Salt in Hypertension
Dietary Approaches to Stop Hypertension

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목 차

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Background

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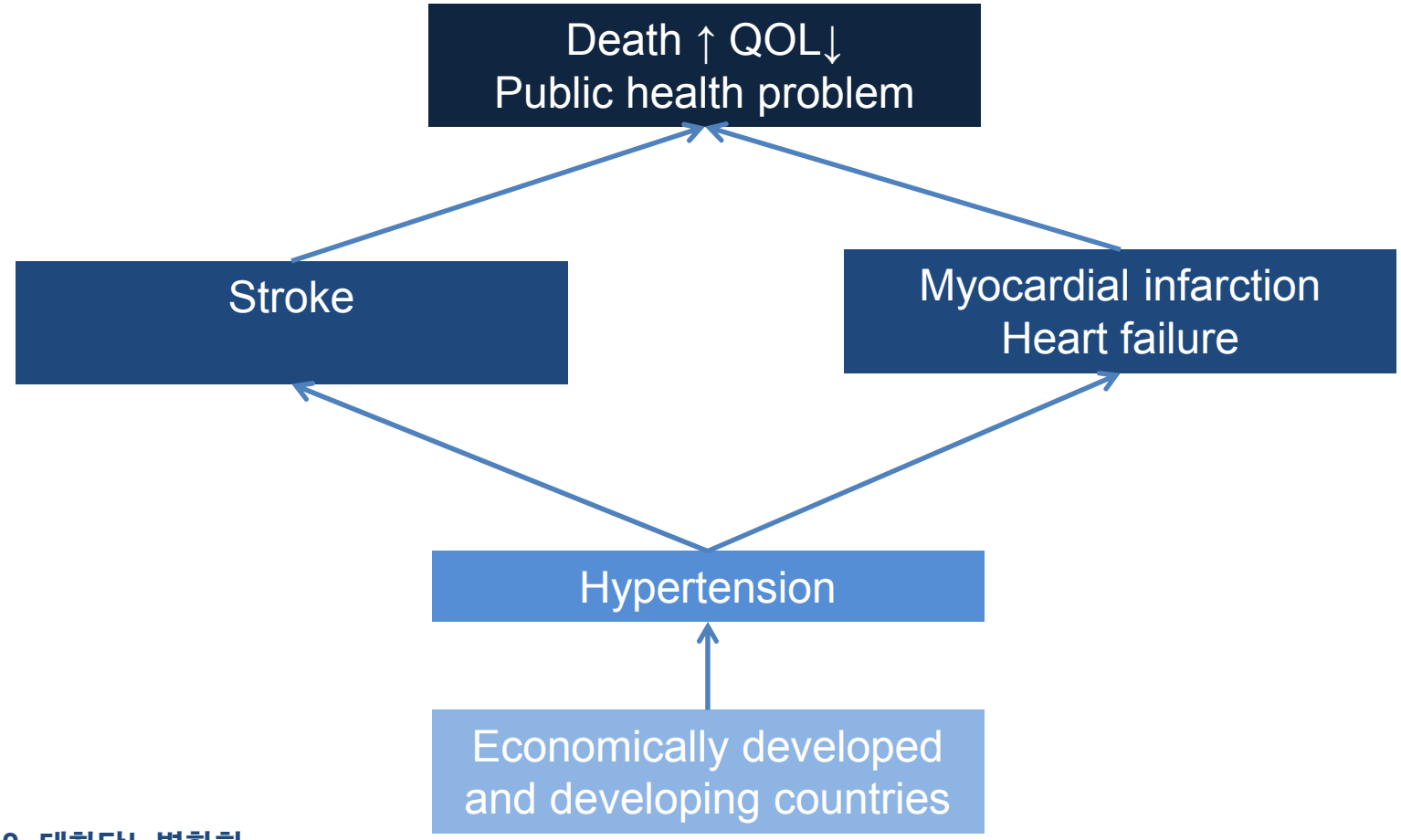
Body weight, dietary salt, and alcohol intake are known to be associated with high blood pressure



Dietary Approaches to Stop Hypertension

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Overview of Studies in Nutritional Epidemiology

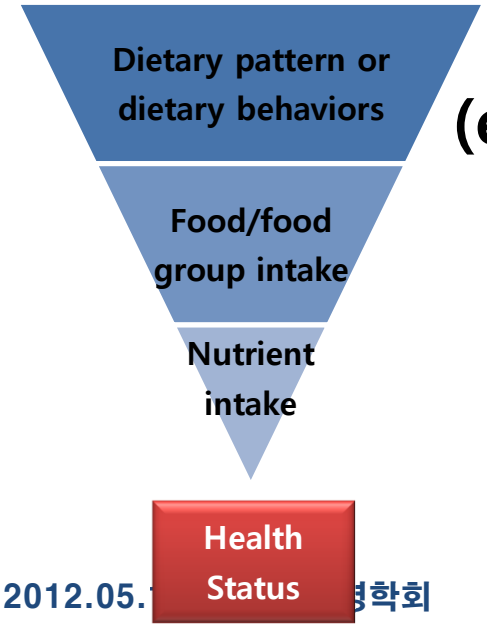
Focusing between single nutrient and disease
(ex: Na & Hypertension, Calcium & Osteoporosis)

↓

Focusing between single food/ food group and disease
(ex: Meat & Colon cancer, Wine & CVD)

↓

Focusing between dietary index / dietary pattern and disease



Nutritional Overview of Studies in Hypertension

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Focusing between single nutrient and Hypertension

(Na, K, Mg, Ca, dietary fiber, protein)

↓

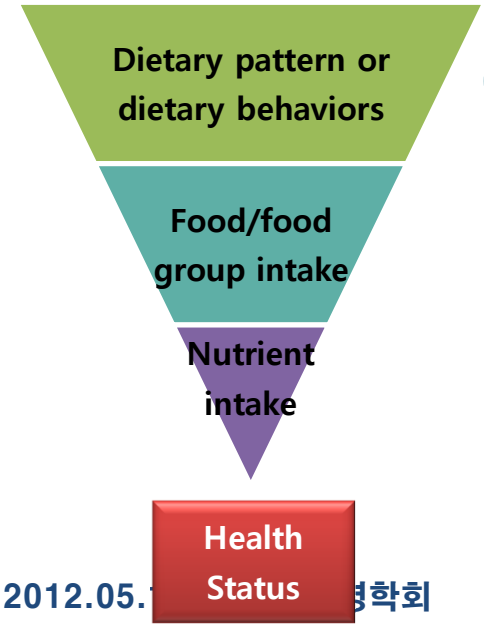
Focusing between single food/ food group and Hypertension

(Vegetable, Fruit, dairy product, Alcohol)

↓

Focusing between dietary index / dietary pattern and Hypertension

(Vegetarian diet)



Rationale for studying dietary patterns

1) The blood pressure-lowering effects of **single nutrients** may be **too small to detect** in small-scale clinical trials
2) **When several nutrients**, such as certain minerals and fiber, are **consumed together** as in observational studies and trials of vegetarian diets, **their addictive effect** may by sufficiently large to be detectable
3) **Interactions** could **exist** among nutrients to amplify the effect of combinations
4) **Untested or unknown nutrients** in plant foods may lower blood pressure
5) **Nutrient supplements** may **not affect blood pressure** to the same extent as do the same nutrients occurring naturally in foods

Dietary Approaches to Stop Hypertension (DASH) trial

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Inclusion Criteria
- Age ≥22 y
- Systolic blood pressure <160 mm Hg
- Diastolic blood pressure 80-95 mm Hg
- Body mass index ≤35

Exclusion Criteria
- Using blood pressure medications (unless granted physician's permission to withdraw)
- Poorly controlled diabetes mellitus
- Hyperlipidemia
- Cardiac event within last 6 months
- Chronic disease that might interfere with participation or with the effect of the diet
- Pregnancy/lactation
- Unwilling to stop use of vitamins, minerals, or antacids containing magnesium, calcium
- Renal insufficiency
- >14 alcoholic drinks/week

FIG 1. Target number of servings per day for the Dietary Approaches to Stop Hypertension 2,100-kcal diet.

Multicenter randomized controlled feeding trial

FIG 2. Inclusion and exclusion criteria for Dietary Approaches to Stop Hypertension run-in and intervention periods. Body mass index is measured as kg/m².

J Am Diet Assoc 1999;99(suppl):S12-S18

Dietary Approaches to Stop Hypertension (DASH) trial

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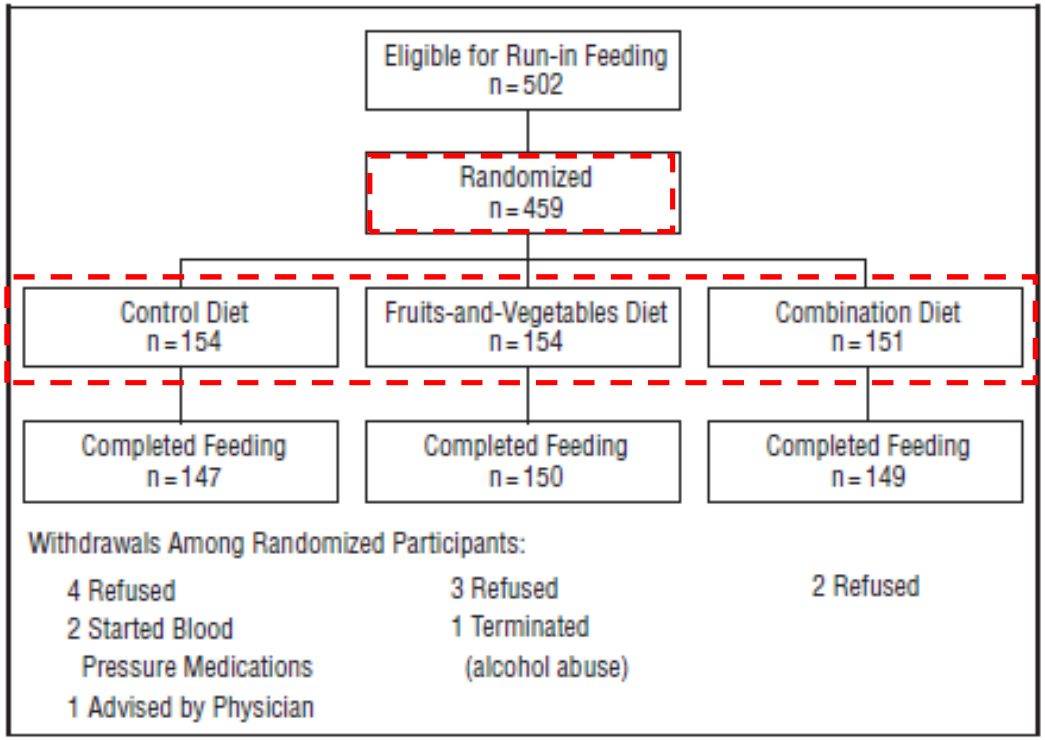

Figure 1. *Progress of participants through the trial.*

- **Control diet**

: 미국의 전형적인 영양소 섭취 반영
다량영양소, 섬유소 함량은 평균 섭취
K, Mg, Ca 미국인 섭취량의 25%tile

- **Fruits and Vegetables diet**

: 다량영양소 구성은 control diet와 비슷함
과일, 채소, 섬유소 함량 ↑, 당류, 가당음료 ↓
K, Mg 미국인 섭취량의 75%tile

- **Combination diet**

: 다량영양소 구성에서 protein 약간 높음
섬유소 ↑, 포화지방, 총지방, 콜레스테롤 ↓
과일, 채소, 저지방 유제품 ↑,
전곡류, 가금류, 생선 견과류 포함
지방, 붉은색육류, 당류, 가당음료 ↓
K, Mg, Ca 미국인 섭취량의 75%tile

Arch Intern Med 1999;159:285-293

Dietary Approaches to Stop Hypertension (DASH) trial

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TABLE 1
Calculated nutrient content and food group servings of menus[1]

	Control diet	DASH diet	FV diet
Nutrient content (/d)[2]			
Protein (% of energy)	14	18	15
Total fat (% of energy)	37	27	37
Saturated	14	7	13
Monounsaturated	13	10	14
Polyunsaturated	7	8	7
Cholesterol (mg)	246	141	188
Carbohydrate (% of energy)	50	58	52
Fiber (g)	10.8	29.7	29.9
Soluble	3.7	9.4	8.5
Insoluble	6.7	20.0	21.3
Sucrose (g)	54.0	35.6	33.6
Keys score[3]	45.3	22.5	40.9
Potassium (mg)	1454	4589	4434
Calcium (mg)	379	1220	468
Magnesium (mg)	140	465	416
Food groups (servings/d)[4]			
Fruit and fruit juices	1.6	5.2	5.2
Vegetables	2.0	4.4	3.3
Grains			
Total	8.2	7.5	6.9
Whole	0	4.1	3.8
Low-fat dairy	0.1	2.0	0
Regular-fat dairy	0.4	0.7	0.3
Nuts, seeds, and legumes	0	0.7	0.6
Beef, pork, and ham	1.5	0.5	1.8
Poultry and fish	1.0	1.1	0.7
Fat, oils, and salad dressing	5.8	2.5	5.3
Snack foods and sweets	4.1	0.7	1.4

Am J clin nutr 2001;74:80-9

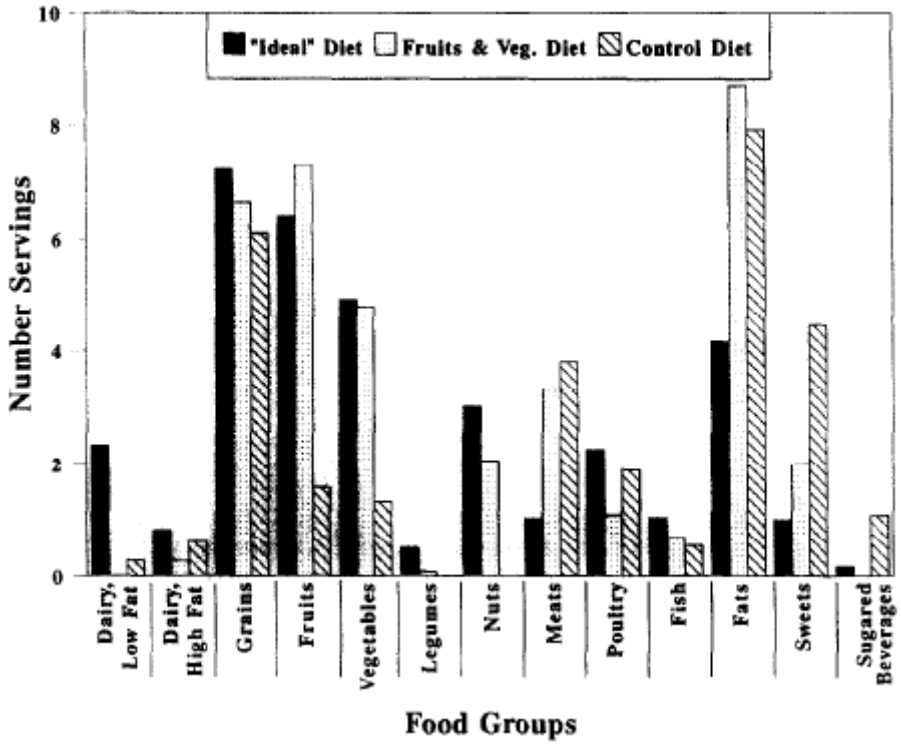

FIGURE 2. Composition of the DASH diets expressed as food groups (numbers of servings/d).

Ann Epidemiol 1995;5:108-118

Dietary Approaches to Stop Hypertension (DASH) trial

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Table 3
Comparisons of mean changes in blood pressure between diets in all participants and in subgroups defined by sex, minority status, and hypertensive status[a]

Category[b]	Change in combination group minus change in control group			Change in combination group minus change in fruits and vegetables group			Change in fruits and vegetables group minus change in control group		
	mm Hg	97.5% CI	*P*	mm Hg	97.5% CI	*P*	mm Hg	97.5% CI	*P*
Systolic blood pressure									
All participants (N=459)	−5.5	−7.4 to −3.7	<.001	−2.7	−4.6 to −0.9	.001	−2.8	−4.7 to −0.9	<.001
Men (n=234)	−4.9	−7.3 to −2.5	<.001	−1.6	−4.0 to 0.8	.13	−3.3	−5.6 to −0.9	.002
Women (n=225)	−6.2	−9.2 to −3.3	<.001	−3.9	−6.9 to −1.0	.003	−2.3	−5.3 to 0.7	.08
Minority (n=303)[c]	−6.8	−9.2 to −4.4	<.001	−3.2	−5.6 to −0.8	.003	−3.6	−6.1 to −1.2	.001
Nonminority (n=156)[c]	−3.0	−5.9 to −0.1	.02	−1.9	−4.8 to 1.0	.13	−1.1	−3.9 to 1.7	.38
Nonhypertensive (n=326)[d]	−3.5	−5.3 to −1.6	<.001	−2.7	−4.5 to −0.8	.001	−0.8	−2.7 to 1.1	.33
Hypertensive (n=133)	−11.4	−15.9 to −6.9	<.001	−4.1	−8.6 to 0.3	.04	−7.2	−11.4 to −3.0	<.001
Diastolic blood pressure									
All participants (N=459)	−3.0	−4.3 to −1.6	<.001	−1.9	−3.3 to −0.6	.002	−1.1	−2.4 to 0.3	.07
Men (n=234)	−3.3	−5.1 to −1.5	<.001	−1.3	−3.2 to 0.5	.10	−2.0	−3.7 to −0.2	.01
Women (n=225)	−2.7	−4.8 to −0.7	.003	−2.5	−4.6 to −0.5	.006	−0.2	−2.3 to 1.9	.83
Minority (n=303)[c]	−3.5	−5.2 to −1.8	<.001	−2.1	−3.8 to −0.4	.007	−1.4	−3.2 to 0.3	.07
Nonminority (n=156)[c]	−2.0	−4.2 to 0.2	.04	−1.6	−3.8 to 0.5	.09	−0.4	−2.5 to 1.7	.70
Nonhypertensive (n=326)[d]	−2.1	−3.6 to −0.5	.003	−1.8	−3.4 to −0.3	.009	−0.3	−1.9 to 1.3	.71
Hypertensive (n=133)	−5.5	−8.2 to −2.7	<.001	−2.6	−5.4 to 0.1	.03	−2.8	−5.4 to −0.3	.01

Adapted from Appel et al (6). Copyright 1997, *New England Journal of Medicine*.

[a]Mean values have been adjusted for clinical center. A *P* value of <.025 was considered to indicate statistical significance. CI=confidence interval. Confidence intervals of 97.5% are given because they are consistent with the adjustment for multiple comparisons.

[b]The mean baseline blood pressure was 131.3/84.7 mm Hg for all participants, 129.6/84.8 mm Hg for men, 133.0/84.5 mm Hg for women, 131.5/84.8 mm Hg for members of minority groups, 130.9/84.5 mm Hg for members of nonminority groups, 126.2/83.0 mm Hg for participants without hypertension, and 143.7/88.8 mm Hg for participants with hypertension.

[c]Minority denotes African-Americans and members of other minority groups; nonminority denotes non-Hispanic whites.

[d]Hypertension was defined as a baseline systolic blood pressure ≥140 mm Hg or a diastolic blood pressure ≥90 mm Hg; nonhypertension was defined as a baseline systolic blood pressure of <140 mm Hg and a diastolic blood pressure of <90 mm Hg.

J Am Diet Assoc 1999;99(suppl):S35-S39

Dietary Approaches to Stop Hypertension (DASH) trial

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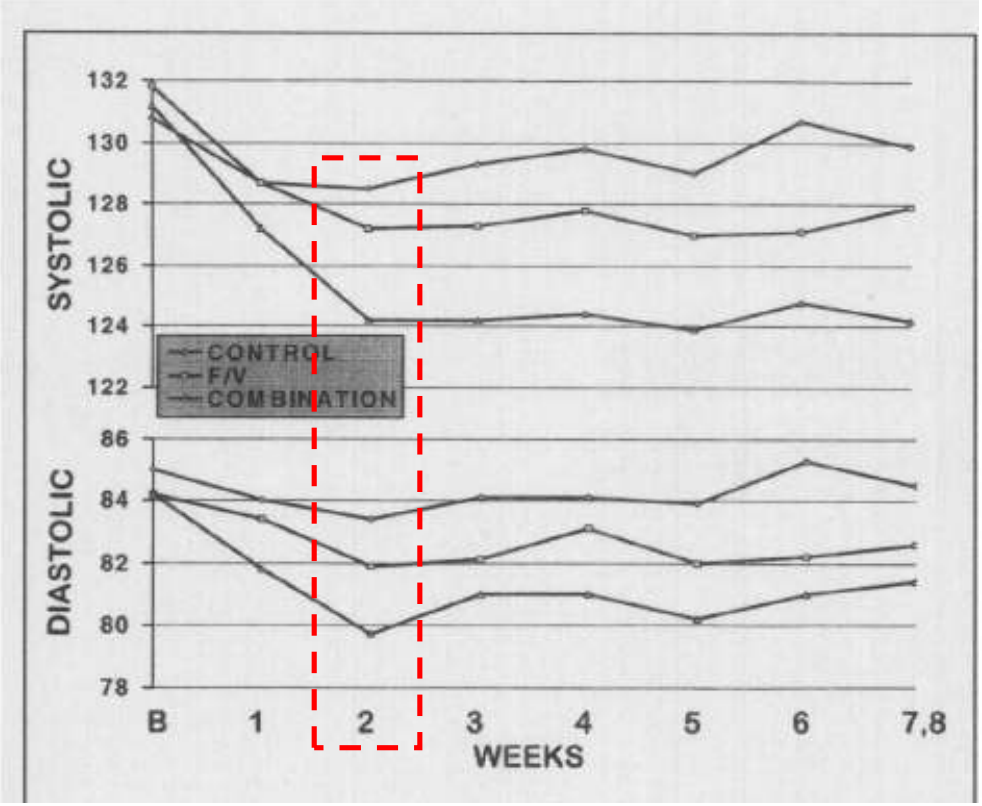

Course of blood pressure change over 8 weeks of feeding intervention on participants randomized to the typical American diet, which was the control condition, the fruits and vegetables diet, or the combination diet. Both intervention diets resulted in significant decreases in blood pressure: 2.8 mm Hg and 1.1 mm Hg for the fruits and vegetables diet for systolic and diastolic blood pressure, respectively. For the combination diet reductions were 5.5 mm Hg and 3.0 mm Hg for systolic and diastolic blood pressure, respectively. All results are net of change in blood pressure in the typical American diet. Note that almost all of the blood pressure decline occurred in the first 2 weeks of feeding. Adapted from Appel et al (6). Copyright 1997, New England Journal of Medicine.

J Am Diet Assoc 1999;99(suppl):S35-S39

Dietary Approaches to Stop Hypertension (DASH) trial

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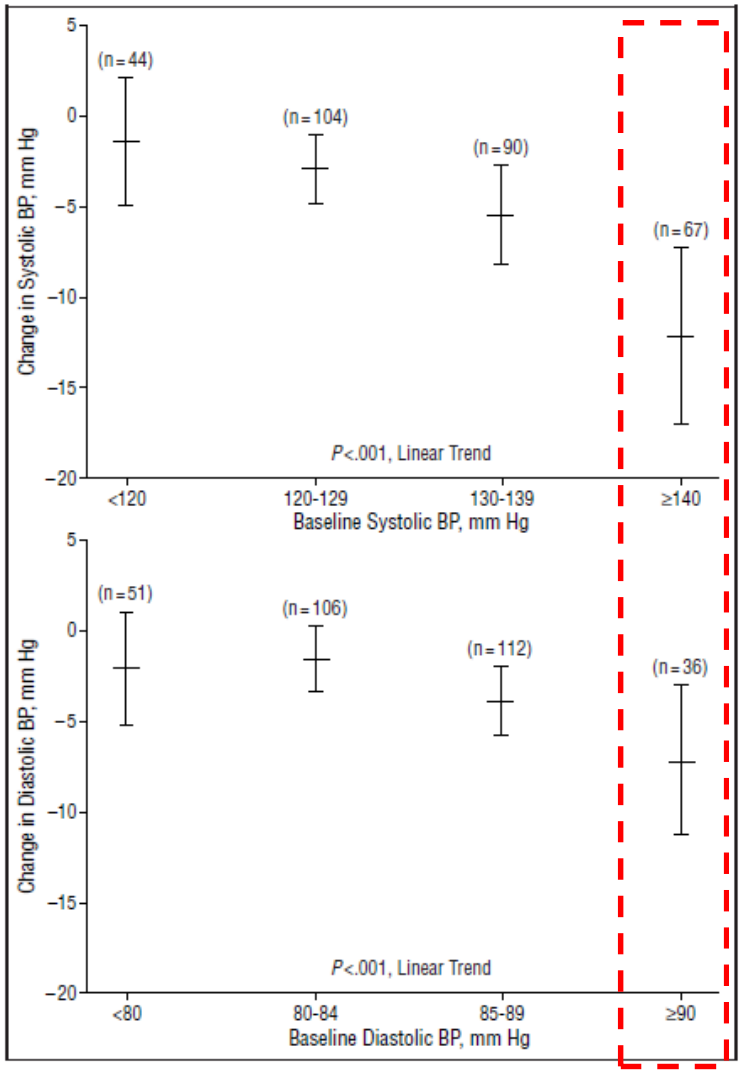

Figure 2. *Change in blood pressure (BP) with the Dietary Approaches to Stop Hypertension (DASH) combination diet (net of control diet) as a function of baseline blood pressure level. Bars indicate 95% confidence intervals.*

Arch Intern Med 1999;159:285-293

Dietary Approaches to Stop Hypertension (DASH) trial

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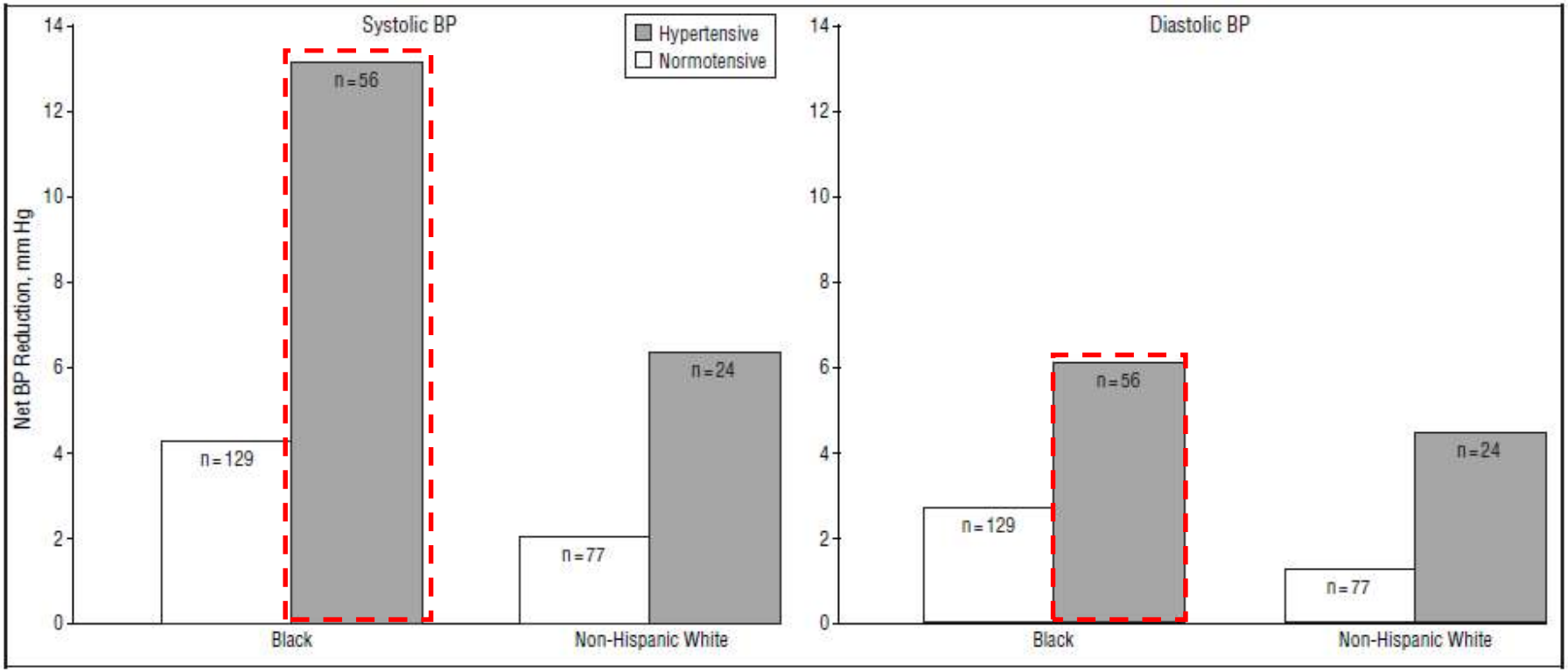

Figure 3. *Joint effect of race and hypertension status on blood pressure (BP) response to Dietary Approaches to Stop Hypertension (DASH) combination diet.*

Arch Intern Med 1999;159:285-293

Dietary Approaches to Stop Hypertension (DASH) trial

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Effects on blood lipids of a blood pressure–lowering diet: the Dietary Approaches to Stop Hypertension (DASH) Trial[1–3]

Eva Obarzanek, Frank M Sacks, William M Vollmer, George A Bray, Edgar R Miller III, Pao-Hwa Lin, Njeri M Karanja, Marlene M Most-Windhauser, Thomas J Moore, Janis F Swain, Connie W Bales, and Michael A Proschan, on behalf of the DASH Research Group

ABSTRACT

Background: Effects of diet on blood lipids are best known in white men, and effects of type of carbohydrate on triacylglycerol concentrations are not well defined.

Objective: Our goal was to determine the effects of diet on plasma lipids, focusing on subgroups by sex, race, and baseline lipid concentrations.

Design: This was a randomized controlled outpatient feeding trial conducted in 4 field centers. The subjects were 436 participants of the Dietary Approaches to Stop Hypertension (DASH) Trial [mean age: 44.6 y; 60% African American; baseline total cholesterol: ≤6.7 mmol/L (≤260 mg/dL)]. The intervention consisted of 8 wk of a control diet, a diet increased in fruit and vegetables, or a diet increased in fruit, vegetables, and low-fat dairy products and reduced in saturated fat, total fat, and cholesterol (DASH diet), during which time subjects remained weight stable. The main outcome measures were fasting total cholesterol, LDL cholesterol, HDL cholesterol, and triacylglycerol.

Results: Relative to the control diet, the DASH diet resulted in lower total (−0.35 mmol/L, or −13.7 mg/dL), LDL- (−0.28 mmol/L, or −10.7 mg/dL), and HDL- (−0.09 mmol/L, or −3.7 mg/dL) cholesterol concentrations (all $P < 0.0001$), without significant effects on triacylglycerol. The net reductions in total and LDL cholesterol in men were greater than those in women by 0.27 mmol/L, or 10.3 mg/dL ($P = 0.052$), and by 0.29 mmol/L, or 11.2 mg/dL ($P < 0.02$), respectively. Changes in lipids did not differ significantly by race or baseline lipid concentrations, except for HDL, which decreased more in participants with higher baseline HDL-cholesterol concentrations than in those with lower baseline HDL-cholesterol concentrations. The fruit and vegetable diet produced few significant lipid changes.

Conclusions: The DASH diet is likely to reduce coronary heart disease risk. The possible opposing effect on coronary heart disease risk of HDL reduction needs further study. *Am J Clin Nutr* 2001;74:80–9.

Am J clin nutr 2001;74:80-9

Dietary Approaches to Stop Hypertension (DASH) trial

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TABLE 4

Lipid concentrations of participants in the Dietary Approaches to Stop Hypertension (DASH) Trial at baseline, by diet group[1]

	Control diet (n = 145)	DASH diet (n = 145)	FV diet (n = 146)
TC			
(mmol/L)	4.95 ± 0.87[2]	4.86 ± 0.88	5.04 ± 0.93
(mg/dL)	191.4 ± 33.8	187.9 ± 33.9	194.8 ± 36.1
LDL			
(mmol/L)	3.15 ± 0.82	3.06 ± 0.78	3.22 ± 0.84
(mg/dL)	121.7 ± 31.6	118.5 ± 30.2	124.4 ± 32.3
HDL			
(mmol/L)	1.25 ± 0.36	1.26 ± 0.40	1.24 ± 0.36
(mg/dL)	48.2 ± 14.0	48.6 ± 15.6	47.9 ± 13.9
TC:HDL	4.26 ± 1.30	4.15 ± 1.23	4.38 ± 1.48
LDL:HDL	2.74 ± 1.03	2.67 ± 1.04	2.85 ± 1.20
Triacylglycerol			
(mmol/L)	1.06 (0.77, 1.48)[3]	1.05 (0.79, 1.35)	1.10 (0.81, 1.56)
(mg/dL)	94 (68, 131)	93 (70, 120)	97.5 (72, 138)

[1] DASH diet, a diet increased in fruit, vegetables, and low-fat dairy products and reduced in saturated fat, total fat, and cholesterol; FV diet, a diet increased in fruit and vegetables. There were no significant differences at baseline between the 3 diet groups (one-way ANOVA). TC, total cholesterol.

[2] $\bar{x}$ ± SD.

[3] Median; 25th and 75th percentiles in parentheses.

Am J clin nutr 2001;74:80-9

Dietary Approaches to Stop Hypertension (DASH) trial

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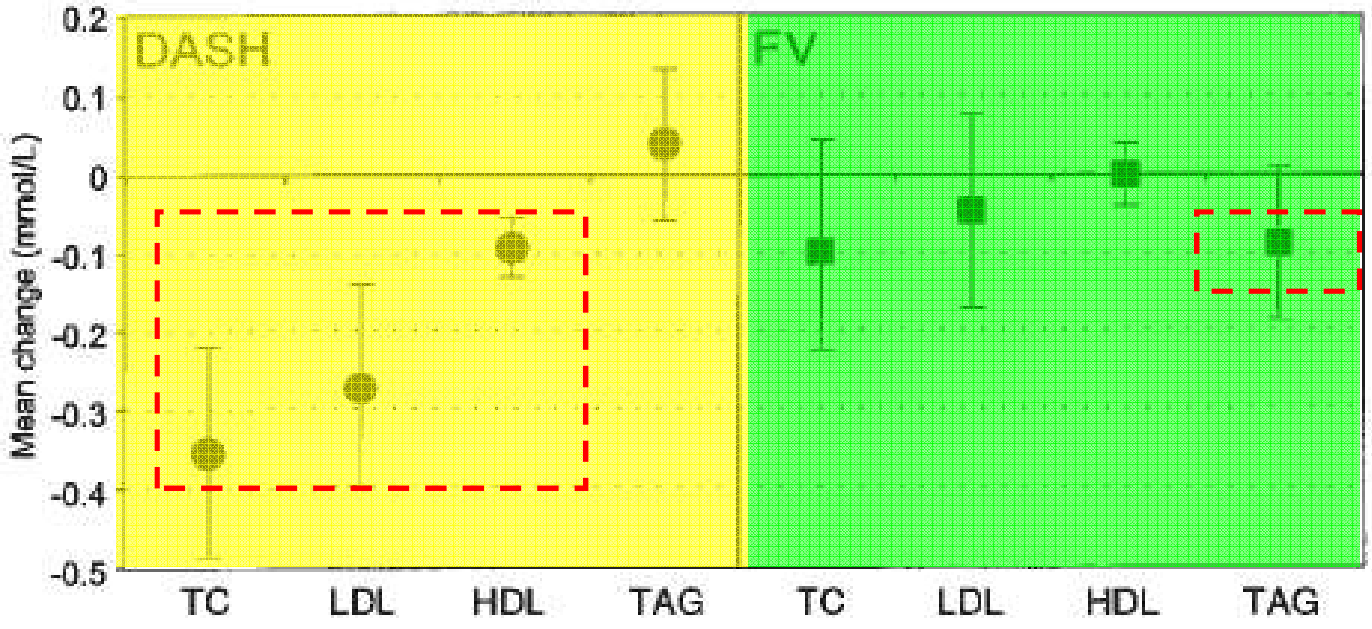

FIGURE 1. Mean change (and 95% CI) in lipids after a diet increased in fruit, vegetables, and low-fat dairy products and reduced in saturated fat, total fat, and cholesterol [DASH (Dietary Approaches to Stop Hypertension) diet] and after a diet increased in fruit and vegetables (FV diet), relative to the control diet. TC, total cholesterol; TAG, triacylglycerol. For the DASH diet, $P < 0.0001$ for TC, LDL cholesterol, and HDL cholesterol. For the FV diet, $P = 0.055$ for TAG.

Am J clin nutr 2001;74:80-9

Dietary Approaches to Stop Hypertension (DASH) trial

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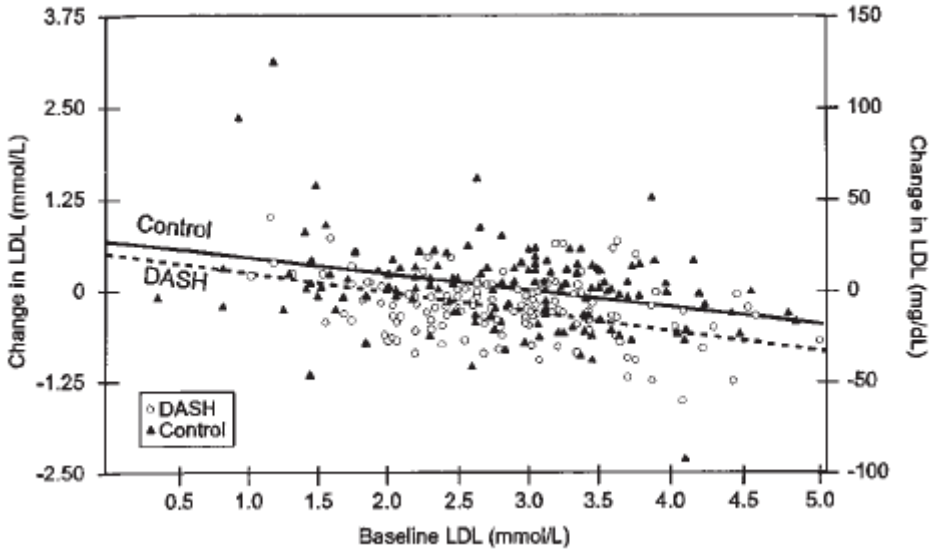

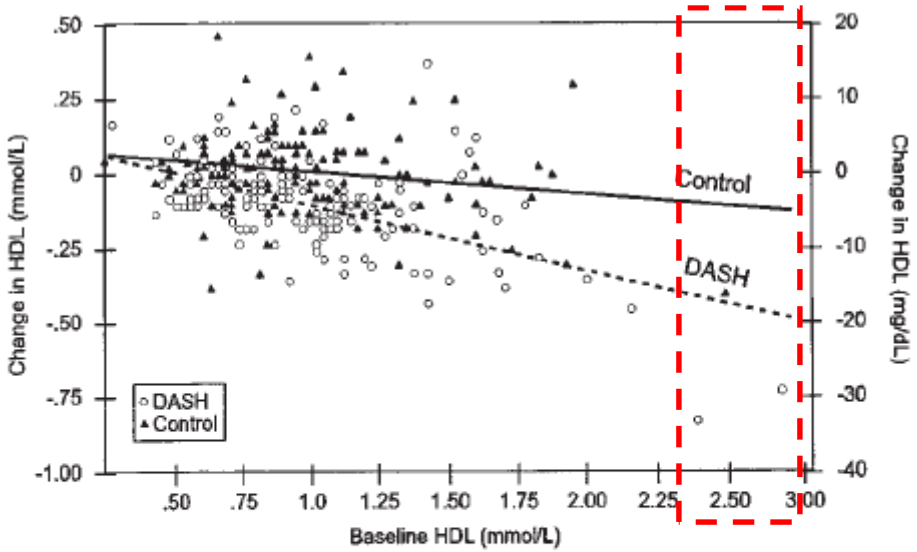

FIGURE 2. Changes in LDL and HDL cholesterol in relation to baseline concentrations for participants consuming a diet increased in fruit, vegetables, and low-fat dairy products and reduced in saturated fat, total fat, and cholesterol [DASH (Dietary Approaches to Stop Hypertension) diet] or a control diet. NS for LDL; $P = 0.02$ for HDL.

Am J clin nutr 2001;74:80-9

Dietary Approaches to Stop Hypertension-Sodium trial

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2012.05.12 대한당뇨병학회

Dietary Approaches to Stop Hypertension (DASH)-Sodium trial

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EFFECTS ON BLOOD PRESSURE OF REDUCED DIETARY SODIUM AND THE DIETARY APPROACHES TO STOP HYPERTENSION (DASH) DIET

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ABSTRACT

Background The effect of dietary composition on blood pressure is a subject of public health importance. We studied the effect of different levels of dietary sodium, in conjunction with the Dietary Approaches to Stop Hypertension (DASH) diet, which is rich in vegetables, fruits, and low-fat dairy products, in persons with and in those without hypertension.

Methods A total of 412 participants were randomly assigned to eat either a control diet typical of intake in the United States or the DASH diet. Within the assigned diet, participants ate foods with high, intermediate, and low levels of sodium for 30 consecutive days each, in random order.

Results Reducing the sodium intake from the high to the intermediate level reduced the systolic blood pressure by 2.1 mm Hg ($P<0.001$) during the control diet and by 1.3 mm Hg ($P=0.03$) during the DASH diet. Reducing the sodium intake from the intermediate to the low level caused additional reductions of 4.6 mm Hg during the control diet ($P<0.001$) and 1.7 mm Hg during the DASH diet ($P<0.01$). The effects of sodium were observed in participants with and in those without hypertension, blacks and those of other races, and women and men. The DASH diet was associated with a significantly lower systolic blood pressure at each sodium level; and the difference was greater with high sodium levels than with low ones. As compared with the control diet with a high sodium level, the DASH diet with a low sodium level led to a mean systolic blood pressure that was 7.1 mm Hg lower in participants without hypertension, and 11.5 mm Hg lower in participants with hypertension.

Conclusions The reduction of sodium intake to levels below the current recommendation of 100 mmol per day and the DASH diet both lower blood pressure substantially, with greater effects in combination than singly. Long-term health benefits will depend on the ability of people to make long-lasting dietary changes and the increased availability of lower-sodium foods. (N Engl J Med 2001;344:3-10.)

Dietary Approaches to Stop Hypertension (DASH)-Sodium trial

TABLE 1. BASE-LINE CHARACTERISTICS OF THE PARTICIPANTS.*

CHARACTERISTIC	DASH DIET (N=208)	CONTROL DIET (N=204)
Age (yr)	47±10	49±10
Female sex (%)	59	54
Race or ethnic group (%)		
Black	57	56
Non-Hispanic white	40	40
Asian or other	3	5
Hypertension (%)†	41	41
Blood pressure (mm Hg)‡		
Systolic	134±10	135±10
Diastolic	86±5	86±4
Body-mass index§	29±5	30±5
Waist circumference (cm)	96±12	100±14
Urinary sodium (mmol/day)¶	158±79	152±72
Educational level (%)		
High-school graduate	12	17
Attended college	41	32
College graduate	45	48
Annual income (%)		
<$30,000	32	34
$30,000–$60,000	33	41
>$60,000	35	25

*Plus–minus values are means ±SD. Because of rounding, not all percentages total 100.

†Hypertension was defined as an average systolic blood pressure of 140 to 159 mm Hg or an average diastolic blood pressure of 90 to 95 mm Hg during the three screening visits.

‡Base-line blood pressure was the average of three screening measurements and two measurements during the run-in period.

§The body-mass index is the weight in kilograms divided by the square of the height in meters.

¶Base-line urinary sodium was determined from a 24-hour urine collection during the screening period, when the participants were eating their customary, self-selected diets. Data were missing for four participants in the DASH-diet group.

N Engl J Med 2001;344:3-10

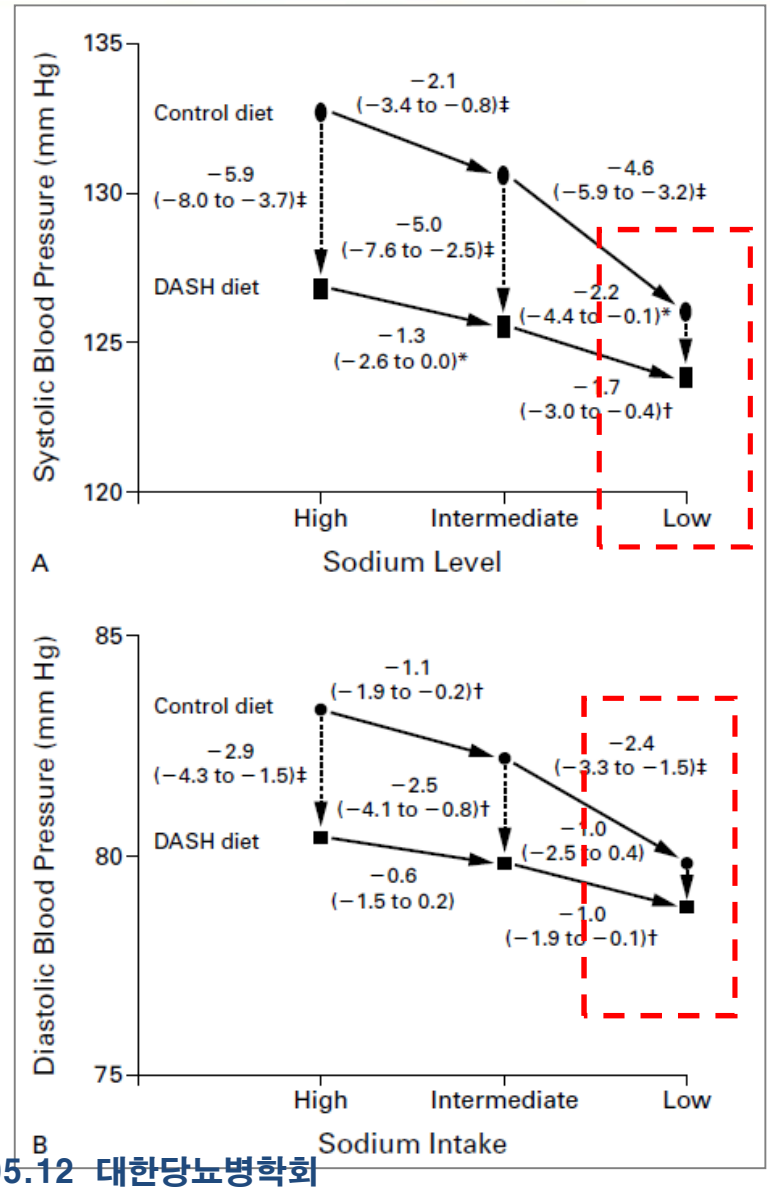
Dietary Approaches to Stop Hypertension (DASH)-Sodium trial

TABLE 2. URINARY EXCRETION AND BODY WEIGHT ACCORDING TO DIETARY SODIUM LEVEL AND ASSIGNED DIET.

VARIABLE	150mmol HIGH SODIUM LEVEL		100mmol INTERMEDIATE SODIUM LEVEL		50mmol LOW SODIUM LEVEL	
	DASH DIET	CONTROL DIET	DASH DIET	CONTROL DIET	DASH DIET	CONTROL DIET
	mean ±SD					
Urinary excretion						
Sodium						
mmol/day	144±58	141±55	107±52	106±44	67±46	64±37
g/day	3.3±1.3	3.3±1.3	2.5±1.2	2.4±1.0	1.5±1.0	1.5±0.8
Potassium						
mmol/day	75±27	40±14	81±31	41±14	81±29	42±14
g/day	2.9±1.1	1.6±0.5	3.2±1.2	1.6±0.5	3.2±1.1	1.6±0.5
Phosphorus (mg/day)	778±285	666±248	825±350	646±264	783±286	672±243
Urea nitrogen (g/day)	11.5±4.0	9.6±3.2	12.4±4.5	9.7±3.4	11.8±4.1	10.0±3.3
Creatinine (g/day)	1.4±0.5	1.5±0.5	1.5±0.6	1.5±0.6	1.4±0.5	1.6±0.6
Weight (kg)	82.3±14.5	85.3±15.6	82.1±14.4	85.1±16.0	82.2±14.5	85.0±15.7

N Engl J Med 2001;344:3-10

Dietary Approaches to Stop Hypertension (DASH)-Sodium trial



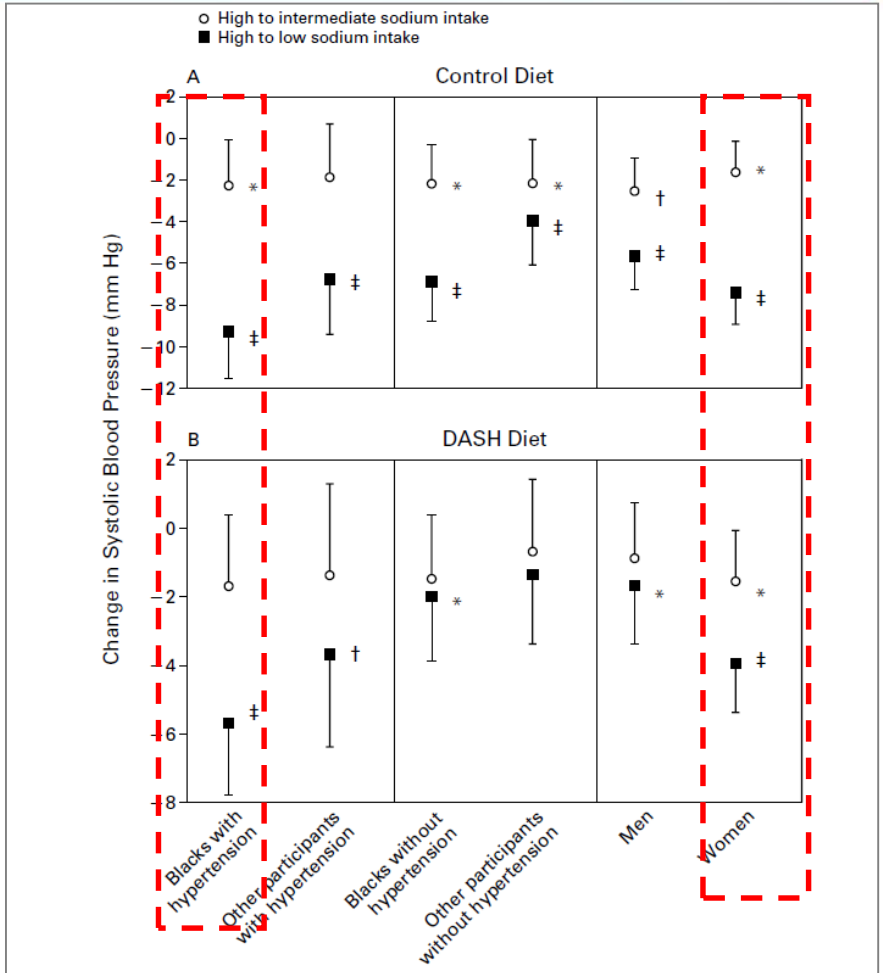


Figure 2. The Effect on Systolic Blood Pressure of Dietary Sodium Intake during the Control Diet (Panel A) and the DASH Diet (Panel B), According to Subgroup.

The error bars represent the 95 percent confidence limits of the changes in blood pressure for each subgroup. Hypertension was defined as an average systolic blood pressure of 140 to 159 mm Hg or an average diastolic blood pressure of 90 to 95 mm Hg during the three screening visits. The "other" category of race and ethnic group is composed primarily of non-Hispanic whites (see Table 1). Asterisks ($P \leq 0.05$), daggers ($P < 0.01$), and double daggers ($P < 0.001$) indicate significant differences between levels of sodium intake.

N Engl J Med 2001;344:3-10

DASH Diet & CHD/CVD Risk

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DASH & CHD/CVD Risk

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The Effect of Dietary Patterns on Estimated Coronary Heart Disease Risk

Results From the Dietary Approaches to Stop Hypertension (DASH) Trial

Steven T. Chen, MD, MPH; Nisa M. Maruthur, MD, MHS; Lawrence J. Appel, MD, MPH

Background—The Dietary Approaches to Stop Hypertension (DASH) diet is recommended in the 2005 US Dietary Guidelines. To understand the potential benefits of DASH on coronary heart disease (CHD), we applied the Framingham risk equations to calculate 10-year risk of developing CHD using data from the DASH trial.

Methods and Results—In the DASH trial, 459 individuals with prehypertension or stage-1 hypertension not taking antihypertensive medication were randomly assigned to 1 of 3 diets: control, fruits and vegetables (F/V), or DASH (rich in fruits, vegetables, low-fat dairy, and reduced in fats and cholesterol). Weight was held constant. Estimated 10-year CHD risk was the primary outcome of this secondary analysis. Among 436 participants with complete data, mean (SD) age was 44.7 (10.7) years, 51% were male, and 60% were African-American. Median 10-year CHD risk was 0.98% at baseline and decreased in all groups. Compared with control, the relative risk ratio comparing 8-week with baseline 10-year CHD risk was 0.93 (95% confidence interval, 0.85 to 1.02; $P=0.12$) for F/V and 0.82 (95% confidence interval, 0.75 to 0.90; $P<0.001$) for DASH. Comparing DASH with F/V, the relative risk ratio was 0.89 (95% confidence interval, 0.81 to 0.97; $P=0.012$). With the exception of an interaction between dietary pattern and race suggesting a greater risk reduction in blacks than whites (P for interaction=0.038), results were similar across subgroups.

Conclusions—Compared with control and F/V, the DASH diet reduced estimated 10-year CHD risk by 18% and 11%, respectively. In addition to reducing blood pressure, the DASH diet should substantially reduce the risk of CHD.

Clinical Trial Registration—URL: http://clinicaltrials.gov. Unique identifier: NCT00000544.

(Circ Cardiovasc Qual Outcomes. **2010;3:484-489.**)

Circ Cardiovasc Qual Outcomes 2010;3:484-489

DASH & CHD/CVD Risk

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Table 1. Baseline Characteristics of Participants With Complete Data for Secondary Analysis

Characteristic	Control (n=144)	F/V (n=146)	DASH (n=146)	All (n=436)
Age, median (min, max)	45 (24, 75)	45 (21, 70)	44 (24, 73)	45 (21, 75)
Female, n (%)	66 (45.8)	71 (48.6)	75 (51.4)	212 (48.6)
Ethnicity, n (%)				
African American	85 (59.0)	86 (58.9)	89 (61.0)	260 (59.6)
White	53 (36.8)	52 (35.6)	47 (32.2)	152 (34.9)
Other	6 (4.2)	8 (5.5)	10 (6.9)	24 (5.5)
BMI, mean (SD), kg/m^2	27.9 (3.8)	28.1 (4.0)	28.6 (4.0)	28.2 (3.9)
Total cholesterol, mean (SD)	191.4 (33.9)	194.8 (36.1)	187.1 (35.4)	191.1 (35.2)
HDL, mean (SD)	48.1 (14.1)	47.9 (13.9)	48.5 (15.6)	48.2 (14.5)
Current smoking, n (%)	11 (7.6)	21 (14.4)	13 (8.9)	45 (10.3)
SBP, mean (SD), mm Hg	131 (11)	132 (11)	131 (10)	131 (11)
DBP, mean (SD), mm Hg	85 (5)	85 (5)	85 (4)	85 (5)
Education, n (%)				
High school or less	26 (18.1)	33 (22.6)	18 (12.3)	77 (17.7)
Some college	85 (59.0)	77 (52.7)	101 (69.2)	263 (60.3)
Some graduate school	33 (22.9)	36 (24.7)	27 (18.5)	96 (22.0)
Income, n (%)				
<$30 000	89 (61.8)	81 (55.5)	93 (63.7)	263 (61.3)
$30 000 to $59 999	46 (31.9)	53 (36.3)	46 (31.5)	145 (33.3)
≥$60 000	7 (4.9)	9 (6.2)	7 (4.8)	23 (5.3)
Unknown	2 (1.4)	3 (2.1)	0 (0.0)	5 (1.2)
Postmenopausal estrogen use, n (%)*	10 (15.2)	10 (14.1)	10 (13.3)	30 (14.2)

*Percentages are calculated from number of women in each group.

Circ Cardiovasc Qual Outcomes 2010;3:484-489

DASH & CHD/CVD Risk

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Table 2. CVD Risk Factors [Mean (SD) Baseline, 8-Week, and Change] and Between-Diet Differences in Mean Change [Mean Change (95% Confidence Interval)]

	Control (n=144)	F/V (n=146)	DASH (n=146)	DASH Minus Control	DASH Minus FV	FV Minus Control
SBP, mm Hg						
Baseline	131 (11)	132 (11)	131 (10)			
8 Weeks	130 (14)	128 (13)	124 (10)			
Change	−1 (6)	−4 (8)	−7 (8)	−6 (−7, −4)	−3 (−5, −1)	−3 (−4, −1)
DBP, mm Hg						
Baseline	85 (5)	85 (5)	85 (4)			
8 Weeks	85 (7)	83 (8)	81 (6)			
Change	−1 (5)	−2 (6)	−4 (5)	−3 (−4, −2)	−2 (−3, 0)	−1 (−2, 0)
Total cholesterol, mg/dL						
Baseline	191.4 (33.9)	194.8 (36.1)	187.1 (35.4)			
8 Weeks	194.9 (33.9)	194.7 (36.2)	177.6 (31.2)			
Change	3.49 (25.3)	−0.18 (23.1)	−9.49 (22.1)	−12.98 (−18.48, −7.48)	−9.31 (−14.52, −4.10)	−3.67 (−9.28, 1.94)
Total LDL, mg/dL						
Baseline	121.6 (31.7)	124.4 (32.3)	117.8 (31.3)			
8 Weeks	124.3 (32.6)	125.2 (32.5)	110.5 (28.7)			
Change	2.66 (23.3)	0.77 (20.4)	−7.33 (20.4)	−9.99 (−15.06, −4.92)	−8.10 (−12.81, −3.39)	−1.89 (−6.96, 3.19)
Total HDL, mg/dL						
Baseline	48.1 (14.1)	47.9 (13.9)	48.5 (15.6)			
8 Weeks	48.3 (13.9)	47.9 (13.2)	45.9 (13.2)			
Change	0.17 (5.3)	0.034 (6.7)	−3.51 (6.5)	−3.68 (−5.05, −2.31)	−3.54 (−5.07, −2.02)	−0.13 (−1.52, 1.26)
Triglycerides						
Baseline	108.4 (55.7)	112.4 (60.1)	103.3 (48.7)			
8 Weeks	111.7 (55.5)	107.3 (54.2)	110.1 (48.3)			
Change	3.3 (35.5)	−5.1 (38.6)	6.8 (35.7)	3.5 (−4.73, 11.72)	11.9 (3.32, 20.46)	−8.4 (−16.96, 0.17)

Circ Cardiovasc Qual Outcomes 2010;3:484-489

DASH & CHD/CVD Risk

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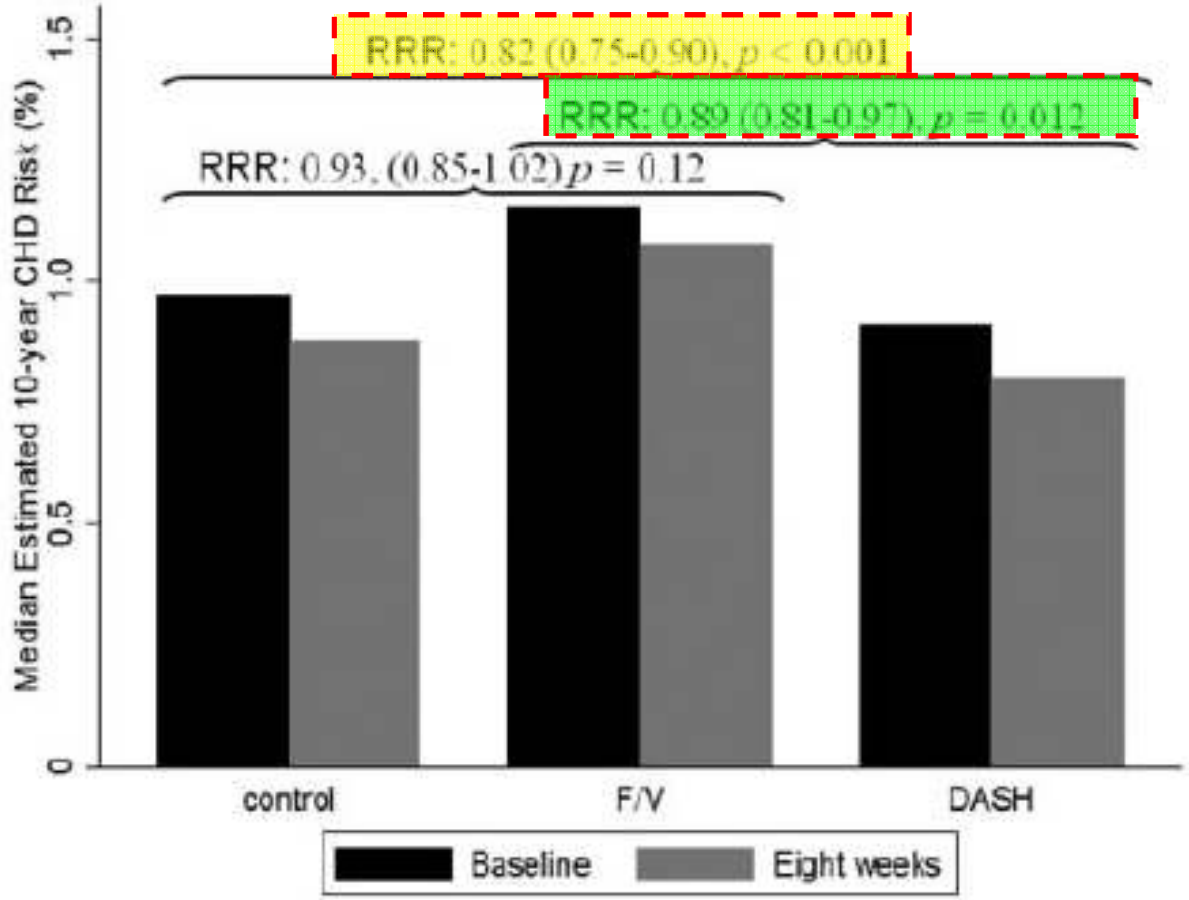

Figure 2. Ten-year probability of CHD event by randomized group.

Circ Cardiovasc Qual Outcomes 2010;3:484-489

DASH & CHD/CVD Risk

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Table 3. Change in Estimated 10-Year CHD Risk in the DASH Trial by Subgroups

		Relative Risk Ratios (95% Confidence Interval)						
	Baseline CHD Risk*	F/V Versus Control	*P* Value	DASH Versus Control	*P* Value	DASH Versus F/V	*P* Value	*P* Value for Interaction
All, n=436	2.94/0.98	0.93 (0.85–1.02)	0.120	0.82 (0.75–0.90)	<0.001	0.89 (0.81–0.97)	0.012	…
Men, n=224	4.72/2.40	0.88 (0.78–1.01)	0.061	0.81 (0.71–0.93)	0.002	0.92 (0.81–1.05)	0.226	0.52
Women, n=212	1.05/0.52	0.98 (0.86–1.13)	0.801	0.84 (0.73–0.96)	0.012	0.85 (0.75–0.98)	0.020	
CHD risk† ≥10%, n=41	14.2/13.36	0.93 (0.69–1.25)	0.633	0.88 (0.64–1.21)	0.436	0.95 (0.69–1.30)	0.736	0.89
CHD risk† <10%, n=395	1.77/0.84	0.93 (0.84–1.02)	0.140	0.82 (0.74–0.90)	<0.001	0.88 (0.80–0.97)	0.012	
HTN,† n=126	4.02/1.47	0.89 (0.76–1.06)	0.195	0.79 (0.66–0.95)	0.011	0.88 (0.74–1.06)	0.175	0.84
No HTN,† n=310	2.50/0.84	0.95 (0.84–1.06)	0.326	0.83 (0.75–0.93)	0.001	0.88 (0.79–0.98)	0.024	
TC† ≥5.18 mmol/L, n=167	4.14/1.79	0.92 (0.80–1.05)	0.228	0.96 (0.81–1.13)	0.599	1.04 (0.88–1.23)	0.638	0.20
TC† <5.18 mmol/L, n=269	2.20/0.58	0.94 (0.83–1.07)	0.332	0.82 (0.73–0.92)	0.001	0.88 (0.78–0.98)	0.024	
Black, n=260	2.35/0.69	0.97 (0.86–1.10)	0.615	0.78 (0.69–0.88)	<0.001	0.80 (0.71–0.91)	<0.001	0.038
Caucasian, n=152	3.99/1.89	0.88 (0.75–1.03)	0.106	0.92 (0.78–1.08)	0.296	1.04 (0.89–1.22)	0.598	
Age† ≥60 y, n=42	10.1/10.2	0.88 (0.67–1.17)	0.381	0.88 (0.63–1.23)	0.454	1.00 (0.72–1.39)	0.993	0.77
Age† <60 y, n=394	2.17/0.84	0.93 (0.85–1.03)	0.182	0.82 (0.74–0.91)	<0.001	0.88 (0.80–0.97)	0.010	

*Mean/median baseline CHD risk expressed as the 10-year probability (%) who would have a CHD event.
†Based on baseline data.

DASH & CHD/CVD Risk

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Effects of the Dietary Approaches to Stop Hypertension (DASH) Eating Plan on Cardiovascular Risks Among Type 2 Diabetic Patients

A randomized crossover clinical trial

OBJECTIVE — To determine the effects of the Dietary Approaches to Stop Hypertension (DASH) eating pattern on cardiometabolic risks in type 2 diabetic patients.

RESEARCH DESIGN AND METHODS — A randomized crossover clinical trial was undertaken in 31 type 2 diabetic patients. For 8 weeks, participants were randomly assigned to a control diet or the DASH eating pattern.

RESULTS — After following the DASH eating pattern, body weight ($P = 0.007$) and waist circumference ($P = 0.002$) reduced significantly. Fasting blood glucose levels and A1C decreased after adoption of the DASH diet (-29.4 ± 6.3 mg/dl; $P = 0.04$ and $-1.7 \pm 0.1\%$; $P = 0.04$, respectively). After the DASH diet, the mean change for HDL cholesterol levels was higher (4.3 ± 0.9 mg/dl; $P = 0.001$) and LDL cholesterol was reduced (-17.2 ± 3.5 mg/dl; $P = 0.02$). Additionally, DASH had beneficial effects on systolic (-13.6 ± 3.5 vs. -3.1 ± 2.7 mmHg; $P = 0.02$) and diastolic blood pressure (-9.5 ± 2.6 vs. -0.7 ± 3.3 mmHg; $P = 0.04$).

CONCLUSIONS — Among diabetic patients, the DASH diet had beneficial effects on cardiometabolic risks.

Diabetes Care 34:55–57, 2011

DASH & CHD/CVD Risk

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Table 1—*Means of the cardiometabolic variables among type 2 diabetic patients after consumption of the DASH or control diet*

	Control diet*	DASH diet†	*P*‡
n	31	31	
Weight (kg)			
Baseline	75.0 ± 1.7	73.4 ± 1.8	0.001
End of trial	72.9 ± 1.8	68.4 ± 1.7	0.001
Change	−2.0 ± 0.3	−5.0 ± 0.9	0.006
Waist circumference (cm)			
Baseline	104.6 ± 1.9	103.4 ± 2.0	0.01
End of trial	102.7 ± 2.0	96.6 ± 1.9	0.001
Change	−1.9 ± 0.4	−6.7 ± 1.2	0.002
SBP (mmHg)			
Baseline	137.4 ± 2.8	134.5 ± 3.8	0.39
End of trial	134.2 ± 3.1	120.8 ± 3.2	0.001
Change	−3.1 ± 2.7	−13.6 ± 3.5	0.02
DBP (mmHg)			
Baseline	81.9 ± 2.2	81.8 ± 1.7	0.95
End of trial	81.2 ± 2.9	72.2 ± 2.7	0.01
Change	−0.7 ± 3.3	−9.5 ± 2.6	0.04
FBG (mg/dl)			
Baseline	171.8 ± 10.9	160.9 ± 10.1	0.73
End of trial	159.0 ± 8.3	131.5 ± 7.3	0.003
Change	−12.8 ± 6.7	−29.4 ± 6.3	0.04
A1C (%)			
Baseline	7.9 ± 1.9	7.7 ± 1.9	0.19
End of trial	7.4 ± 1.7	6.1 ± 0.5	0.05
Change	−0.5 ± 0.02	−1.7 ± 0.1	0.04
TG (mg/dl)			
Baseline	189.7 ± 19.3	170.7 ± 12.4	0.17
End of trial	178.7 ± 18.4	185.1 ± 13.8	0.53
Change	−10.9 ± 6.8	−14.4 ± 10.7	0.79
HDL-C (mg/dl)			
Baseline	41.2 ± 1.0	41.2 ± 1.0	0.97
End of trial	42.5 ± 1.0	45.6 ± 1.1	0.001
Change	1.3 ± 0.7	4.3 ± 0.9	0.001
LDL-C (mg/dl)			
Baseline	114.7 ± 3.5	118.7 ± 3.6	0.23
End of trial	111.9 ± 4.1	101.5 ± 3.1	0.02
Change	−2.7 ± 4.8	−17.2 ± 3.5	0.02
Total cholesterol (mg/dl)			
Baseline	213.3 ± 6.0	214.9 ± 5.7	0.80
End of trial	205.0 ± 6.6	192.7 ± 4.6	0.03
Change	−8.3 ± 6.3	−22.1 ± 5.7	0.11

Data are means ± SE. *The control diet was a designed to control diabetes. The general recommendation for macronutrient composition of the diet was 50–60% carbohydrates; 15–20% protein and <30% total fat. The amount of simple sugar was less than 5% of calorie intake. †The DASH diet was rich in fruits, vegetables, whole grains, and low-fat dairy products, and low in saturated fat, total fat, cholesterol, refined grains, and sweets. The amount of sodium intake was 2,400 mg per day. ‡*P* values are for comparisons between the two diet periods (general linear model). DBP, diastolic blood pressure; FBG, fasting blood glucose; HDL-C, HDL cholesterol; LDL-C, LDL cholesterol; SBP, systolic blood pressure; TG, triglyceride.

DASH Style Diet & T2DM / CHD and Stroke Risk

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DASH Style Diet & T2DM / CHD and Stroke Risk

Adherence to the DASH Diet Is Inversely Associated With Incidence of Type 2 Diabetes: The Insulin Resistance Atherosclerosis Study

OBJECTIVE — The Dietary Approaches to Stop Hypertension (DASH) diet has been widely promoted; however, little is known about its impact on type 2 diabetes.

RESEARCH DESIGN AND METHODS — We evaluated the association of the DASH diet with incidence of type 2 diabetes among 862 participants of the Insulin Resistance Atherosclerosis Study (IRAS) who completed a 1-year food frequency questionnaire at baseline. Type 2 diabetes odds ratios (ORs) were estimated at tertiles of the DASH score.

RESULTS — An inverse association was observed in whites (tertile 2 vs. tertile 1, OR 0.66 [95% CI 0.29–1.48]) that became significant for the most extreme contrast (tertile 3 vs. tertile 1, 0.31 [0.13–0.75]), with adjustment for covariates. No association was observed in blacks or Hispanics (tertile 2 vs. tertile 1, 1.16 [0.61–2.18]; tertile 3 vs. tertile 1, 1.34 [0.70–2.58]).

CONCLUSIONS — Adherence to the DASH dietary pattern, which is rich in vegetables, fruit, and low-fat dairy products, may have the potential to prevent type 2 diabetes.

Diabetes Care 32:1434–1436, 2009

DASH Style Diet &

Table 1—*Food group intake and odds of type 2 diabetes by tertile of DASH dietary pattern score*

	n/N	β (*P*)	Tertiles of the DASH score 1	2	3	*P* for trend
DASH score			38.4 ± 5.3	49.5 ± 2.5	60.2 ± 4.5	
Food group (serving/day)						
Total grains*			2.6 ± 1.5	2.9 ± 1.5	3.3 ± 1.4	
High-fiber grains†			0.5 ± 0.6	0.8 ± 0.7	1.2 ± 0.8	
Vegetables‡			2.5 ± 1.5	3.3 ± 1.8	4.1 ± 1.6	
Fruit§			1.3 ± 1.1	2.3 ± 1.6	3.3 ± 1.6	
Total dairy‖			0.9 ± 0.6	1.0 ± 0.7	1.2 ± 0.8	
Low-fat dairy¶			0.1 ± 0.2	0.2 ± 0.3	0.4 ± 0.4	
Meat, poultry, eggs, fish#			2.0 ± 1.2	1.7 ± 1.0	1.7 ± 0.9	
Nuts, seeds, dried beans**			2.2 ± 2.7	3.0 ± 3.3	3.9 ± 2.9	
Fats and oils††			1.8 ± 1.4	1.6 ± 1.0	1.4 ± 0.9	
Sweets‡‡			11.0 ± 8.6	7.5 ± 6.4	5.6 ± 6.1	
Total population						
Model 1§§	141/864	−0.032 (0.77)	1.00	0.86 (0.54–1.38)	0.73 (0.45–1.21)	0.47
Model 2‖‖	141/862	−0.002 (0.98)	1.00	0.94 (0.58–1.52)	0.78 (0.47–1.29)	0.60
Model 3¶¶	129/822	−0.066 (0.58)	1.00	0.88 (0.51–1.51)	0.64 (0.37–1.13)	0.29
Whites						
Model 1§§	54/347	−0.429 (0.02)	1.00	0.53 (0.24–1.15)	0.25 (0.11–0.61)	<0.01
Model 2‖‖	54/346	−0.349 (0.07)	1.00	0.66 (0.29–1.48)	0.31 (0.13–0.75)	0.03
Model 3¶¶	49/327	−0.414 (0.05)	1.00	0.77 (0.31–1.90)	0.25 (0.09–0.67)	0.02
Blacks/Hispanics						
Model 1§§	87/517	0.176 (0.20)	1.00	1.11 (0.59–2.07)	1.34 (0.70–2.55)	0.67
Model 2‖‖	87/516	0.183 (0.19)	1.00	1.16 (0.61–2.18)	1.34 (0.70–2.58)	0.68
Model 3¶¶	80/495	0.075 (0.63)	1.00	0.90 (0.45–1.80)	0.96 (0.46–1.97)	0.95

Data are means ± SD, OR, and OR (95% CI) unless otherwise indicated. *High-fiber dark bread and cereal, low-fiber bread and cereal, salty snacks, rice, and pasta. †High-fiber dark bread and cereal. ‡Tomato vegetables, cruciferous vegetables, other vegetables, potatoes, and fries. §Fruit and fruit juices. ‖Milk, yogurt, cottage cheese, cheese, and ice cream. ¶Milk and yogurt up to 2% fat. #All meats including processed meats, poultry, eggs, fish, and shellfish. **Nuts, seeds, dried beans, and tofu. ††Fats, oils, salad dressing, gravies, and creamer. ‡‡Sweets including chocolate, regular soft drinks, and pastry. §§Adjusted for age, sex, race/ethnicity/clinic, glucose tolerance status, family history of diabetes, education, smoking status, energy intake, and energy expenditure. ‖‖Adjusted for covariates contained in model 1 plus baseline BMI. ¶¶Adjusted for covariates contained in model 2 plus baseline insulin sensitivity and secretion. β, change per 10-unit increase in the DASH score; *n*, case subjects; *N*, population at risk.

DASH Style Diet & T2DM / CHD and Stroke Risk

Adherence to a DASH-Style Diet and Risk of Coronary Heart Disease and Stroke in Women

Background: The Dietary Approaches to Stop Hypertension (DASH) diet has been shown to lower blood pressure, but little is known about its long-term effect on cardiovascular end points. Our objective was to assess the association between a DASH-style diet adherence score and risk of coronary heart disease (CHD) and stroke in women.

Methods: In this prospective cohort study, diet was assessed 7 times during 24 years of follow-up (1980-2004) with validated food frequency questionnaires. A DASH score based on 8 food and nutrient components (fruits, vegetables, whole grains, nuts and legumes, low-fat dairy, red and processed meats, sweetened beverages, and sodium) was calculated. Lifestyle and medical information was collected biennially with a questionnaire. The Cox proportional hazard model was used to adjust for potential confounders. The study population comprised 88 517 female nurses aged 34 to 59 years without a history of cardiovascular disease or diabetes in 1980. The main outcome measures were the numbers of confirmed incident cases of nonfatal myocardial infarction, CHD death, and stroke.

Results: We documented 2129 cases of incident nonfatal myocardial infarction, 976 CHD deaths, and 3105 cases of stroke. After adjustment for age, smoking, and other cardiovascular risk factors, the relative risks of CHD across quintiles of the DASH score were 1.0, 0.99, 0.86, 0.87, and 0.76 (95% confidence interval, 0.67-0.85) ($P<.001$ for trend). The magnitude of risk difference was similar for nonfatal myocardial infarction and fatal CHD. The DASH score was also significantly associated with lower risk of stroke (multivariate relative risks across quintiles of the DASH score were 1.0, 0.92, 0.91, 0.89, and 0.82) ($P=.002$ for trend). Cross-sectional analysis in a subgroup of women with blood samples showed that the DASH score was significantly associated with lower plasma levels of C-reactive protein ($P=.008$ for trend) and interleukin 6 ($P=.04$ for trend).

Conclusion: Adherence to the DASH-style diet is associated with a lower risk of CHD and stroke among middle-aged women during 24 years of follow-up.

Arch Intern Med. 2008;168(7):713-720

DASH Style Diet & T2DM / CHD and Stroke Risk

Table 1. Scoring Criteria for the DASH-Style Diet and Mean[a] Intake for Q1 (Low Consumption) and Q5 (High Consumption) in the Cohort

Component	Foods	Scoring Criteria	Q1, Servings/d	Q5, Servings/d
Fruits	All fruits and fruit juices	Q1 = 1 point	0.7	4.1
Vegetables	All vegetables except potatoes and legumes	Q2 = 2 points	1.1	4.6
Nuts and legumes	Nuts and peanut butter, dried beans, peas, tofu	Q3 = 3 points	0.3	1.5
Whole grains	Brown rice, dark breads, cooked cereal, whole grain cereal, other grains, popcorn, wheat germ, bran	Q4 = 4 points Q5 = 5 points	0.1	2.4
Low-fat dairy	Skim milk, yogurt, cottage cheese		0.1	2.3
Sodium[b]	Sum of sodium content of all foods in FFQ	Reverse scoring: Q1 = 5 points	1041 mg	2676 mg
Red and processed meats[b]	Beef, pork, lamb, deli meats, organ meats, hot dogs, bacon	Q2 = 4 points Q3 = 3 points	0.4	1.8
Sweetened beverages[b]	Carbonated and noncarbonated sweetened beverages	Q4 = 4 points Q5 = 1 point	0	1.2

Abbreviations: DASH, Dietary Approaches to Stop Hypertension; FFQ, food frequency questionnaire; Q, quintile.
[a] Mean of 5 FFQs.
[b] Higher quintiles represent higher intake; however, in constructing the DASH score, high intake and high quintiles received lower scores.

DASH Style Diet & T2DM / CHD and Stroke Risk

Table 3. Relative Risks of Cumulative DASH Score for CHD

Variable	Relative Risk (95% Confidence Interval) Q1	Q2	Q3	Q4	Q5	*P* Value for Trend
Total CHD (3105 cases)						
No. of cases	686	657	612	599	551	
Crude incidence rate, per 100 000 person-years	165	174	144	153	140	
DASH score (age and energy intake adjusted)	1 [Reference]	0.87 (0.78-0.97)	0.68 (0.61-0.76)	0.66 (0.59-0.73)	0.53 (0.47-0.60)	<.001
DASH score (multivariate adjusted)[a]	1 [Reference]	0.99 (0.89-1.11)	0.86 (0.76-0.96)	0.87 (0.78-0.98)	0.76 (0.67-0.85)	<.001
DASH score (multivariate adjusted)[a] + omega-3 and *trans* fat	1 [Reference]	0.98 (0.88-1.10)	0.84 (0.75-0.94)	0.85 (0.76-0.96)	0.73 (0.64-0.84)	<.001
Nonfatal CHD (2129 cases)	479	437	397	434	382	
Crude incidence rate, per 100 000 person-years	115	116	93	111	97	
DASH score (age and energy intake adjusted)	1 [Reference]	0.84 (0.74-0.96)	0.65 (0.57-0.75)	0.71 (0.62-0.81)	0.56 (0.49-0.64)	<.001
DASH score (multivariate adjusted)[a]	1 [Reference]	0.94 (0.82-1.07)	0.79 (0.69-0.90)	0.91 (0.79-1.04)	0.78 (0.67-0.90)	.002
DASH score (multivariate adjusted)[a] + omega-3 and *trans* fat	1 [Reference]	0.94 (0.82-1.07)	0.79 (0.68-0.90)	0.90 (0.78-1.04)	0.78 (0.66-0.91)	.005
Fatal CHD (976 cases)	207	220	215	165	169	
Crude incidence rate, per 100 000 person-years	50	58	51	42	43	
DASH score (age and energy intake adjusted)	1 [Reference]	0.93 (0.77-1.12)	0.75 (0.62-0.91)	0.55 (0.45-0.67)	0.48 (0.39-0.59)	<.001
DASH score (multivariate adjusted)[a]	1 [Reference]	1.11 (0.92-1.35)	1.02 (0.84-1.24)	0.80 (0.65-0.99)	0.71 (0.58-0.89)	<.001
DASH score (multivariate adjusted)[a] + omega-3 and *trans* fat	1 [Reference]	1.09 (0.90-1.32)	0.98 (0.80-1.20)	0.75 (0.60-0.94)	0.66 (0.52-0.83)	<.001

Abbreviations: CHD, coronary heart disease; DASH, Dietary Approaches to Stop Hypertension; Q, quintile.
[a]Adjusted for age, smoking, body mass index, menopausal status and postmenopausal hormone use, energy intake, multivitamin intake, alcohol intake, family history, physical activity, and aspirin use.

DASH Style Diet & T2DM / CHD and Stroke Risk

Table 4. Relative Risks of Cumulative DASH Score for Stroke

Variable	Relative Risk (95% Confidence Interval) Q1	Q2	Q3	Q4	Q5	*P* Value for Trend
Total stroke						
No. of cases (2317 cases)	486	440	485	459	447	
Crude incidence rate, per 100 000 person, y	119	119	116	120	116	
DASH score (age and energy intake adjusted)	1 [Reference]	0.83 (0.73-0.95)	0.75 (0.66-0.86)	0.70 (0.62-0.80)	0.60 (0.52-0.68)	<.001
DASH score (multivariate adjusted)[a]	1 [Reference]	0.92 (0.81-1.05)	0.91 (0.80-1.03)	0.89 (0.78-1.02)	0.82 (0.71-0.94)	.002
DASH score (multivariate adjusted)[a] + omega-3 and *trans* fat	1 [Reference]	0.93 (0.81-1.06)	0.91 (0.80-1.04)	0.90 (0.79-1.03)	0.83 (0.71-0.96)	.007
Ischemic stroke (1242 cases)						
No. of cases	247	229	263	247	256	
Crude incidence rate, per 100 000 person-years	61	62	63	65	66	
DASH score (age and energy intake adjusted)	1 [Reference]	0.84 (0.70-1.01)	0.78 (0.66-0.93)	0.72 (0.60-0.86)	0.64 (0.53-0.77)	<.001
DASH score (multivariate adjusted)[a]	1 [Reference]	0.92 (0.76-1.10)	0.92 (0.77-1.10)	0.90 (0.74-1.08)	0.89 (0.73-1.07)	.13
DASH score (multivariate adjusted)[a] + omega-3 and *trans* fat	1 [Reference]	0.93 (0.77-1.12)	0.94 (0.78-1.13)	0.92 (0.76-1.12)	0.92 (0.75-1.12)	.30
Hemorrhagic stroke (440 cases)						
No. of cases	90	86	106	83	75	
Crude incidence rate, per 100 000 person-years	22	23	25	22	19	
DASH score (age and energy intake adjusted)	1 [Reference]	0.92 (0.69-1.24)	0.96 (0.73-1.28)	0.77 (0.71-1.05)	0.63 (0.46-0.86)	.004
DASH score (multivariate adjusted)[a]	1 [Reference]	1.04 (0.77-1.40)	1.18 (0.88-1.57)	1.01 (0.74-1.38)	0.86 (0.62-1.18)	.56
DASH score (multivariate adjusted)[a] + omega-3 and *trans* fat	1 [Reference]	1.03 (0.76-1.39)	1.16 (0.86-1.56)	0.99 (0.72-1.36)	0.83 (0.59-1.16)	.45

Abbreviations: DASH, Dietary Approaches to Stop Hypertension; Q, quintile.

[a] Adjusted for age, smoking, body mass index, menopausal status and postmenopausal hormone use, energy intake, multivitamin intake, alcohol intake, family history, physical activity, and aspirin use.

DASH Style Diet & T2DM / CHD and Stroke Risk

Association between Dietary Patterns and Blood Lipid Profiles in Korean Adults with Type 2 Diabetes

We aimed to explore the associations of dietary patterns with blood lipid profiles and obesity in adults with type 2 diabetes. The data were obtained from the Forth Korean National Health and Nutrition Examination Survey, 2007-2008. Adults 30 yr or older, from which had both biochemical and dietary data were obtained. Among them, 680 subjects were defined as having diabetes based on criteria of fasting glucose ≥ 126 mg/dL, anti-diabetic treatment, or previously diagnosed diabetes. Dietary data from a 24-hr recall were used to derive dietary patterns by factor analysis. Four dietary patterns by factor analysis were identified: 'Bread & Meat & Alcohol', 'Noodles & Seafood', 'Rice & Vegetables', and 'Korean Healthy' patterns. Serum cholesterol levels in the highest quartile of the 'Bread & Meat & Alcohol' pattern were significantly higher compared with those in the lowest quartile. In addition, total cholesterol and triglyceride levels in the highest quartile of the 'Korean Healthy' pattern were significantly lower after adjusting for potential confounders. Dietary patterns of adults with diabetes were found to be associated with blood lipid profiles. 'Korean Healthy' pattern including whole grains, legumes, vegetables, and fruits could thus improve lipid profiles among those with type 2 diabetes.

J Korean Med Sci 2011; 26: 1201-1208

DASH Style Diet & T2DM / CHD and Stroke Risk

Table 2. Factor-loading matrix for dietary patterns identified by principal component analysis

Diets	Bread & Meat & Alcohol	Noodles & Seafood	Rice & Vegetables	Korean Healthy
Rice	-	-	0.75	-
Whole grains	-	-	-0.39	0.49
Breads	0.25	-0.44	-	0.29
Noodles	-	0.25	-0.52	-
Potatoes	-	-	-	-
Sugars	0.60	-	-	-
Legumes	-	-	-	0.49
Nuts	-	-	-	0.39
Vegetables	0.37	-	0.34	0.47
Kimchi	-	0.65	-	-
Mushrooms	-	0.29	-	0.28
Fruits	-	-	-	0.42
Meats	0.46	-	-	-
Eggs	0.31	0.32	0.30	-
Fishes	-	0.55	-	-
Seaweed	-	0.32	-	-
Dairy products	-	-	-	-
Oils	0.72	-	-	-
Beverages	0.30	-	-	-
Alcohols	0.35	-	-0.20	-
Seasonings	0.45	0.32	-	0.37
Others	-	-	-	-

Factor loadings more than 0.20 were represented for simplicity.

J Korean Med Sci 2011; 26: 1201-1208

DASH Style Diet & T2DM / CHD and Stroke Risk

Table 5. Body indices and blood profiles of subjects by dietary pattern

Variables	Bread & Meat & Alcohol			Noodles & Seafood			Rice & Vegetables			Korean Healthy		
	Quartile 1	Quartile 4	*P* trend	Quartile 1	Quartile 4	*P* trend	Quartile 1	Quartile 4	*P* trend	Quartile 1	Quartile 4	*P* trend
Body mass index (kg/m^2)	25.2 ± 3.3	25.6 ± 3.5	0.551	25.3 ± 3.1	25.3 ± 3.4	0.406	25.3 ± 3.4	25.4 ± 3.3	0.934	24.9 ± 3.1	25.5 ± 3.1	0.825
Waist circumference (cm)	88.2 ± 8.7	89.4 ± 8.6	0.459	88.4 ± 8.5	88.2 ± 8.7	0.306	88.1 ± 9.0	89.2 ± 8.7	0.862	87.6 ± 8.8	88.7 ± 8.1	0.607
Fasting blood sugar (mg/dL)	148.2 ± 47.9	151.4 ± 46.9	0.655	141.9 ± 46.7	150.3 ± 45.3	0.293	143.7 ± 49.2	146.5 ± 45.8	0.779	142.8 ± 43.9	148.6 ± 53.5	0.971
Hemoglobin A1c (%)	7.5 ± 1.7	7.5 ± 1.7	0.686	7.2 ± 1.5	7.4 ± 1.5	0.555	7.4 ± 1.7	7.4 ± 1.7	0.431	7.3 ± 1.7	7.4 ± 1.8	0.822
Cholesterol (mg/dL)	191.9 ± 42.3	201.8 ± 41.8	0.002	195.1 ± 49.0	194.7 ± 40.6	0.518	198.8 ± 44.8	192.1 ± 41.1	0.784	202.5 ± 44.7	188.4 ± 40.3	0.004
Triglyceride (mg/dL)	175.9 ± 109.9	189.8 ± 125.2	0.804	177.3 ± 128.7	179.9 ± 125.8	0.864	175.2 ± 118.2	166.7 ± 104.6	0.499	188.9 ± 149.0	162.2 ± 89.2	0.030
HDL cholesterol (mg/dL)	42.9 ± 9.4	44.7 ± 10.1	0.001	43.1 ± 9.0	43.9 ± 9.0	0.347	43.6 ± 10.0	43.1 ± 8.9	0.285	44.3 ± 10.0	44.2 ± 8.8	0.674
Systolic blood pressure (mmHg)	126.9 ± 17.4	126.8 ± 17.8	0.181	127.7 ± 17.8	125.6 ± 15.9	0.983	126.6 ± 18.2	125.5 ± 15.8	0.814	126.8 ± 18.6	126.3 ± 17.6	0.495
Diastolic blood pressure (mmHg)	76 ± 10.4	78.8 ± 11.9	0.468	76.2 ± 11.3	78.6 ± 9.8	0.080	78 ± 11.9	76.8 ± 10.2	0.107	76.4 ± 11.3	77.8 ± 10.4	0.840

Mean ± SD; *P* for trend after adjusted for age, gender, education, household income, smoking, physical activity, DM duration, DM treatment, BMI, and energy intake.

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DASH Diet & Dietary Guidelines

SNUH 서울대학교병원 SEOUL NATIONAL UNIVERSITY HOSPITAL

2012.05.12 대한당뇨병학회

DASH Diet & Dietary Guidelines

SEOUL NATIONAL UNIVERSITY HOSPITAL

IN BRIEF:

Your Guide To Lowering Your Blood Pressure With DASH

Following the DASH Eating Plan

Use this chart to help you plan your menus—or take it with you when you go to the store.

Food Group	Servings Per Day			Serving Sizes	Examples and Notes	Significance of Each Food Group to the DASH Eating Plan
	1,600 Calories	2,000 Calories	2,600 Calories			
Grains*	6	6–8	10–11	1 slice bread 1 oz dry cereal† ½ cup cooked rice, pasta, or cereal	Whole wheat bread and rolls, whole wheat pasta, English muffin, pita bread, bagel, cereals, grits, oatmeal, brown rice, unsalted pretzels and popcorn	Major sources of energy and fiber
Vegetables	3–4	4–5	5–6	1 cup raw leafy vegetable ½ cup cut-up raw or cooked vegetable ½ cup vegetable juice	Broccoli, carrots, collards, green beans, green peas, kale, lima beans, potatoes, spinach, squash, sweet potatoes, tomatoes	Rich sources of potassium, magnesium, and fiber
Fruits	4	4–5	5–6	1 medium fruit ¼ cup dried fruit ½ cup fresh, frozen, or canned fruit ½ cup fruit juice	Apples, apricots, bananas, dates, grapes, oranges, grapefruit, grapefruit juice, mangoes, melons, peaches, pineapples, raisins, strawberries, tangerines	Important sources of potassium, magnesium, and fiber
Fat-free or low-fat milk and milk products	2–3	2–3	3	1 cup milk or yogurt 1½ oz cheese	Fat-free (skim) or low-fat (1%) milk or buttermilk; fat-free, low-fat, or reduced-fat cheese; fat-free or low-fat regular or frozen yogurt	Major sources of calcium and protein
Lean meats, poultry, and fish	3–6	6 or less	6	1 oz cooked meats, poultry, or fish 1 egg‡	Select only lean; trim away visible fats; broil, roast, or poach; remove skin from poultry	Rich sources of protein and magnesium
Nuts, seeds, and legumes	3 per week	4–5 per week	1	⅓ cup or 1½ oz nuts 2 Tbsp peanut butter 2 Tbsp or ½ oz seeds ½ cup cooked legumes (dry beans and peas)	Almonds, hazelnuts, mixed nuts, peanuts, walnuts, sunflower seeds, peanut butter, kidney beans, lentils, split peas	Rich sources of energy, magnesium, protein, and fiber
Fats and oils§	2	2–3	3	1 tsp soft margarine 1 tsp vegetable oil 1 Tbsp mayonnaise 2 Tbsp salad dressing	Soft margarine, vegetable oil (such as canola, corn, olive, or safflower), low-fat mayonnaise, light salad dressing	The DASH study had 27 percent of calories as fat, including fat in or added to foods
Sweets and added sugars	0	5 or less per week	≤ 2	1 Tbsp sugar 1 Tbsp jelly or jam ½ cup sorbet, gelatin 1 cup lemonade	Fruit-flavored gelatin, fruit punch, hard candy, jelly, maple syrup, sorbet and ices, sugar	Sweets should be low in fat

DASH Diet & Dietary Guidelines

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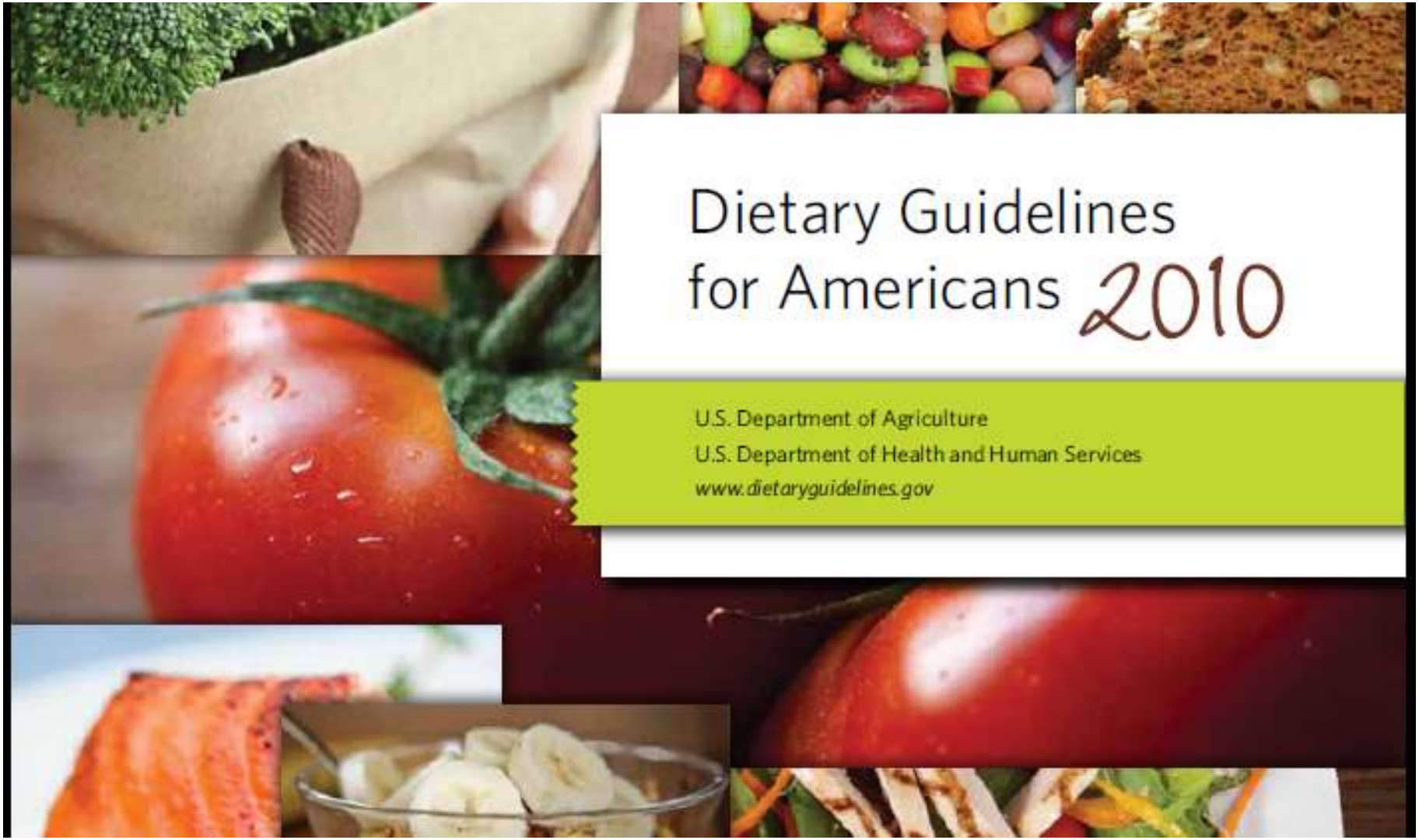


DASH Diet & Dietary Guidelines

A ROADMAP TO THE *DIETARY GUIDELINES FOR AMERICANS, 2010*

Dietary Guidelines for Americans, 2010 consists of six chapters. This first chapter introduces the document and provides information on background and purpose. The next five chapters correspond to major themes that emerged from the 2010 DGAC's review of the evidence, and Chapters 2 through 5 provide recommendations with supporting evidence and explanations. These recommendations are based on a preponderance of the scientific evidence for nutritional factors that are important for promoting health and lowering risk of diet-related chronic disease. Quantitative recommendations always refer to individual intake or amount rather than population average intake, unless otherwise noted.

Although divided into chapters that focus on particular aspects of eating patterns, *Dietary Guidelines for Americans* provides integrated recommendations for health. To get the full benefit, individuals should carry out these recommendations in their entirety as part of an overall healthy eating pattern:

- **Chapter 2: Balancing Calories to Manage Weight** explains the concept of calorie balance, describes some of the environmental factors that have contributed to the current epidemic of overweight and obesity, and discusses diet and physical activity principles that can be used to help Americans achieve calorie balance.
- **Chapter 3: Foods and Food Components to Reduce** focuses on several dietary components that Americans generally consume in excess compared to recommendations. These include sodium, solid fats (major sources of saturated fats and *trans* fats), cholesterol, added sugars, refined grains, and for some Americans, alcohol. The chapter explains that reducing foods and beverages that contain relatively high amounts of these dietary components and replacing them with foods and beverages that provide substantial amounts of nutrients and relatively few calories would improve the health of Americans.
- **Chapter 4: Foods and Nutrients to Increase** focuses on the nutritious foods that are recommended for nutrient adequacy, disease prevention, and overall good health. These include vegetables; fruits; whole grains; fat-free or low-fat milk and milk products;[22] protein foods, including seafood, lean meat and poultry, eggs, beans and peas, soy products, and unsalted nuts and seeds; and oils. Additionally, nutrients of public health concern, including potassium, dietary fiber, calcium, and vitamin D, are discussed.
- **Chapter 5: Building Healthy Eating Patterns** shows how the recommendations and principles described in earlier chapters can be combined into a healthy, overall eating pattern. The USDA Food Patterns and DASH Eating Plan are healthy eating patterns that provide flexible templates allowing all Americans to stay within their calorie limits, meet their nutrient needs, and reduce chronic disease risk.
- **Chapter 6: Helping Americans Make Healthy Choices** discusses two critically important facts. The first is that the current food and physical activity environment is influential in the nutrition and activity choices that people make—for better and for worse. The second is that all elements of society, including individuals and families, communities, business and industry, and various levels of government, have a positive and productive role to play in the movement to make America healthy. The chapter suggests a number of ways that these players can work together to improve the Nation's nutrition and physical activity.

DASH Diet & Dietary Guidelines

SEOUL NATIONAL UNIVERSITY HOSPITAL

There are so many ways to eat **Fruits** & **Vegetables** every day.

Tomatoes, carrots, celery, and onions are key to this whole-grain **Spaghetti and Quick Meat Sauce**, paired with broccoli florets. Finish with warm **Roasted Pears and Vanilla Cream**.

Flavorful herbed green beans and roasted potatoes round out this **Smoky Mustard-Maple Salmon**. For dessert, enjoy a fruit, granola, and yogurt parfait.

Pineapple, carrots, and tomatoes add tang to this **Sweet and Sour Pork**, served with a colorful salad. Finish with nonfat frozen yogurt.

Enjoy the crunchy, juicy goodness of apples and grapes in this **Chicken Waldorf Salad**, served on mixed greens and topped with low-fat dressing. End your meal with **Blueberry-Lime Yogurt**.

Find these recipes and more ideas at Choose**MyPlate**.gov

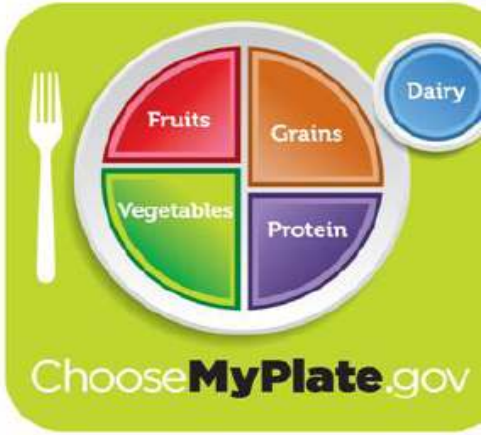
USDA

Getting Started with MyPlate

ChooseMyPlate.gov

MyPlate Icon

- MyPlate is part of a larger communications initiative based on *2010 Dietary Guidelines for Americans* to help consumers make better food choices.
- MyPlate is designed to *remind* Americans to eat healthfully; it is not intended to change consumer behavior alone.
- MyPlate illustrates the five food groups using a familiar mealtime visual, a place setting.



ChooseMyPlate.gov

- The website features practical information and tips to help Americans build healthier diets.
- It features selected messages to help consumer focus on key behaviors. Selected messages include:
  - **Balancing Calories**
    - Enjoy your food, but eat less.
    - Avoid oversized portions.
  - **Foods to Increase**
    - Make half your plate fruits and vegetables.
    - Make at least half your grains whole grains.
    - Switch to fat-free or low-fat (1%) milk.

  - **Foods to Reduce**
    - Compare sodium in foods like soup, bread, and frozen meals—and choose foods with lower numbers.
    - Drink water instead of sugary drinks.

DASH Diet & Dietary Guidelines

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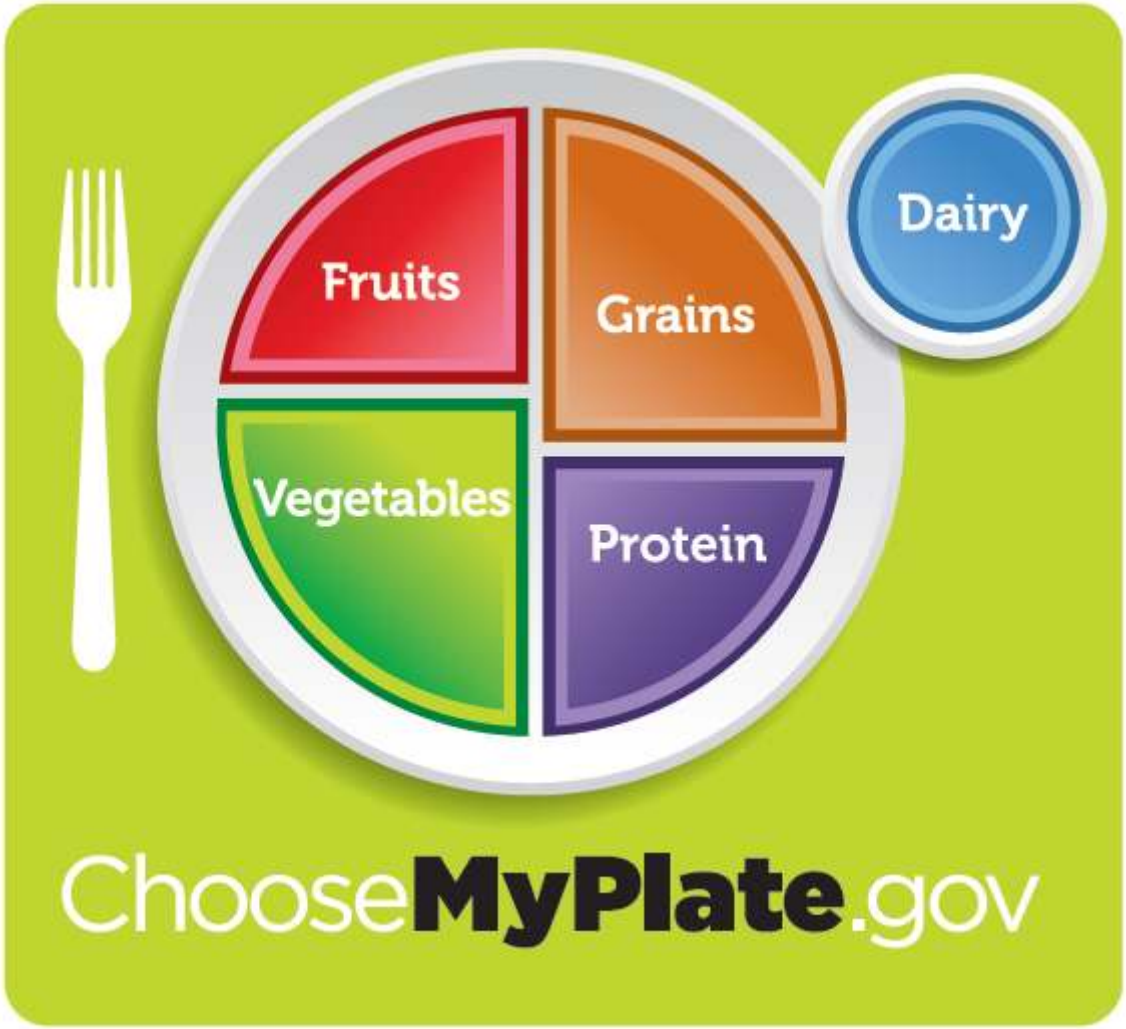

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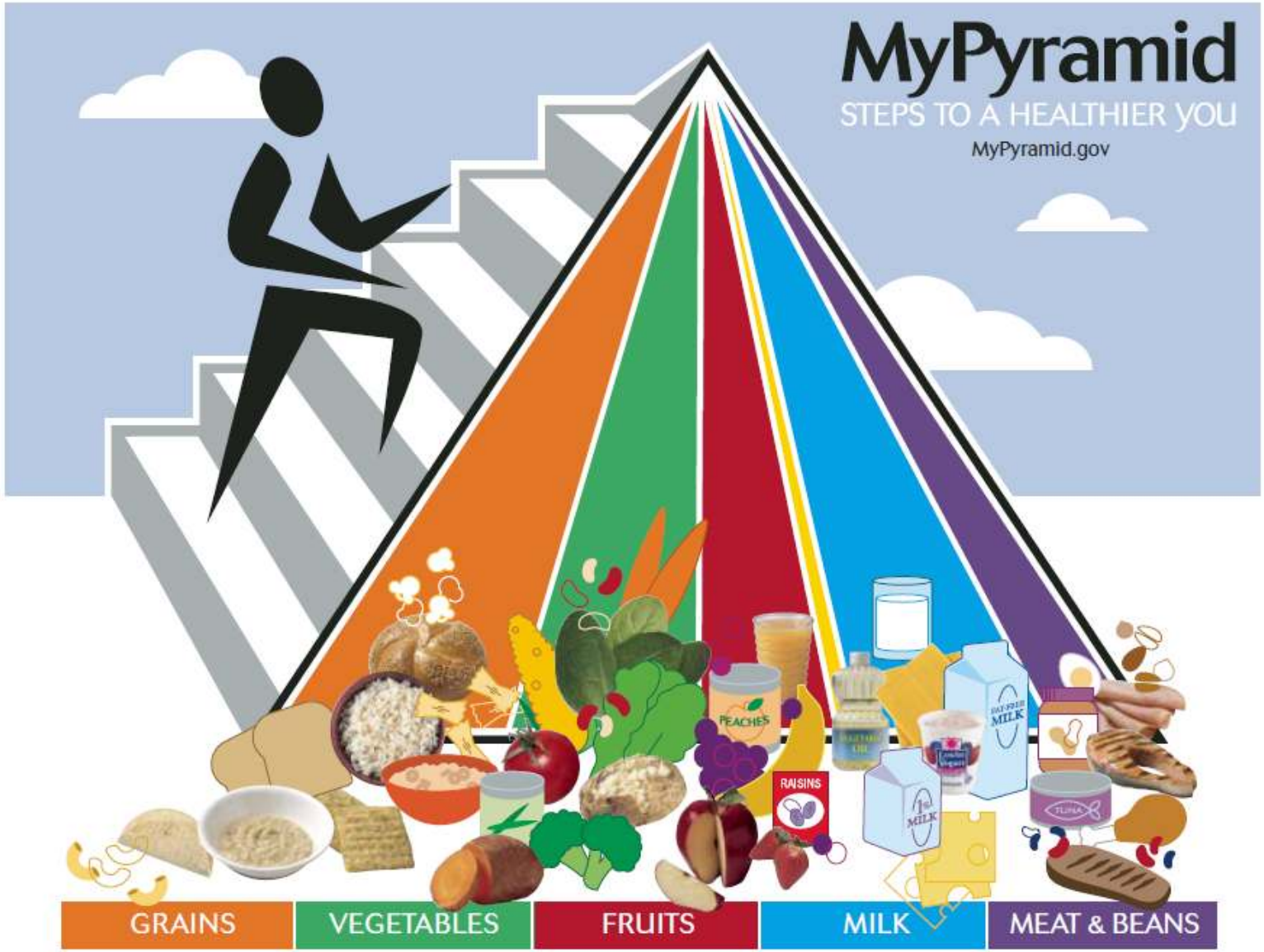

식사구성안

SEOUL NATIONAL UNIVERSITY HOSPITAL

식사구성안과 식품구성자전거

◉ 식사구성안이란?

일반인에게 영양섭취기준에 만족할 만한 식사를 제공할 수 있도록 식품군별 대표 식품과 섭취 횟수를 이용하여 식사의 기본 구성 개념을 설명한 것

◉ 식품구성자전거와 식품군별 1인 1회분량

식품구성자전거는 6개의 식품군에 권장식사패턴의 섭취횟수와 분량에 맞추어 바퀴 면적을 배분한 형태로, 기존의 식품구성탑 보다 다양한 식품 섭취를 통한 **균형 잡힌 식사**와 **수분 섭취의 중요성** 그리고 **적절한 운동**을 통한 **비만 예방**이라는 **기본 개념**을 나타냄. **식품군별 대표식품의 1인 1회 분량**을 기준으로 섭취 횟수를 활용하여 개인별 권장섭취패턴을 계획하거나 평가할 수 있음.

[식품구성자전거]

KNS 한국영양학회

[식품군별 대표식품의 1인 1회분량]

식 품 군	1인 1회 분량
곡류	밥 1공기(210g), 국수 1대접(건면 100g), 식빵(대) 2쪽(100g), 감자(중) 1개 (130g)*, 시리얼 1접시(40g)*
고기·생선·계란·콩류	육류 1접시(생 60g), 닭고기 1조각(생 60g), 생선 1토막(생 60g), 달걀 1개(60g), 두부 2조각(80g), 콩(20g)
채소류	콩나물 1접시(생 70g), 시금치나물 1접시(생 70g), 배추김치 1접시(40g), 오이소박이 1접시(60g), 버섯 1접시(생 30g), 물미역 1접시(생 30g)
과일류	사과(중) 1/2개(100g), 귤(중) 1개(100g), 참외(중) 1/2개(200g), 포도(중) 15알(100g), 오렌지주스 1/2컵(100g)
우유·유제품류	우유 1컵(200g), 호상요구르트 1/2컵(100g), 액상요구르트 3/4컵(150g), 아이스크림 1/2컵(100g), 치즈 1장(20g)*
유지·당류	식용유 1작은술(5g), 버터 1작은술(5g), 마요네즈 1작은술(5g), 설탕 1큰술(10g), 커피믹스 1봉(12g)

* 다른 식품들 1회 분량의 1/2 에너지를 함유하고 있으므로 식단 작성 시 0.5회로 간주함.

<자료출처 : 사)한국영양학회, 한국인 영양섭취기준 개정판, 2010>

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Table1. Target pattern for adults in the Korean Food Guidance System 2010

Energy level	1,600kcal	1,900kcal	2,000kcal	2,400kcal
Age and sex group / Food group(serving)	Women ≥ 65yrs	Women 19~64yrs	Men ≥ 65yrs	Men 19~64yrs
Grains	3	3	3.5	4
Meat, Fish, Eggs, and Beans	2.5	4	4	5
Vegetables	5	7	7	7
Fruits	1	2	1	3
Milk and Dairy products	1	1	1	1
Oils, Fats, and Sugars	3	4	4	5

Source : Korean Nutrition Society, Dietary Reference Intakes for Koreans, First Revision, 2010. p.535

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Association between adherence to the Korean Food Guidance System and the risk of metabolic abnormalities in Koreans

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Abstract

Consumption of a diet consistent with dietary guidelines is believed to have a beneficial effect on the prevention of chronic diseases and the promotion of general health. This study was conducted to explore the relationship between adherence to the Korean Food Guidance System (KFGS), which was based on the 2010 revised KDRIs, and the risk of metabolic abnormalities. Five hundred and ninety-six Korean adults between 30 and 59 years of age were recruited by advertisement to the Bundang Jesaeng General Hospital (BJGH), and those not taking regular medications and without diagnoses of fulminant disease were included. Data were collected on anthropometric measurements, diagnostic parameters for metabolic syndrome (MetS), and 3-day dietary intakes from individuals in the study. The number of servings consumed from each food group was compared to the KFGS recommended servings for each of the 6 food groups. Poor adherence to the recommendations for servings of milk and dairy products (OR: 2.038, 1.128-3.682) was associated with a higher risk of MetS, and poor adherence to the guidelines for fruit consumption (OR: 1.849, 1.027-3.329) was associated with a higher risk for the existence an elevated waist circumference. Conversely, the consumption of meat, fish, eggs, and beans above the recommended number of servings was associated with a lower risk of having an elevated waist circumference (OR: 0.523, 0.288-0.950), and the consumption of vegetables above the recommended number of servings was associated with a reduced risk of having elevated fasting glucose (OR: 0.533, 0.298-0.954). These results suggest that adherence to the KFGS guidelines helps to prevent the development of MetS, but this association needs to be confirmed by prospective studies.

Key Words: Metabolic syndrome, food group consumption, Korean food guidance system

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Table 4. Odds ratios for metabolic abnormalities according to quartile categories of adherence scores for each food group[1)2)]

Food group	MetS[2)3)]	Elevated Waist Circumference[3)]	Elevated Triglyceride[4)]	Reduced HD cholesterol[4)]	Elevated Blood Pressure[4)]	Elevated Fasting Glucose[4)]
Fruits						
Q1 ≤ 23.8%	1.576 (0.864-2.874)	1.849 (1.027-3.329)*	0.930 (0.515-1.679)	0.635 (0.363-1.110)	1.298 (0.766-2.200)	1.133 (0.613-2.095)
Q2 23.8-66.7%	1.006 (0.550-1.841)	1.185 (0.653-2.148)	1.032 (0.582-1.829)	0.677 (0.395-1.158)	0.644 (0.379-1.094)	1.418 (0.786-2.560)
Q3 66.7-133.0%	1	1	1	1	1	1
Q4 > 133.0%	0.536 (0.279-1.030)	0.961 (0.522-1.770)	0.872 (0.496-1.533)	0.650 (0.383-1.105)	0.622 (0.367-1.054)	0.758 (0.404-1.420)
P for trend	0.0138	0.0988	0.9354	0.2968	0.014	0.2419
Milk and dairy products						
Q1 ≤ 4.7%	2.038 (1.128-3.682)*	1.336 (0.754-2.368)	1.239 (0.704-2.179)	0.938 (0.536-1.641)	1.041 (0.618-1.752)	1.484 (0.841-2.617)
Q2 4.7-44.7%	1.451 (0.788-2.673)	1.326 (0.753-2.334)	0.997 (0.568-1.750)	1.832 (1.074-3.127)*	0.869 (0.513-1.472)	0.751 (0.411-1.370)
Q3 44.7-95.3%	1.070 (0.567-2.021)	0.974 (0.538-1.765)	0.803 (0.452-1.425)	1.042 (0.604-1.798)	0.988 (0.586-1.666)	0.629 (0.339-1.165)
Q4 > 95.3%	1	1	1	1	1	1
P for trend	0.0679	0.5618	0.5178	0.044	0.9151	0.0222

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Table 4. Odds ratios for metabolic abnormalities according to quartile categories of adherence scores for each food group[1)2)]

Food group	MetS[2)3)]	Elevated Waist Circumference[3)]	Elevated Triglyceride[4)]	Reduced HD cholesterol[4)]	Elevated Blood Pressure[4)]	Elevated Fasting Glucose[4)]
Meat, fish, eggs, and beans						
Q1 ≤ 72.2%	1.557 (0.849-2.855)	1.168 (0.654-2.084)	1.171 (0.645-2.126)	1.575 (0.895-2.775)	1.472 (0.853-2.540)	0.848 (0.458-1.569)
Q2 72.2-98.7%	0.605 (0.329-1.114)	0.861 (0.496-1.495)	0.584 (0.331-1.029)	1.136 (0.660-1.957)	0.756 (0.449-1.272)	0.513 (0.277-0.948)*
Q3 98.7-131.6%	1	1	1	1	1	1
Q4 > 131.6%	0.839 (0.461-1.526)	0.523 (0.288-0.950)*	1.047 (0.594-1.847)	1.008 (0.579-1.755)	1.012 (0.599-1.708)	1.715 (0.960-3.061)
P for trend	0.0288	0.0871	0.0774	0.3888	0.1166	0.003
Vegetables						
Q1 ≤ 71.7%	0.959 (0.506-1.817)	1.043 (0.569-1.914)	1.123 (0.614-2.051)	0.951 (0.535-1.690)	0.682 (0.387-1.203)	1.173 (0.632-2.176)
Q2 71.7-94.7%	0.894 (0.492-1.625)	0.971 (0.547-1.722)	1.021 (0.584-1.782)	0.893 (0.520-1.533)	1.395 (0.837-2.325)	0.725 (0.403-1.304)
Q3 94.7-125.9%	1	1	1	1	1	1
Q4 > 125.9%	0.831 (0.462-1.495)	0.894 (0.505-1.582)	1.169 (0.673-2.030)	1.115 (0.655-1.898)	1.037 (0.622-1.728)	0.533 (0.298-0.954)*
P for trend	0.9347	0.967	0.9359	0.8907	0.0753	0.0677

요 약

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제 언

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1. Korean style Healthy Diet 연구 활성화
2. 만성질환의 예방과 치료에 대한 효과 검증
3. Lifestyle modification 향상을 위한 지속적 관리

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