2012 대한임상건강증진학회 추계 통합학술대회

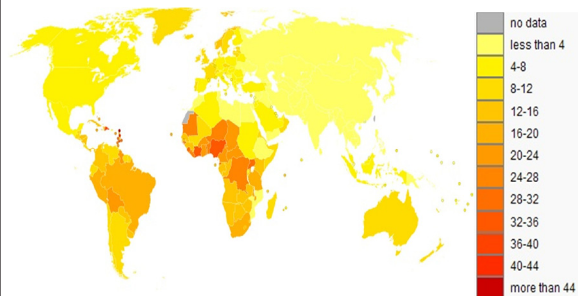
세미나 : 암 환자의 재활운동

전립선암과 운동중재

송 욱

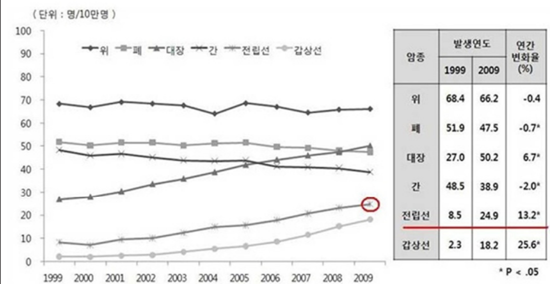
서울대학교 건강운동과학연구실

국가별 전립선암의 사망률 (인구 100,000당)



WHO,2009

남자 주요 암 연령표준화 발생 추이(1999~2009)

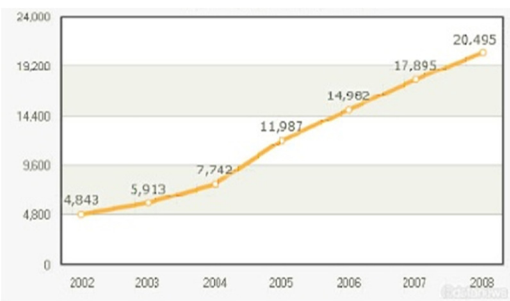


암종	발생연도 1999	발생연도 2009	연간 변화율 (%)
위	68.4	66.2	-0.4
폐	51.9	47.5	-0.7*
대장	27.0	50.2	6.7*
간	48.5	38.9	-2.0*
전립선	8.5	24.9	13.2*
갑상선	2.3	18.2	25.6*

* P < .05

보건복지부 중앙암등록본부, 2009

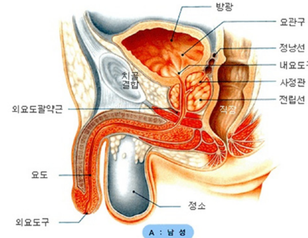
전립선암 진료환자 수 추이



국민건강보험공단/ 단위:명

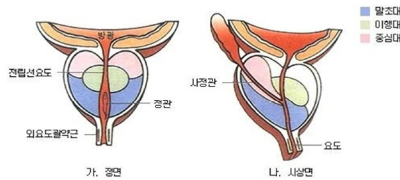
전립선

- 전립선(전립샘)은 남성의 방광 바로 아래위치하며 15~20g 정도의 크기
- 정낭, 고환과 함께 남성생식을 담당
- 정액의 일부를 생성, 남성호르몬의 영향을 받음



전립선암

- **전립선암**은 전립선에 발생하는 악성종양으로 선암(adenocarcinoma)이라고하며 전립선샘 세포의 변형이 암으로 발전됨
- 전립선의 말초대 70~80%, 이행대에서 20%, 중심대에서 5%발생함



임상 증상

- 배뇨증상: 빈뇨, 배뇨통, 지연뇨, 잔뇨, 혈뇨
- 초기에는 특이한 증상이 없으나 전립선 비대증 증상과 유사
- 환자 중 1/3은 증상을 호소하며 전립선암으로 판명되는 반면 2/3는 증상이 없이 암이 진행됨
- 중증 환자의 경우 암이 뼈로 전이되면서 뼈의 통증이 발생

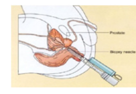
원인

- **가족력**: 가족력이 있는 경우 전립선암 위험률이 2배 더 증가함
- **비만**: 전립선암 위험요인 중 가장 관련이 높음
- **연령**: 평균 발생나이 70세, 연령이 높을 수록 전립선암 위험률이 증가함
- **식이습관**: 과도한 육류 섭취는 높은 전립선 유병률과 관련 있으며 혈중 낮은 vitamin D 농도 또한 전립선암 위험률을 증가시킴
- **인종**: 흑인남성의 경우 가장 흔하게 발생하는 반면, 아시아 남성의 경우 가장 적게 나타남

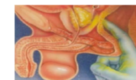
진단

- **전립선 특이항원(PAS)검사**: 전립선암인 경우 증가, 전립선비대증, 전립선염 등 다른 전립선 질환에서도 상승

- **전립선조직 검사**: 전립선 특이항원이 증가한 경우 전립선암 확진을 위해 시행



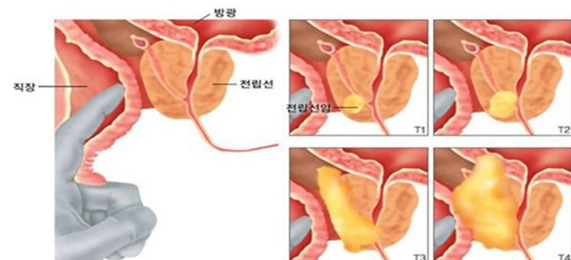
- **직장수지검사**: 항문을 통해 손가락으로 전립선 촉진



- **경직장 초음파 검사**: 전립선 용적을 측정, 전립선 내 병리적 변화 발견

전립선암 단계

- TNM system(Tumor/Nodes/Metastases): 전립선암의 치료를 결정함에 있어 환자의 병기판단이 매우 중요하며 환자의 연령, 전이상태에 따라 분류
- 종양의 크기, 림프선으로 전이된 수, 다른 조직으로의 전이 유무에 따라 단계가 결정됨



- T1, T2:증상이 전혀 없는 초기로 전립선에서만 암이 발견됨. 특별한 치료 없이 관찰, 전립선 적출술 시행
- T3,T4: 모든 조직으로 암이 전이됨. 방사선 요법, 내분비요법, 화학요법, 근치적 전립선적출술

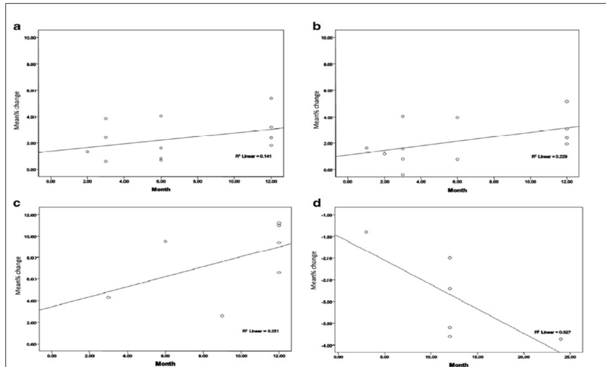
치료 및 예방

- **치료**
- Androgen deprivation theraphy(ADT)
- 방사선치료(Radiotheraphy)

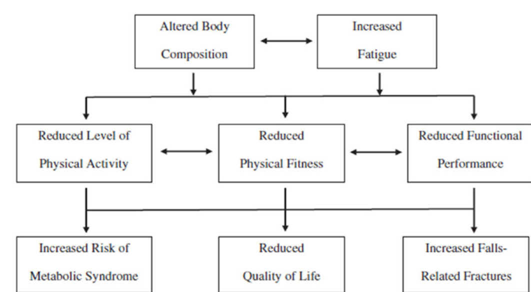
- **예방**
- 식이요법: 적절한 체중을 유지하고 알코올과 동물성지방 섭취는 줄이고 저지방 및 고 섬유질 섭취
- 규칙적인 운동: 65세 이하 건강한 성인의 경우, 중강도 유산소 운동 30분, 5일/주 또는 고강도 유산소 운동 20분/3일/주 (Haskell WL, 2007)

Androgen Deprivation Therapy(ADT)

- ADT는 진행된 전립선암 환자에게 가장 흔히 사용되는 치료로, 약 50% 환자가 ADT를 사용할 것으로 예상
- ADT는 남성 호르몬의 생산을 감소시키지만 열감, 빈혈증, 피로, 지방증가, 골다골증, 골절, 심혈관 질환, 대사합병증과 같은 다양한 부작용을 일으킴
- 낙상과 연관된 골절은 더 많은 공공 건강 문제와 대사적 질환의 위험성과 연관된 위험성을 증가시킬 수 있음
- 따라서 ADT와 같은 보편적인 방법의 부작용과 증상을 대응 할 수 있는 분명하고 효과적인 치료법이 필요함



Mean percentage of change in body composition (a) body weight, (b) BMI, (c) fat mass, (d) lean mass over the months of treatment with ADT. (Haseen et al, 2010)



Potential interrelationships between changes in outcomes that may contribute to the increased risk of metabolic syndrome and falls-related fractures and reduced quality of life of prostate cancer patients, especially those using ADT.
(Justin et al 2012)

운동의 필요성

- 신체활동과 같은 운동은 자연 요법 중 하나이며 많은 이점을 제공하며 비교적 부작용이 적음
- 운동 프로그램은 삶의 질을 개선할 뿐만 아니라 기능적인 적응향상에도 중요한 역할을 하는 것으로 밝혀졌다 (Segal et al., 2003).
- 몇몇 연구를 통해 신체적 활동이 전립선 암 환자에게 삶의 질의 향상과 피로감 감소, 낮은 수준의 전립선 특이항원, ADT 시작을 지연 시켜 주는 것으로 보고 됨

Resistance Training and Reduction of Treatment Side Effects in Prostate Cancer Patients

DANIEL A. GALVÃO[1], KAZUNORI NOSAKA[1], DENNIS R. TAAFFE[2], NIGEL SPRY[3,4], LINDA J. KRISTJANSON[5], MICHAEL R. MCGUIGAN[1], KATSUHIKO SUZUKI[6], KANEMITSU YAMAYA[7], and ROBERT U. NEWTON[1]

[1]School of Exercise, Biomedical and Health Sciences, Edith Cowan University, Joondalup, AUSTRALIA; [2]School of Human Movement Studies, The University of Queensland, Brisbane, AUSTRALIA; [3]Department of Radiation Oncology, Sir Charles Gairdner Hospital, Nedlands, AUSTRALIA; [4]Faculty of Medicine, University of Western Australia, Nedlands, AUSTRALIA; [5]WA Centre for Cancer and Palliative Care, Edith Cowan University, Churchlands, AUSTRALIA; [6]Consolidated Research Institute for Advanced Science and Medical Care, Waseda University, JAPAN; and [7]Oyokyo Kidney Research Institute, JAPAN

ABSTRACT

GALVÃO, D. A., K. NOSAKA, D. R. TAAFFE, N. SPRY, L. J. KRISTJANSON, M. R. MCGUIGAN, K. SUZUKI, K. YAMAYA, and R. U. NEWTON. Resistance Training and Reduction of Treatment Side Effects in Prostate Cancer Patients. *Med. Sci. Sports Exerc.*, Vol. 38, No. 12, pp. 2045–2052, 2006. **Purpose:** To examine the effect of progressive resistance training on muscle function, functional performance, balance, body composition, and muscle thickness in men receiving androgen deprivation for prostate cancer. **Methods:** Ten men aged 59–82 yr on androgen deprivation for localized prostate cancer undertook progressive resistance training for 20 wk at 6- to 12-repetition maximum (RM) for 12 upper- and lower-body exercises in a university exercise rehabilitation clinic. Outcome measures included muscle strength and muscle endurance for the upper and lower body, functional performance (repeated chair rise, usual and fast 6-m walk, 6-m backwards walk, stair climb, and 400-m walk time), and balance by sensory organization test. Body composition was measured by dual-energy x-ray absorptiometry and muscle thickness at four anatomical sites by B-mode ultrasound. Blood samples were assessed for prostate specific antigen (PSA), testosterone, growth hormone (GH), cortisol, and hemoglobin. **Results:** Muscle strength (chest press, 40.5%; seated row, 41.9%; leg press, 96.3%; $P < 0.001$) and muscle endurance (chest press, 114.9%; leg press, 167.1%; $P < 0.001$) increased significantly after training. Significant improvement ($P < 0.05$) occurred in the 6-m usual walk (14.1%), 6-m backwards walk (22.3%), chair rise (26.8%), stair climbing (10.4%), 400-m walk (7.4%), and balance (7.8%). Muscle thickness increased ($P < 0.05$) by 15.7% at the quadriceps site. Whole-body lean mass was preserved with no change in fat mass. There were no significant changes in PSA, testosterone, GH, cortisol, or hemoglobin. **Conclusions:** Progressive resistance exercise has beneficial effects on muscle strength, functional performance and balance in older men receiving androgen deprivation for prostate cancer and should be considered to preserve body composition and reduce treatment side effects. **Key Words:** MUSCLE STRENGTH, SARCOPENIA, ANDROGEN DEPRIVATION, ELDERLY MEN

Resistance training and reduction of treatment side effects in prostate cancer patients (Galva˜o DA, 2006)

TABLE 2. Muscle strength and endurance at baseline and after 10 and 20 wk of resistance training (mean ± SD).

Variable	Baseline	Week 10	Week 20	Percentage Change	P value
Chest press 1RM (kg)	30.9 ± 13.2	39.5 ± 15.4^{a}	43.0 ± 16.4^{b,c}	40.5 ± 18.5	<0.001
Seated row 1RM (kg)	36.4 ± 7.3	44.6 ± 7.3^{a}	50.7 ± 7.6^{b,c}	41.9 ± 21.4	<0.001
Leg press 1RM (kg)	81.3 ± 34.2	109.0 ± 37.0^{a}	158.0 ± 63.1^{b,c}	96.3 ± 25.7	<0.001
Chest press end (rep)	9.0 ± 2.5	13.8 ± 2.2^{a}	20.2 ± 5.5^{b,c}	114.9 ± 42.6	<0.001
Chest press end†(rep)	9.0 ± 2.5	7.3 ± 2.2	9.4 ± 2.0	3.2 ± 31.7	0.085
Leg press end (rep)	20.3 ± 7.9	35.8 ± 10.8^{a}	47.2 ± 10.5^{b}	167.1 ± 143.6	<0.001
Leg press end†(rep)	20.3 ± 7.9	25.0 ± 8.4	27.2 ± 8.6^{b}	56.3 ± 94.5	0.024

Significant difference, $P < 0.05$; [a] baseline to week 10; [b] baseline to week 20; [c] week 10 to week 20.
1RM, one-repetition maximum; end, muscle endurance at baseline test 70% 1RM; rep, number of repetitions performed.
† Muscle endurance at posttest 70% 1RM.

Muscle strength and endurance at baseline and after 10 and 20wk of resistance training.

Resistance training and reduction of treatment side effects in prostate cancer patients (Galva˜o DA, 2006)

Variable	Baseline	Week 10	Week 20	Percentage Change	P Value
Chair rise (s)	15.4 ± 4.9	11.3 ± 3.5^{a}	10.5 ± 2.7^{b}	−26.8 ± 7.1	<0.001
6-m backwards walk (s)	23.5 ± 9.3	18.7 ± 10.1	17.7 ± 10.1^{b}	−22.3 ± 21.9	0.017
6-m usual walk (s)	5.0 ± 1.0	4.5 ± 0.8^{a}	4.3 ± 0.7^{b}	−14.1 ± 10.2	0.002
6-m fast walk (s)	3.7 ± 0.7	3.5 ± 0.7	3.5 ± 0.7	−5.5 ± 10.4	0.227
400-m walk (s)	283.1 ± 60.0	255.6 ± 40.8^{a}	252.1 ± 46.5^{b,c}	−7.4 ± 5.9	0.003
Stair climb (s)	7.0 ± 3.6	6.5 ± 3.9^{a}	6.3 ± 2.9^{b}	−10.4 ± 9.8	0.014
SOT (0–100)	68.7 ± 8.3	72.7 ± 6.1	75.7 ± 6.9^{b}	7.8 ± 6.9	0.042

Significant difference, $P < 0.05$; [a] baseline to week 10; [b] baseline to week 20; [c] week 10 to week 20.

Functional performance measures and sensory organization test(SOT) at baseline and after 10 and 20wk of resistance training

Cancer Epidemiology, Biomarkers & Prevention

Short Communication

Recreational Physical Activity and Risk of Prostate Cancer in a Large Cohort of U.S. Men

Alpa V. Patel, Carmen Rodriguez, Eric J. Jacobs, Laura Solomon, Michael J. Thun, and Eugenia E. Calle

Department of Epidemiology and Surveillance Research, American Cancer Society, Atlanta, Georgia

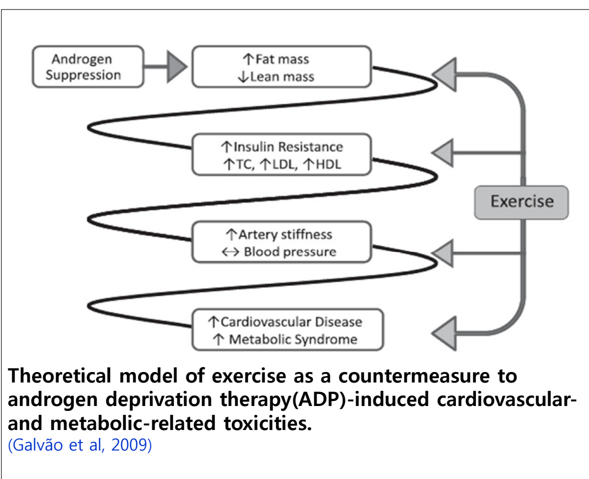
Abstract

Physical activity has been proposed as a modifiable risk factor for prostate cancer because of its potential effects on circulating hormones such as testosterone and insulin. We examined the association of various measures of physical activity with prostate cancer risk among men in the American Cancer Society Cancer Prevention Study II Nutrition Cohort, a large prospective study of U.S. adults. Information on recreational physical activity was obtained from a self-administered questionnaire completed at cohort enrollment in 1992/1993, as well as from a questionnaire completed as part of an earlier study in 1982. During the 9-year prospective follow-up, 5,503 incident prostate cancer cases were identified among 72,174 men who were cancer-free at enrollment. Cox proportional hazards modeling was used to compute hazard rate ratios (RR) for measures of recreational physical activity and to adjust for potential confounding factors. We observed no difference in risk of prostate cancer between men who engaged in the highest level of recreational physical activity (>35 metabolic equivalent-hours/wk) and those who reported no recreational physical activity at baseline (RR, 0.90; 95% confidence interval, 0.78-1.04; P for trend = 0.31). We also did not observe an association between prostate cancer and recalled physical activity at age 40 or exercise reported in 1982. However, the incidence of aggressive prostate cancer was inversely associated with >35 metabolic equivalent-hours/wk of recreational physical activity compared with that in men who reported no recreational physical activity (RR, 0.69; 95% confidence interval, 0.52-0.92; P for trend = 0.06). Our findings are consistent with most previous studies that found no association between recreational physical activity and overall prostate cancer risk but suggest physical activity may be associated with reduced risk of aggressive prostate cancer. (Cancer Epidemiol Biomarkers Prev 2005;14(1):275–9)

Recreational Physical Activity and Risk of Prostate Cancer in a Large Cohort of U.S. Men(Patel AV, 2005)

Table 3. Rate ratios for baseline recreational leisure time physical activity and risk of nonaggressive and aggressive prostate cancer, CPS-II Nutrition Cohort, 1992 to 2001

	No. cases/person-years	RR* (95% CI)
Nonaggressive prostate cancer†		
MET-h/wk in 1992‡		
None	440/63,885	1.00 (reference)
>0-7	1,205/161,811	1.02 (0.92-1.14)
>7-21	1,549/188,800	1.07 (0.96-1.20)
>21-35	728/95,816	0.99 (0.88-1.11)
>35	238/31,182	0.98 (0.84-1.16), P for trend = 0.57
Aggressive prostate cancer†		
MET-h/wk in 1992‡		
None	184/62,782	1.00 (reference)
>0-7	372/157,940	0.79 (0.66-0.94)
>7-21	495/183,771	0.87 (0.73-1.04)
>21-35	226/93,473	0.77 (0.63-0.94)
>35	66/30,327	0.69 (0.52-0.92), P for trend = 0.06



Theoretical model of exercise as a countermeasure to androgen deprivation therapy(ADP)-induced cardiovascular- and metabolic-related toxicities.
(Galvão et al, 2009)

결론

- 운동은 암 예방과 조절에 있어 중요한 역할을 하며, 신체적으로 활동적인 삶이 암의 위험률을 감소 시킴
- 생활습관의 중재(식이조절뿐만 아니라 신체활동, 흡연과 음주의 중단)과 칼슘/비타민D의 보충은 전립선 암환자에게 ADT 부작용을 감소시켜주며, 특히 저항성 운동을 통해 보다 큰 효과를 관찰 할 수 있음.
- 따라서 이러한 효과를 확인하기 위해 앞으로 대규모의 연구가 더 필요함.