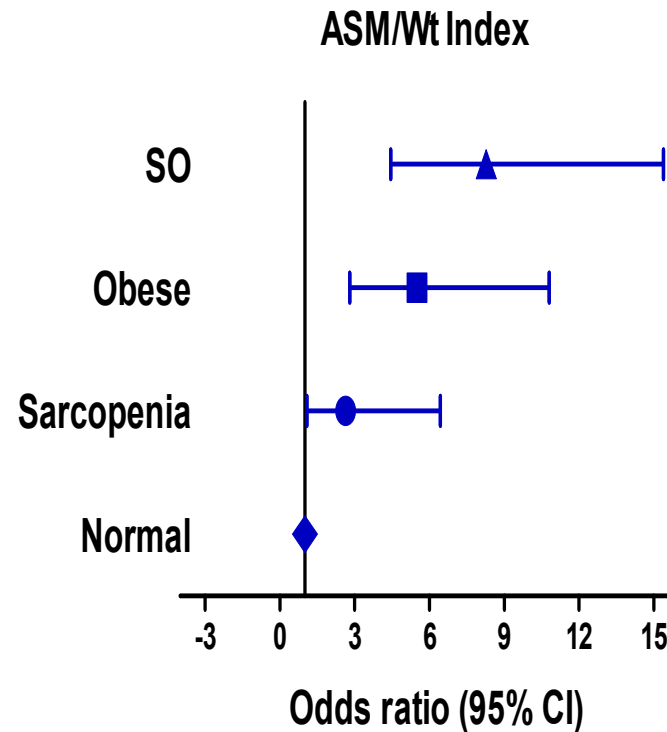
노화와 인슐린 저항성



근감소성 비만 (Sarcopenic Obesity):KLoSHA



Prediction for metabolic syndrome



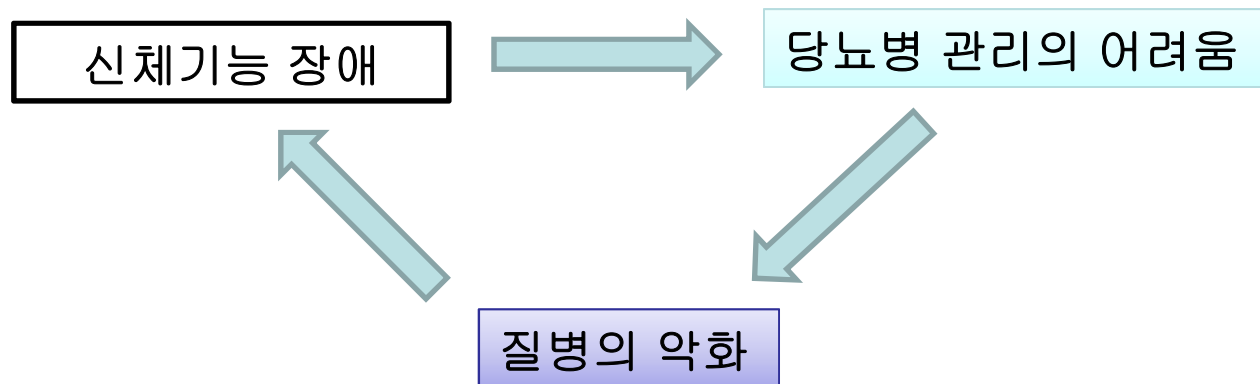
ASM /bodyweight × 100 (%) < -1 SD of sex-specific mean for young reference group. Cutoff value: 29.85% (men) 25.09% (women)
 Visceral fat area ≥ 100 cm²

노인 당뇨병의 역학

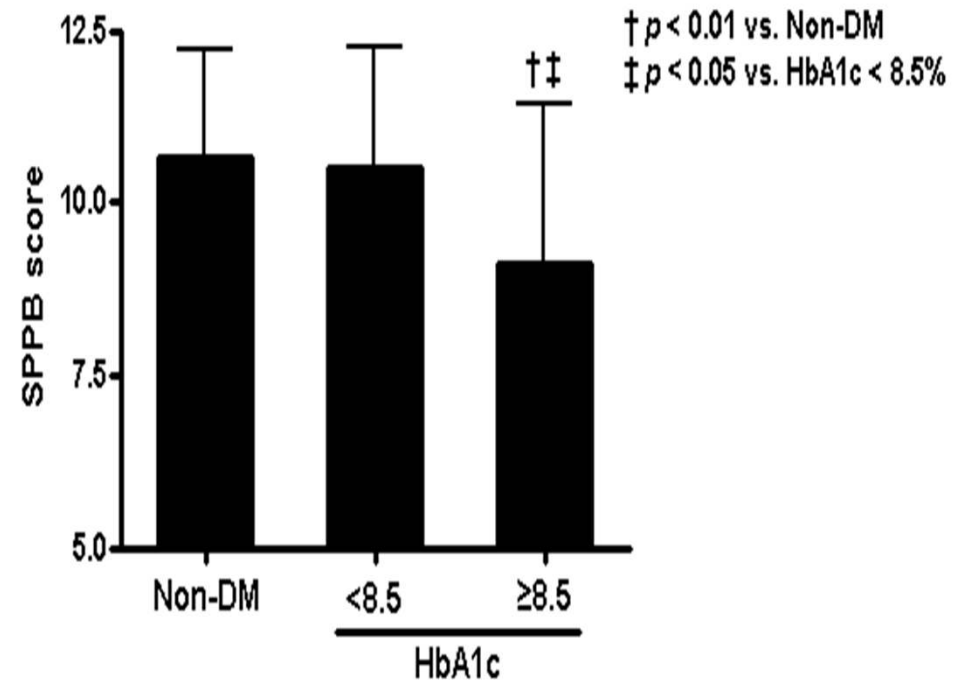
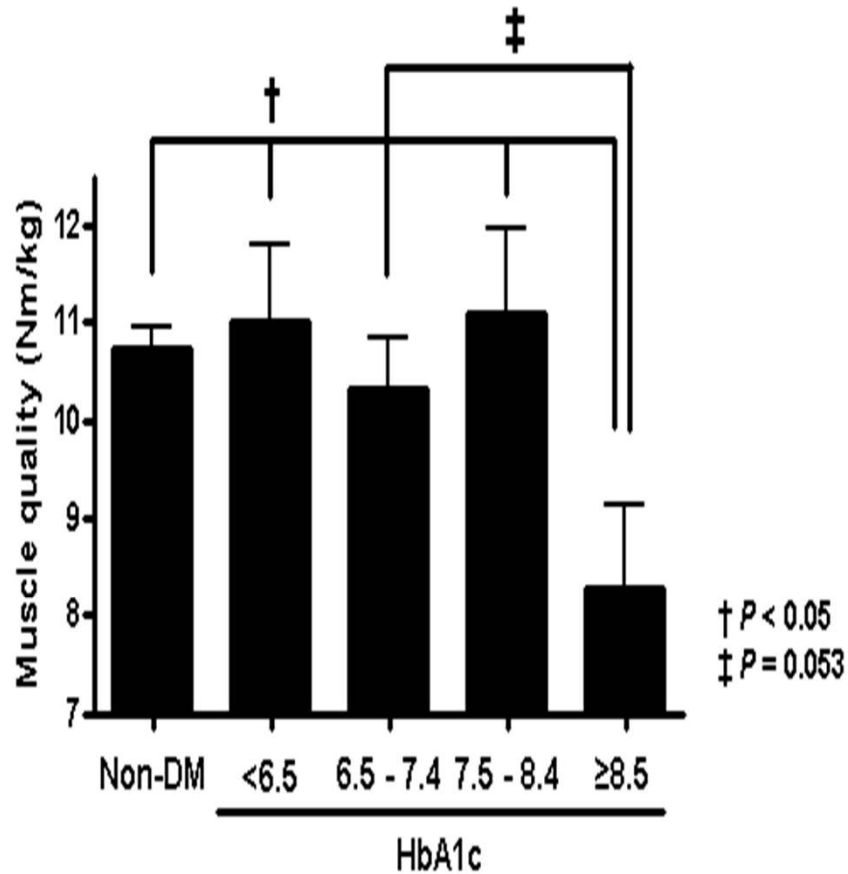
- 노인 당뇨병 환자: 하지 절단, 심근경색, 시력장애, 만성신부전의 발생률이 제일 높다.
- 특히 75세 이상의 노인 환자는 65-74세 노인환자에 비하여 합병증의 발생률이 더 높다.
- 비록 최근 20년간 고혈당 위기로 인한 사망률이 감소하였지만, 노인 당뇨병 환자에서 고혈당 위기로 인한 사망률이 제일 높다.
- 75세 이상의 노인 당뇨병 환자는 저혈당으로 인한 응급실 방문 빈도가 2배 높다.

노인 당뇨병 환자에서 신체 기능장애의 발생위험이 높다

- 노인 당뇨병에서 신체 기능장애 발생 위험
 - 1.5-2.0배 증가 (NHANES, 1999-2006; Kalyani et al., 2010)
 - 위험인자: CVD, Complications, Obesity, A1C, Depression
 - **신체기능 장애 → 건강수명 ↓, 의료비용 ↑**



심한 고혈당은 근육의 질을 저하시키고, 일상 생활 수행 능력을 감소시킨다.



SPPB, short physical performance battery

KLoSHA data, Submitted

노인에서 당뇨병이 있으면?

- 사망률 증가
- 기능 감소, 또는 장애 증가
- 요양시설에 입원할 위험 증가

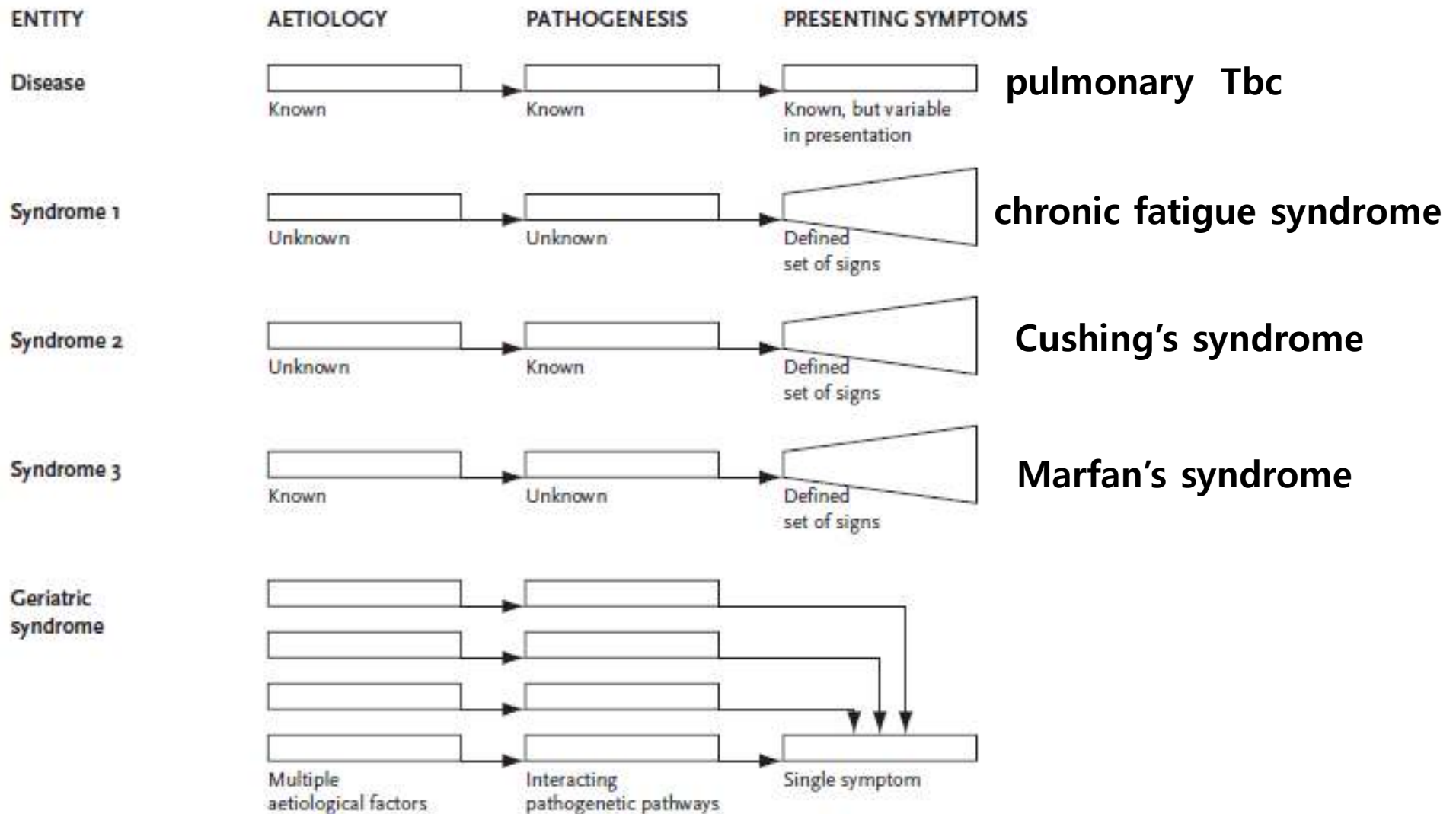
순서

- 노인에서 당뇨병이란?
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노인병과 노인증후군

- 노인병 “Disease in the elderly”
 - Common diseases in older adults
 - 동맥경화, 고혈압, 당뇨병, 빈혈, 치매
- Specific diseases in older adults
 - 노인증후군(Geriatric syndrome)
- Previous disease in adult age

Symbolic presentation of 'disease', 'syndrome' and 'geriatric syndrome'



(Neth J Med 2003;61:83–87)

Geriatric syndrome- heterogeneous

- Geriatric syndromes are used as nosological entities
“patients who are suffering from one or more geriatric syndromes as too frail to have a life-prolonging therapy.”
- ECWG of AGS: 13 most common geriatric syndromes
 - dementia, inappropriate prescribing of medications, incontinence, depression, delirium, iatrogenic problems, falls, osteoporosis, sensory alterations including hearing and visual impairment, failure to thrive, immobility and gait disturbances, pressure ulcers, and sleep disorders
- Harrison’s Principles of Internal Medicine
 - dementia, delirium, falls, urinary incontinence, pressure ulcers

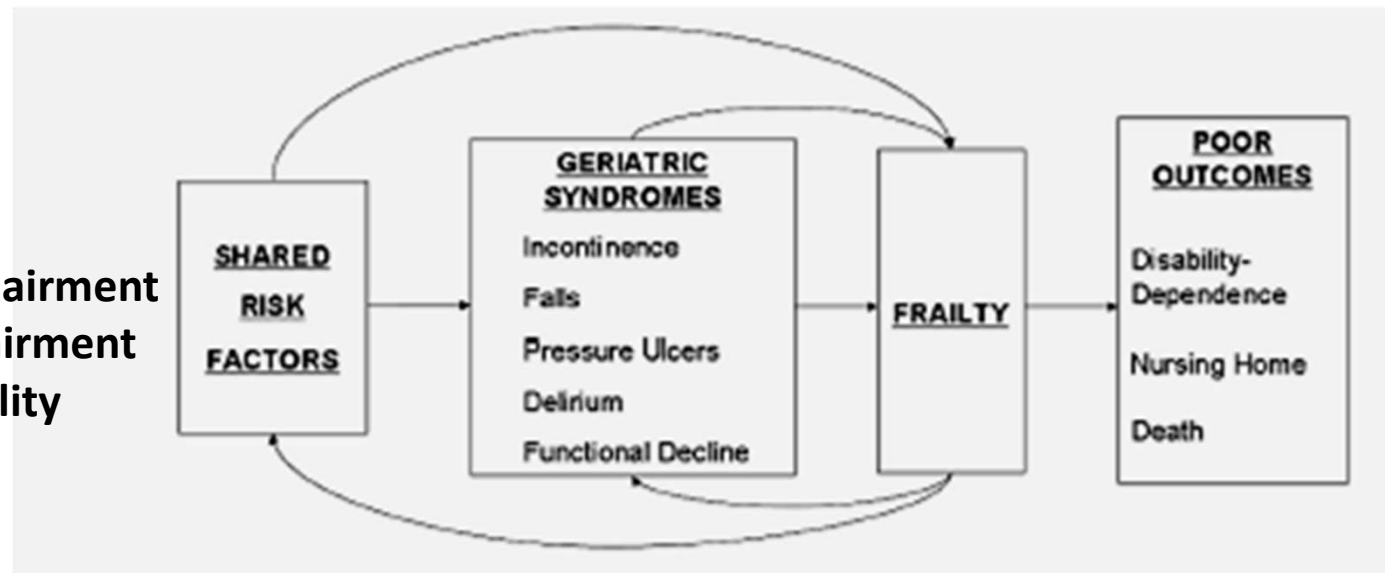
노인증후군의 통합개념 모델

- 5 geriatric syndromes (common, associated with a high degree of morbidity, demonstrated to be preventable in some cases, and investigated with multiple previous risk factor studies): **pressure ulcers, incontinence, falls, functional decline, and delirium**
- Risk factors were identified for each geriatric syndrome
- Shared risk factors identified consistently across all geriatric syndromes: **older age, functional impairment, cognitive impairment, and impaired mobility**

노인증후군의 통합개념 모델

- Multiple risk factors or etiology contribute to geriatric syndrome
- Some geriatric syndromes might share underlying factors
- Frailty and the other geriatric syndromes may also feed-back to result in the development of more risk factors and more geriatric syndromes.
- These pathways in turn lead to the final outcomes of disability, dependence, and death.

Older age
Functional impairment
Cognitive impairment
Impaired mobility



노인증후군

- 노인에서 분리된 질병으로 구별되지 않는 임상 증후군을 노인증후군으로 정의
- 섬망(delirium), 낙상, 노쇠(frailty), 어지럼증, 실신(syncope), 뇨실금
- 노인, 특히 노쇠한 노인에서 흔히 발생함
- 삶의 질이나 신체장애에 미치는 영향이 큼
- 여러 장기에, 또 다양한 기저원인에 의하여 발생
- 원인을 규명하기 위한 진단적 검사가 비효율적이거나 부담스러울 때가 있음.
- 확진이나, 원인 규명 없이 임상상에 따라 치료하는 것이 도움이 됨.

순서

- 노인에서 당뇨병이란?
- 노인증후군 (Geriatric syndrome)
- 노인 당뇨병진료지침 에서 노인증후군

노인증후군이 당뇨병 진료지침에 반영 - CHF & AGS, 2003 -

- Six geriatric syndromes were selected for inclusion in these DM guidelines
- Polypharmacy
- Depression
- Cognitive Impairment
- Urinary Incontinence
- Injurious Falls
- Pain

노인당뇨병 진료지침 중 노인증후군

- Depression
 - The older adult with DM is at increased risk for major depression and **should be screened for depression during the initial evaluation period** (first 3 months) and **if there is any unexplained decline in clinical status.** (IIA)
 - The older adult with DM who presents with new-onset or a recurrence of depression should be treated or referred within 2 weeks of presentation, unless there is documentation that the patient has improved. (IIIB)
 - The older adult who has received therapy for depression should be evaluated for improvement in target symptoms within 6 weeks of the initiation of therapy. (IIIB)

노인당뇨병 진료지침 중 노인증후군

- Polypharmacy
 - The older adult who has DM should be advised **to maintain an updated medication list for review by the clinician.** (IIA)
 - The medication list of an older adult with DM who presents with depression, falls, cognitive impairment, or urinary incontinence should be reviewed. (IIA)

노인당뇨병 진료지침 중 노인증후군

- Cognitive Impairment
 - The clinician should assess the older adult with DM for **cognitive impairment using a standardized screening instrument during the initial evaluation and with any significant decline in clinical status.** (IIIA)
 - If there is evidence of cognitive impairment in an older adult with DM and delirium has been excluded as a cause, then an **initial evaluation designed to identify reversible conditions** that may potentially cause or exacerbate cognitive impairment should be performed promptly after diagnosis. (IIIA)

노인당뇨병 진료지침 중 노인증후군

- Urinary Incontinence
 - The older adult who has DM should be **evaluated for symptoms of urinary incontinence during annual screening.** (IIIA)
 - If there is evidence of urinary incontinence in the evaluation of an older adult with DM, then an evaluation designed to identify treatable causes of urinary incontinence should be pursued. (IIIB)

노인당뇨병 진료지침 중 노인증후군

- Injurious Falls
 - **The older adult with DM should be asked about falls.** (IIIB)
 - If an older adult presents with evidence of falls, the clinician should document a basic falls evaluation, including an assessment of injuries and examination of potentially **reversible causes of the falls** (e.g., medications, environmental factors). (IIIB)
- Pain
 - The older adult who has DM should be assessed during the initial evaluation period for evidence of persistent pain. (IIIA).

미국당뇨병학회 /미국노인병 학회

Comorbidities and geriatric syndromes

- Geriatric syndromes also occur at higher frequency in older adults with diabetes and may affect self-care abilities and health outcomes including quality of life.
- Cognitive dysfunction
- Functional impairment
- Falls and fractures
- Polypharmacy
- Depression
- Vision and hearing impairment
- Other commonly occurring medical conditions: pain, urinary incontinence

노인증후군: 인지장애

- Alzheimer's-type and multi-infarct dementia are approximately twice as likely to occur in those with diabetes.
- In the ACCORD trial, neither intensive glycemic control nor blood pressure control to a target SBP <120 mmHg was shown to prevent a decline in brain function.
- Cross-sectional studies have shown an association between **hyperglycemia** and cognitive dysfunction; **Hypoglycemia** is linked to cognitive dysfunction in a bidirectional fashion.
- **It is important to periodically screen for cognitive dysfunction**
- In older patients with cognitive dysfunction, **regimens should be simplified, caregivers involved, and the occurrence of hypoglycemia carefully assessed.**

노인증후군: 기능장애

- After controlling for age, people with diabetes are less physically active and have more functional impairment than those without diabetes.
- The etiology of functional impairment in diabetes may include interaction between **coexisting medical conditions, peripheral neuropathy, vision and hearing difficulty, and gait and balance problems.**
- Peripheral neuropathy, present in 50–70% of older patients with diabetes, increases the risk of postural instability, balance problems, and muscle atrophy, limiting physical activity and increasing the risk of falls.

노인증후군: 낙상 및 골절

- Functional impairment are associated with the higher risk of falls and fractures.
- **Women with diabetes have a higher risk of hip and proximal humeral fractures** after adjustment for age, BMI, and bone density.
- It is important to assess **fall risks and perform functional assessment periodically in older adults.**
- **Avoidance of severe hyperglycemia and hypoglycemia** can decrease the risk of falls. **Physical therapy should be encouraged** in patients who are at high risk or who have experienced a recent fall.

노인의 영양문제

- Older adults may be at risk for undernutrition due to anorexia, altered taste and smell, swallowing difficulties, oral/dental issues, and functional impairments leading to difficulties in preparing or consuming food.
- **Mini-Nutritional Assessment, specifically designed for older adults**, is simple to perform and may help determine whether referral to a registered dietitian for medical nutrition therapy (MNT) is needed.
- **MNT has proven to be beneficial in older adults with diabetes.**

Screening

A 지난 3개월 동안 밥맛이 없거나, 소화가 잘 안되거나, 씹고 삼키는 것이 어려워서 식사량이 줄었습니까?

- 0= 많이 줄었다
- 1= 조금 줄었다
- 2= 변화 없다

B 지난 3개월 동안 몸무게가 줄었습니까?

- 0= 3kg 이상 감소
- 1= 모르겠다
- 2= 1kg~3kg 감소
- 3= 변화 없다

C 거동 능력

- 0= 외출 불가, 침대나 의자에서만 생활 가능
- 1= 외출 불가, 집에서만 활동 가능
- 2= 외출 가능, 활동 제약 없음

D 지난 3개월 동안 정신적 스트레스를 경험했거나 급성 질환을 앓았던 적이 있습니까?

- 0= 예
- 2= 아니오

E 신경 정신과적 문제

- 0= 중증 치매나 우울증
- 1= 경증 치매
- 2= 없음

F1 체질량지수 (Body Mass Index, kg/m²)

- 0 = BMI < 19
- 1 = 19 ≤ BMI < 21
- 2 = 21 ≤ BMI < 23
- 3 = BMI ≥ 23

체질량지수를 모름 경우 F2 로 가십시오.
F1 응답을 하신 분은 F2 를 하실 필요가 없습니다.

F2 종아리둘레 (Calf circumference, cm)

- 0 = CC < 31
- 3 = CC ≥ 31

Screening score (총 14점)

- 12-14 점 정상
- 8-11 점 영양불량 위험 있음
- 0-7 점 영양불량

Self MNA[®]

Mini Nutritional Assessment

For Adults 65 years of Age and Older

근감소성 비만

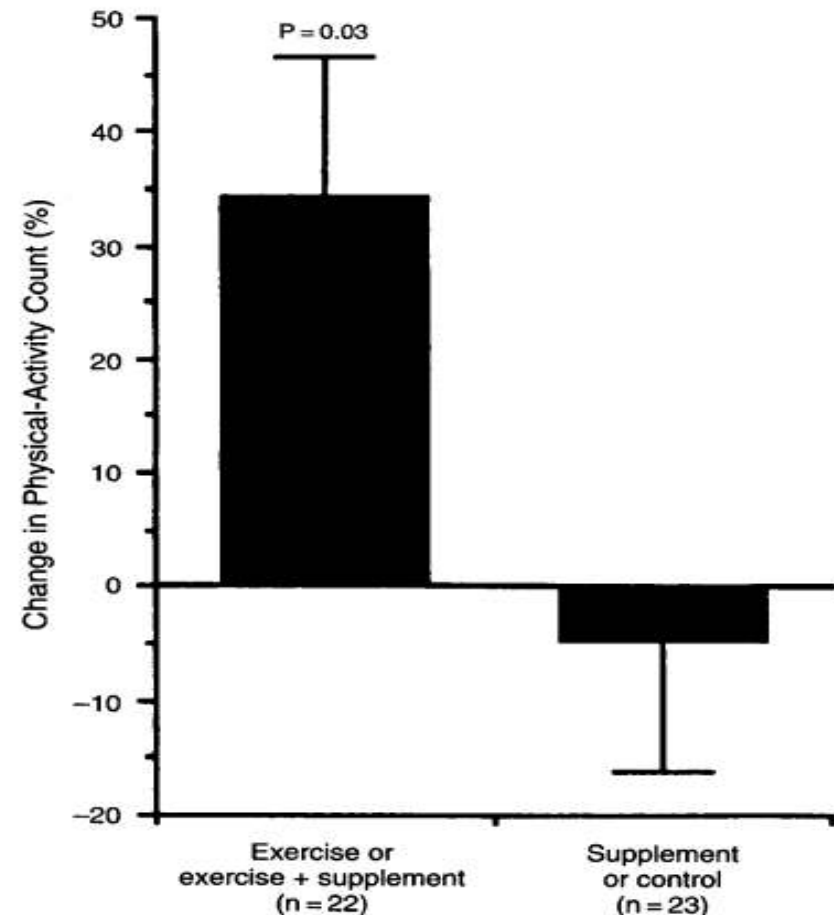
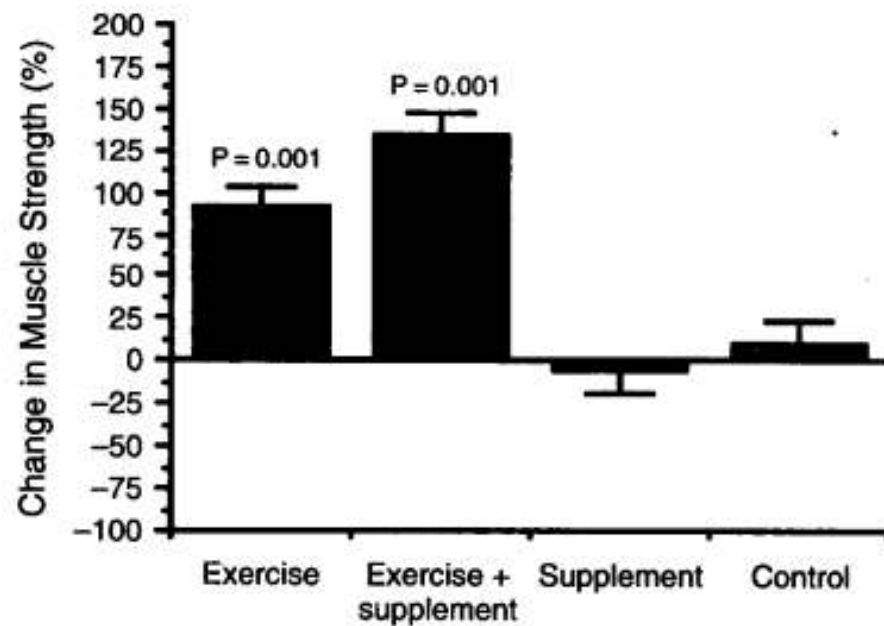
- Overweight and obesity are prevalent among older adults.
- **BMI may not be an accurate predictor of the degree of adiposity** in some older adults due to changes in body composition with aging.
- **Obesity exacerbates decline in physical function** due to aging and increases the risk of frailty.
- Strategies that **combine physical activity with nutrition therapy to promote weight loss may result in improved physical performance** and function and reduced cardiometabolic risk in older adults.

신체 활동과 체력

- People with diabetes of longer duration and those with higher A1C have **lower muscle strength** per unit of muscle mass.
- In the Look AHEAD (Action for Health in Diabetes) study, participants aged 65–76 years had lower gains in fitness with the intensive lifestyle intervention than younger patients, but **still improved their measures of fitness** by a mean of over 15%.
- In older adults, even light-intensity physical activity is associated with higher **self-rated physical health and psychosocial well-being**.

Exercise Training and Nutritional Supplementation for Frailty in very Elderly People

- Randomized, placebo controlled trial comparing resistance exercise training, and/or nutrient supplementation in 100 frail nursing home residents (87.1 yrs) over a 10 weeks period.



N Engl J Med 1994;330:1769

요약

- 고령자의 급격한 증가가 예상되는 현실을 고려할 때, 노인증후군, 근감소증, 노쇠에 대한 임상적 관심이 필요함.
- 노인 당뇨병에서 노인증후군 연구가 필요함.
- 위험인자의 발견과 예방적 조치가 필요함
- 당뇨병 교육자로서 노인에서 '삶의 질', '육체적-사회적 기능' 을 고려해야 함.

감사합니다



Irisin: A PGC1- α -dependent myokine that drives brown-fat-like development of white fat and thermogenesis (Nature, 2012)

