암환자의 식이요법

박 민 선
서울대학교 가정의학교실

목차

- Basic nutrition principle
- 암완치자를 위한 식사패턴
- 암완치자를 위한 vitamin/mineral supplements
- 암완치자 영양치료의 실제

Basic nutrition concepts

- **Maintain body wt. and nutrient store**
  - Better tolerate treatment-related side effects and recover from therapy more quickly
  - Maintenance of lean tissue mass during treatment & recovery
- **Protein**
  - Protein needs?
  - Repair and to rebuild tissues
  - Maintain a healthy immune system
  - As a fuel substance

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- Basic nutrition principle
- 암완치자를 위한 식사패턴과 비만
- 암완치자를 위한 vitamin/mineral supplements
- 암완치자 영양치료의 실제

증거	보호요소	위험요소
증거 충분	규칙적인 신체활동(대장)	과체중, 비만(식도, 질결장, 폐경이후 유방, 자궁내막암, 신장암) 술(구강, 인두, 후두, 식도, 간, 유방) Aflatoxin(간) 중국식 염장생선 (비인두)
제한된 증거	과일, 채소(구강, 식도, 위, 식도, 직결장) 신체활동(유방)	보존육류(직결장) 염장음식 및 소금(위) 매우 뜨거운 음료 및 음식 (구강, 인두, 식도)
가능 /증거불충분	콩류 생선 N-3 지방산 Carotenoids Vitamin B2, B6, folate, B12, C, D, E, Ca, Zn, Se Non-nutrient plant constituents(allium compounds, flavonoid, isoflavones, lignans)	동물성 지방 Heterocyclic amines Polycyclic aromatic hydrocarbons Nitrosamines

WHO technical report series 916, (2003) ? 식이, 영양 및 만성질환 예방"

Physical fitness and activity and mortality

Table 3. Hazard ratios for all-cause, cardiovascular and cancer mortality according to level of physical fitness and regularity of physical activity

		Physical activity					
		Regular case/person-years	ID	aHR (95% CI)	No regular case/person-years	ID	aHR (95% CI)
All cause mortality	1st tertile	81/16,735	484.02	1.00	240/28,123	853.39	1.00
	2nd tertile	58/14,252	406.96	0.71 (0.49-1.02)	50/20,608	242.62	0.49 (0.37-0.65)
	3rd tertile	35/14,482	241.68	0.77 (0.52-1.12)	43/22,027	195.22	0.49 (0.36-0.67)
				p for trend=0.148			*p* for trend <0.001
Cardiovascular mortality	1st tertile	13/16,735	77.68	1.00	53/28,123	188.46	1.00
	2nd tertile	8/14,252	56.13	0.62 (0.22-1.73)	14/20,608	67.93	0.41 (0.21-0.79)
	3rd tertile	5/14,482	34.53	1.01 (0.35-2.95)	8/22,027	36.31	0.46 (0.22-0.95)
				p for trend=0.625			*p* for trend=0.007
Cancer mortality	1st tertile	44/16,735	262.92	1.00	107/28,123	380.47	1.00
	2nd tertile	26/14,252	182.43	0.49 (0.27-0.85)	49/20,608	237.77	0.57 (0.39-0.85)
	3rd tertile	19/14,482	131.20	0.71 (0.41-1.24)	17/22,027	77.18	0.42 (0.26-0.68)
				p for trend=0.036			*p* for trend<0.001

Adjusting for age, study year, total cholesterol, body mass index, smoking status (never, former, current), regular drinking (drinking alcoholic beverages at least once a week) and diagnosis of hypertension or diabetes
Regular physical activity (PA) means 'engaging in light, moderate to vigorous activities for at least 30 min more than three times a week.'
VO_2 max was categorized as low (VO_2 max ≤23 mL/kg/min), moderate (24 mL/kg/min ≤VO_2 max ≤29 mL/kg/min) and high (VO_2 max ≥30 mL/kg/min) in the regular PA group and low (VO_2 max ≤22 mL/kg/min), moderate (23 mL/kg/min ≤VO_2 max ≤28 mL/kg/min) and high (VO_2 max ≥29 mL/kg/min) in the no regular PA group.
ID, incidence density (per 100,000 person-years); aHR, adjusted hazard ratio; CI, confidence interval.

(Park et al, JKMS. 2009;103:1598-)

체력 (Fitness) 의 결정 인자

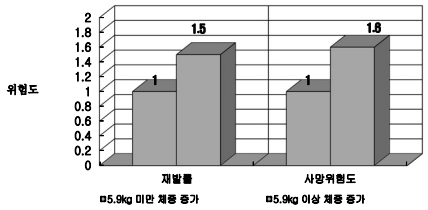
Variable	42–48 yrs			54–60 yrs		
	Standardized	In Original Units	p Value	Standardized	In Original Units	p Value
Weight (kg)	0.563	30.926	<0.001	0.395	21.282	<0.001
Heart rate at maximal exercise (beats/min)	0.430	14.917	<0.001	0.540	12.786	<0.001
Heart rate at rest (beats/min)	−0.243	−14.234	<0.001	−0.179	−9.466	<0.001
Intensity of conditioning physical activity (METs)†	0.204	73.433	<0.001	0.129	44.745	<0.001
Intake of carbohydrates (g/day)	0.167	1.343	<0.001	0.102	0.905	0.001
Fasting serum insulin (mU/L)	−0.130	−12.597	<0.001	−0.085	−7.083	0.019
CHD (yes vs no)	−0.092	−178.380	0.005	−0.085	−108.839	0.014
Duration of conditioning physical activity (h/wk)	0.087	28.499	0.004	*	*	*
Waist-to-hip ratio	−0.083	−884.061	0.020	−0.121	−1,274.426	0.002
FEV$_1$	*	*	*	0.989	80.495	0.005
Asthma (yes vs no)	−0.062	−248.250	0.037	−0.101	−281.878	0.001
Blood hemoglobin (g/dl)‡	*	*	*	0.099	6.072	0.002
Cardiomyopathy (yes vs no)‡	*	*	*	−0.065	−302.345	0.036

(AJC, 2009;103:1598-)

암 치료 후 체증 증가

⊡ 유방암 진단 후 평균 체중 증가: 5.9kg

유방암 진단 후 신체활동량 11% ↓

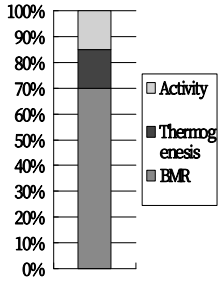


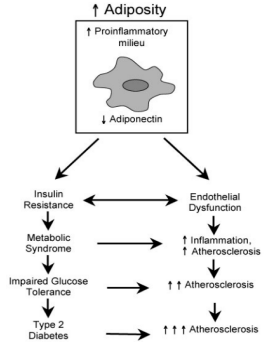
⊙ Adjuvant chemotherapy 이후 체중증가 :
- 유방암 환자에서 Fat CT상 체중증가는 대부분 fat
- 소아암 : total body fat은 증가, lean body mass는 감소

Irwin et al. Cancer 2003;97:1746-57

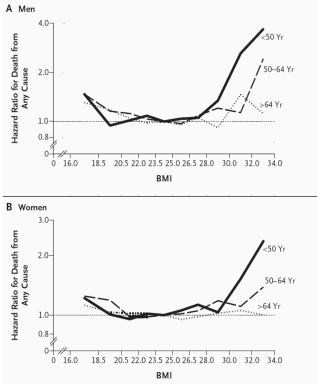
Adiposity ⇧

Energy intake expenditure imbalance





BMI and mortality in Korean men and women



(Jee, NEJM, 2006)

적정 체중 (Kg)

신장 (cm)	정상 (BMI=21 kg/m^2)	과체중 (BMI=23 kg/m^2)	비만 (BMI=25 kg/m^2)	고도비만 (BMI=30kg/m^2)
150	47	52	56	67
155	50	55	60	72
160	54	59	64	77
165	57	63	68	82
170	61	66	72	87
175	64	70	77	92
180	68	75	81	97
185	72	79	86	103

식사횟수와 복부비만과의 관계

(data from 2005 KNHANES III)

	Total (n=4434) OR (95%CI)	P-value	20-45 years (n=2203) OR (95%CI)	P-value	≥46 years (n=2231) OR (95%CI)	p-value
Eating Frequency		0.046		0.768		0.017
≥4	1		1		1	
3	1.09 (0.95-1.25)		1.08 (0.87-1.35)		1.14 (0.95-1.37)	
1-2	1.34 (1.06-1.70)		1.09 (0.77-1.55)		1.64 (1.16-2.31)	
Snack Frequency		0.499		0.878		0.371
≥2	1		1		1	
1	1.02 (1.85-1.22)		0.94 (0.73-1.22)		1.03 (0.80-1.34)	
0	1.10 (0.91-1.31)		0.99 (0.74-1.31)		1.16 (0.90-1.50)	
Regular Meal		0.011		0.037		0.130
3	1		1		1	
2	1.16 (0.98-1.37)		1.13 (0.68-1.22)		1.20 (0.94-1.54)	
1	1.81 (1.17-2.79)		2.00 (1.27-4.24)		1.90 (0.84-4.32)	

after adjusting for age, sex, physical activity, total calorie intake, smoking and alcohol consumption

Appropriate protein intake

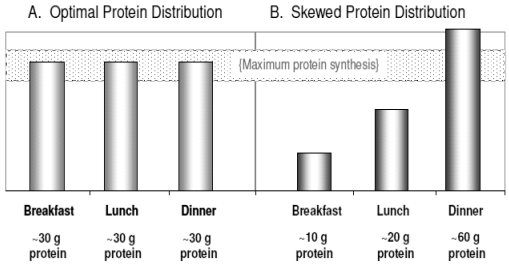
- **Breast cancer (Holmes MD, 1999) Survival advantage of diet factors**
  - Cohort, N=1982, 18yr, NHS, 유방암 진단 후 FFQ를 사용한 영양평가
  - No association with fat or red meat
  - Inverse association with increasing intake of protein and poultry
    - Lowest (<= 0.1 serving/d) vs. highest (>=0.4 serving /d)
    - without metastasis, 35% lower risk for protein intake, 30% lower risk for poultry intake
    - With metastasis, weaker association
    - Protein from poultry and dairy, fish

Holmes MD et al. Cancer 1;86(5):826-35.

동물성 vs 식물성 단백

동물성		식물성	
식품명	생물가	식품명	생물가
달걀	96	표고버섯	81
우유	88	대두	77
고등어	84	보리	74
대구	83	쌀	73
오징어	83	감자	67
쇠고기	79	땅콩	57
닭고기	79	옥수수	54
돼지고기	75	밀가루	53
새우	75	얼무	53
멸치	74	팥	46
치즈	73	참깨	36

Recommendation for meal distribution in protein intake



Layman DK, Nutrition & Metabolism 2009:1186:1743-

fruits and vegetables

- **↓Lung cancer : 5 servings per day of fruits and vegetables**
  - One food diet 하나의 특정한 야채나 과일을 다량 먹는 것은 주의
- **Breast cancer mortality (Holmes MD, 1999)**
  - **Cohort, N=1982, 18yr, NHS, 유방암 진단 후 FFQ 이용 영양평가**
  - **Vegetable intkae : >= 4.2 serving /d vs. <=2.1 servings /d**
  - **Decreasing mortality, without metastasis**

목차

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- **암완치자를 위한 식사패턴**
- **암완치자를 위한 vitamin/mineral supplements**
- **암완치자 영양치료의 실제**

Cancer mortality according to no vitamin use (referent); multivitamin use; vitamin A, C, or E use; or use of multivitamins and vitamin A, C, or E, by presence of cancer at enrollment, Cancer Prevention Study II, 1982–1989

	No vitamin (referent) (no. of deaths)	Multivitamin				Vitamin A, C, or E				Multivitamin and vitamin A, C, or E			
		No. of deaths	Age-adjusted RR†	Multivariate RR‡	95% CI†	No. of deaths	Age-adjusted RR	Multivariate RR‡	95% CI	No. of deaths	Age-adjusted RR	Multivariate RR	95% CI
All cancers													
Men													
No history of cancer	6,727	1,860	1.05	1.09***	1.03, 1.15	1,451	0.94*	1.01	0.95, 1.07	1,568	0.87***	0.99	0.94, 1.05
History of cancer	1,994	777	1.25***	1.24***	1.14, 1.35	501	0.96	1.03	0.93, 1.13	651	1.06	1.18***	1.08, 1.29
Women													
No history of cancer	4,692	1,641	1.01	1.04	0.98, 1.10	1,204	0.92**	0.96	0.90, 1.02	1,511	0.90***	0.97	0.91, 1.03

Am J Epidemiol 2000;152:149–62.

70/M 폐암
39059954 배 O 남

Inflammation and lung cancer

Inflammation and lung cancer

Inflammation and lung cancer

°

BMR or REE of specific organ

환자 ID: 45424902
이름: 정윤중(남/77세)

Organ	(%)
Liver	27%
Brain	19%
Heart	7%
Kidney	10%
Muscle	18%
Others	19

Gastric emptying time (GET)

위에서 소장으로의 이행시간: 액체 1-2시간, 고체 2-3시간
탄수화물< 단백질< 지방<섬유질 음식의 순
액체, 작은 입자, low calorie meal 이 더 빨리 이동

Acute alcohol intake : delayed GET
Chronic alcohol intake : fasten GET

식품군	총 교환 단위수	아 침	점 심	저 녁
곡류군	8	2 70g x 2교환=140g 잡곡밥 2/3공기 (140g)	3 70g x 3교환=210g 조밥 1공기 (210g)	3 70g x 3교환=210g 흑미밥 1공기 (210g)
어육류군	5	1 연두부 1교환 (150g)	2 스테이크볶음 (쇠고기 1교환, 40g) 오징어초무침 (오징어 1교환, 50g)	2 돈육고추잡채 (돼지고기 1교환, 40g) 동태전 (동태살 1교환, 50g)
채소군	7	2 콩나물국 1교환 (70g) 미역줄기볶음 0.5교환 (35g) 나박김치 0.5교환 (35g)	3 들깨맹이버섯탕/스테이크 볶음/ 오징어초무침에 포함된 채소 1교환 연근조림 1교환 (40g) 청경채나물 1교환 (70g)	2 근대된장국 (근대 1교환, 70g) 마늘쫑볶음 (마늘쫑 1교환, 40g)
지방군	4	1 식용유 1작은스푼 (5g) 미역줄기볶음용	1.5 들깨가루 0.5교환 (4g) 식용유/참기름 1작은스푼 (5g) 연근조림/청경채나물 조리용	1.5 식용유 1.5작은스푼 (7.5g) 마늘쫑볶음/동태전 조리용
우유군	2	식사사간 사이 간식으로 드세요 우유 1교환 (1컵, 200cc) 두유 1교환 (1컵, 200cc)		
과일군	2	식사사간 사이 간식으로 드세요 사과 1교환 (1/3개, 80g) 딸기 1교환 (150g)		

암완치자의 식사

1. 식사 규칙적으로, 제 때하기
2. 음식 섭취 횟수: 5회 이상하기
3. 적절한 체중 유지
4. 지나친 소식 피하기
5. 대영양소 구성을 이상적으로: 단백질 섭취를 제대로
6. 과일 및 채소 적절히, 짜고 맵고 자극적인 음식 피하기
7. 절주
8. 항산화 영양제는 가급적 사용하지 않기
   꼭 필요하다면 하루 필요량 정도로