

Dietary Guidelines for Americans, 2010

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Objectives

1. **Introduce the origins and uses of the Dietary Guidelines for Americans.**
2. Describe new and more rigorous methods for collecting and grading evidence for 2010 Guideline recommendations.
3. Using the Section on Fatty Acids and Cholesterol, illustrate 2010 Guidelines' evidence and recommendations.
4. Discuss opportunities and challenges for the 2010 Guidelines to impact U.S. public health.

Dietary Guidelines for Americans: A Brief History

- First published in 1980.
- Public Law 101-445, Title III requires Dietary Guidelines' review, updating, and publication by a Dietary Guidelines Advisory Committee of experts every five years.
- Recommendations to Secretaries of Agriculture and of Health and Human Services.
- After the DGAC Report and public comment period, Dietary Guidelines for Americans are published.

2010 Dietary Guidelines for Americans: A Sense of Urgency

- Focus of healthcare reform on burdens and costs of chronic diseases, many of which are diet related.
- Poor diet and physical inactivity overtaking tobacco as the #1 "Actual" cause of death in U.S.
- Obesity epidemic deemed #1 public health threat of the 21st century.
- Special concerns about population groups:
 - Children
 - Pregnant and Lactating Women
 - Older Adults
 - Disadvantaged Minorities

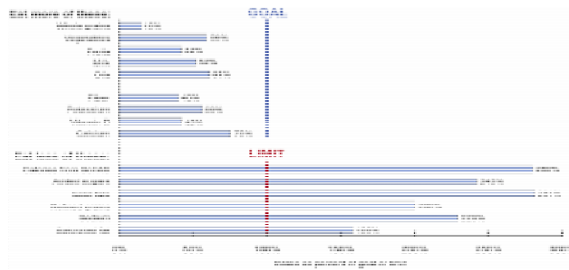
Examples of Uses of Dietary Guidelines for Americans

- Menu planning for U.S. government food assistance programs
 - National School Lunch Programs
 - Elderly Nutrition Programs
- Nutrition education efforts and campaigns
 - Special Supplemental Nutrition Programs for Women, Infants, and Children (WIC)
- National health objectives
 - Healthy People Objectives
- Encouragement to food industry to grow, manufacture, and sell foods that promote health

Major Emphases for a Healthful Total Diet

- Moderate energy intake
- Reduce solid fats and added sugars
- Consume nutrient-dense foods (but not too much of them)
- Reduce sodium intake

Dietary Intakes in Comparison to Recommended Intake Levels or Limits

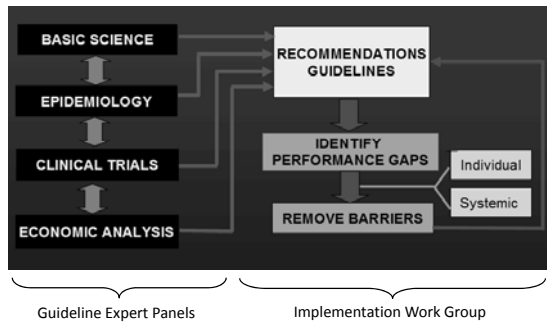


Note: Bars show average intakes for all individuals (ages 1 or 2 years or older) as a percent of the recommended intake level or limit. Recommended intakes for food groups and limits for refined grains, SoFAS, solid fats, and added sugars are based on the USDA 2000-calorie food patterns. Recommended intakes for fiber, potassium, vitamin D, and calcium are based on the highest AI for ages 14 to 70 years. Limits for sodium are based on the AI and for saturated fat on 7 percent of calories.
Data source: What We Eat in America, National Health and Nutrition Examination Survey (WWEIA, NHANES) 2001-2004 or 2005-2006.

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Feedback Loop



2010 U.S. Dietary Guidelines Advisory Committee

Members (N=13) appointed October 2008 – May 2010
 Six public meetings (two face-to-face, four webinars)
 All committee deliberations made available for public viewing
 Written public comments (58 organizations registered)
 Seven subcommittees, each with 3-5 committee members
 Weekly communications (telephone, webinar, email)

2010 U.S. Dietary Guidelines Advisory Committee

Linda Van Horn, PhD, RD (Chair)	Northwestern U.
Naomi K. Fukagawa, MD, PhD (Vice Chair)	U. Vermont
Cheryl Achterberg, PhD	Ohio State U.
Lawrence J. Appel, MD, MPH	Johns Hopkins
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Thomas A. Pearson, MD, MPH, PhD	U. of Rochester
Rafael Perez-Escamilla, PhD	Yale U.
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Joanne L. Slavin, PhD, RD	U. Minnesota
Christine L. Williams, MD, MPH	Columbia U.

2010 U.S. Dietary Guidelines Advisory Committee Staff

Executive Secretaries (2 USDA, 2 HHS)
 Policy Officials (2 USDA, 2 HHS)
 Management Team Staff (12 USDA and HHS)
 Nutrition Evidence Library Staff (10 USDA)
 Technical Writer/Editor (1)

Methodology of 2010 US DGAC: Web-based Electronic System and Methods for Evidence Review

- DGAC members developed research questions in the eight topic areas used in 2005 Guidelines, created a search and sort plan, and approved all completed search and sort lists.
- Use of systematic reviews if comprehensive and published recently.
- Trained evidence abstractors systematically abstracted published articles and evaluated methodologic quality.
- Nutrition Evidence Library (NEL) staff conducted quality review of materials and developed summary paragraphs and evidence tables.

Methodology of 2010 US DGAC: Web-based Electronic System and Methods for Evidence Review (Cont'd)

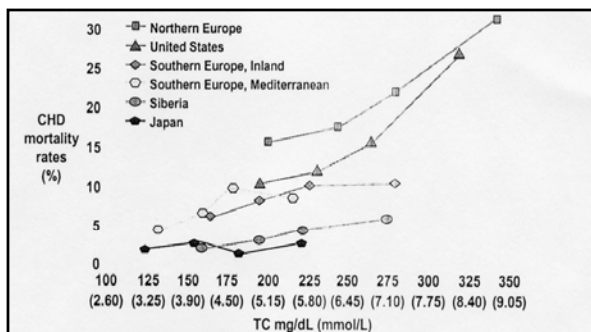
- DGAC members developed evidence summaries and conclusion statements, graded each conclusion, and described findings.
- Food pattern modeling to assess impact on dietary adequacy if specific changes are made.
- NEL makes available complete evidence portfolio for each review question:
www.NutritionEvidenceLibrary.gov

Eligibility Measures Used in Evidence Sorting

- Human studies in English in peer-reviewed publications
- Age
- Health status of subjects
- Study setting
- Number of subjects per arm (10 minimum)
- Attrition rate (<20%)
- Characteristics of the intervention
- Outcome measures and timing of measures
- Study design

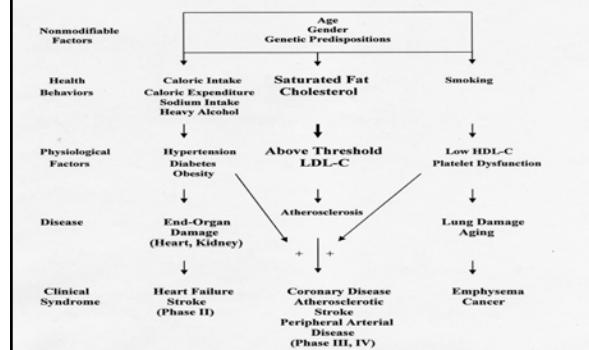
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Twenty-five-year coronary death rates and median serum cholesterol levels. (Reproduced, with permission, from Verschuren et al.)

Risk Factor Model to Better Describe the Epidemiologic Transition



Quantitative Advice Related to Dietary Fat, Dietary Guidelines for Americans, 1980-2005

	1980	1985	1990	1995	2000	2005
Total Fat	Avoid too much	Avoid too much	≤30%	≤30%	≤30%	20-35% ¹
Saturated Fat	Avoid too much	Avoid too much	≤10%	≤10%	≤10%	≤10%
Cholesterol	Avoid too much	Avoid too much	Low	≤300mg	≤300mg	≤300mg

Note: ¹30-35% for ages 2-3 years; 25-35% for ages 4-18 years.
Source: DGA 1980-2005.

2010 Dietary Guidelines for Americans: Eleven Questions from Four Topic Areas Addressing Fatty Acids and Cholesterol

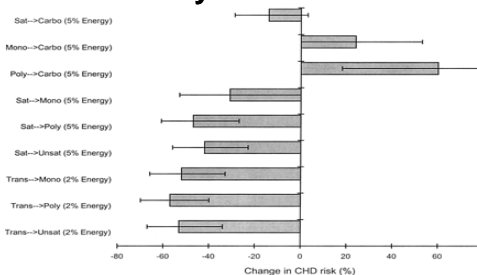
- The influence of dietary fats on cardiovascular disease (CVD) and other health outcomes
- Specific fatty acids that affect plasma LDL, HDL, and non-HDL cholesterol levels
- Relationships between consumption of N-3 fatty acids and health outcomes
- Cardiovascular health effects related to consumption of specific foods high in fatty acids

Question 1: What is the Effect of Saturated Fat Intake on Increased Risk of Cardiovascular Disease or Type 2 Diabetes, Including Effects on Intermediate Markers such as Serum Lipid and Lipoprotein Levels

Evidence: 12 studies since 2004 (10 RCT, 1 non-randomized trial, 1 meta analysis of 11 pooled cohorts)

Conclusion: Strong evidence indicates that intake of dietary SFA is positively associated with intermediate markers and endpoint health outcomes for two distinct metabolic pathways: 1) increased serum total and LDL cholesterol and increased risk of CVD, and 2) increased markers of insulin resistance and increased risk of T2D. Conversely, decreased SFA intake improves measures of both CVD and T2D risk. The evidence shows that 5 percent energy decrease in SFA, replaced with MUFA or PUFA, decreases risk of CVD and T2D in healthy adults and improves insulin responsiveness in insulin resistant and T2D individuals.

Saturated Fatty Acid Substitution and Coronary Heart Disease Risk



Note: Estimated changes (percent with 95% confidence intervals) in risk of coronary heart disease (CHD) associated with isocaloric dietary substitutions. Adjusted for coronary risk factors and total energy intake. Sat=SFA, Carbo=carbohydrate, Mono=MUFA, Poly=PUFA, Trans=trans fatty acids, Sat-Carbo=substitute carbohydrates for SFA.
Source: Hu et al., 2001. *J Amer Col Nutr* 20,5-19. Used with permission, the American College of Nutrition.

Question 2: What is the Effect of Dietary Cholesterol Intake on Risk of Cardiovascular Disease, Including Effects on Intermediate Markers Such as Serum Lipid and Lipoprotein Levels and Inflammation

Evidence: 16 studies published since 1999 (8 RCT, 5 prospective cohort studies, 1 meta analysis of 17 studies, and 2 systematic reviews of 167 cholesterol feeding studies and of 8 cohort studies of dietary cholesterol and 6 cohort studies of egg consumption)

Question 2: What is the Effect of Dietary Cholesterol Intake on Risk of Cardiovascular Disease, Including Effects on Intermediate Markers Such as Serum Lipid and Lipoprotein Levels and Inflammation (Cont'd)

Conclusion: Moderate evidence from epidemiologic studies relates dietary cholesterol intake to clinical CVD endpoints. Many randomized clinical trials on dietary cholesterol use eggs as the dietary source. Independent of other dietary factors, evidence suggests that consumption of one egg per day is not associated with risk of CHD or stroke in healthy adults, although consumption of more than seven eggs per week has been associated with increased risk. An important distinction is that many individuals with T2D, increased dietary cholesterol intake is associated with CVD risk.

Dietary Cholesterol Modeling of Nutrient Changes

When dietary cholesterol is limited to less than 200 mg/day, decreases in protein, choline, vitamins A and D, and in EPA, DHA and increases in Vitamin E, thiamin, linoleic acid, and alpha linolenic acid

Question 3 and 4: Replacement of SFA with Monounsaturated or Polyunsaturated Fatty Acids

Evidence: Since 2004, 13 studies of MUFA, 10 studies of PUFA on health

Conclusion:

- Strong evidence for dietary MUFA or dietary PUFA improving blood lipids when replacing SFA
- 5 percent energy replacement with MUFA or PUFA reduces intermediate markers and risk of CVD and T2D in healthy adults and insulin resistant in T2D individuals.

Implication: Reduction of 12% of calories from SFA to 7% by replacement with MUFA, PUFA, or combination should yield significant public health benefits

Question 5 and 6: Effect of Specific Fatty Acid Intake on LDL Cholesterol

- Stearic Acid
- Cholesterol-raising Fatty Acids
- Natural (Ruminant) vs. Synthetic (Industrial Hydrogenated) Trans Fatty Acids

Mean Trans Fatty Acid Levels in Certain Foods from Food Label and Package Surveys (FLAPS) 2006-2007 and Mean Trans Fatty Acid Levels of Comparable Food Products

Food	2004 ^a	FLAPS 2006-2007 ^a
Potato chips	n = 8	n = 10
Number of samples	0.45 (0.45)	0.0 (0) NS ^b
Mean TFA levels g/100 g (SE)		
Tortilla chips	n = 8	n = 9
Number of samples	1.76 (0.6)	0.0 (0) ^c
Mean TFA levels g/100 g (SE)		
Frozen potato products	n = 6	n = 7
Number of samples	1.97 (0.48)	0.74 (0.24) ^c
Mean TFA levels g/100 g (SE)		
Cereal and granola	n = 8	n = 9
Number of samples	1.70 (0.8)	0.0 (0) ^d
Mean TFA levels g/100 g (SE)		
Tortillas	n = 6	n = 7
Number of samples	0.76 (0.39)	0.22 (0.22) ^f
Mean TFA levels g/100 g (SE)		

^a Trans fat levels for 2004 are from Sachithanandam et al. 2004a, and were analyzed from food products. The levels from FLAPS are values from food labels.
^b NS = Not significant.
^c Significant decrease at p < 0.05.
^d Significant increase at p < 0.05.
^e NS = Not significant.
^f Mean is NS, but median is significant decrease at p < 0.05.

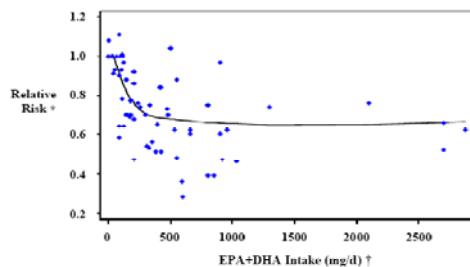
Question 7: What is the Relationship Between Consumption of Seafood n-3 Fatty Acids and Risk of CVD

Evidence: NEL search and 2007 ADA review identified 25 studies since 2004

Conclusion: Moderate evidence that consumption of two servings of seafood per week (4 oz. serving) which provides an average of 250 mg. per day of long chain n-3 fatty acids is associated with reduced cardiac mortality from CHD or sudden death in persons with or without CVD.

Seafood Modeling:
 4 oz. high n-3, 8 oz. mixed low and high n-3, and 12 oz. of low n-3 fish on nutrient adequacy.

Relative Risk of Coronary Heart Disease Death by Dose of EPA+DHA



Mozaffarian and Rimm, JAMA 2006; 296: 1855-99

Question 8: What is the Relationship Between Consumption of Plant n-3 Fatty Acids and Risk of CVD

Evidence: Eight studies since 2004 (5 from ADA, 3 from NEL)

Conclusion: Alpha-linolenic acid intake of 0.6-1.2% of total calories will meet current recommendations and may lessen CVD risk, but new evidence is insufficient to warrant greater intake beyond this level. Limited but supportive evidence suggests higher intake of n-3 fatty acids from plant sources may reduce mortality level among persons with existing CVD.

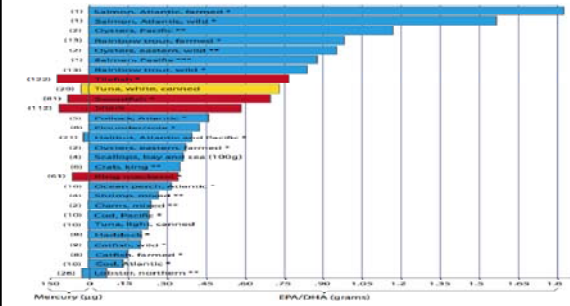
Question 9: What are the Effects of Maternal Dietary Intake and n-3 Fatty Acids from Seafood on Breast Milk Consumption and Health Outcomes

Conclusion:

Moderate evidence indicates that increased maternal dietary intake of long chain n-3 PUFA, in particular docosahexaenoic acid (DHA) from at least two servings of seafood per week, during pregnancy and lactation, is associated with increased DHA levels of breast milk and improved infant health outcomes, such as visual acuity and cognitive development.

Evidence: Brenna and Lipillonne (2009)

Estimated EPA/DHA Content and Methyl Mercury Content of 3 oz. Portions of Seafood



* = cooked, dry heat.
 ** = cooked, moist heat.
 *** = EPA and DHA content in Pacific salmon is a composite of chum, coho, and sockeye.
 Source: Institute of Medicine (IOM), Seafood Choices, 2006. Used with permission, National Academies Press, Washington, DC.

Question 10: What are the Health Effects Related to Consumption of Nuts?

Conclusion:

There is moderate evidence that consumption of unsalted peanuts and tree nuts, specifically walnuts, almonds, and pistachios, in the context of a nutritionally adequate diet and when total caloric intake is held constant, has a favorable impact on cardiovascular risk factors, particularly serum lipid levels.

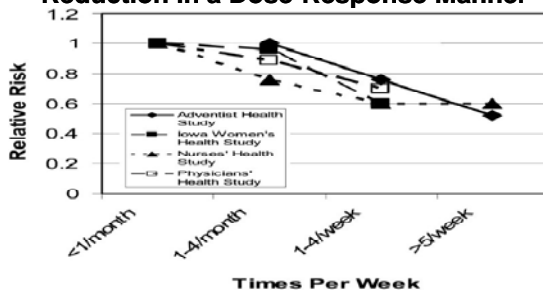
Evidence: 17 studies since 2000

Nutrient Composition of Nuts Per 1.5 Ounces (43 g)

Type	Energy (kcal)	Total fat (g)	Saturated fatty acids (g)	Monounsaturated fatty acids (g)	Polyunsaturated fatty acids (g)	Protein (g)
Almonds	254	22.5	1.7	14.3	5.4	9.4
Brazil nuts	279	28.2	6.4	10.4	8.8	6.1
Cashews	244	19.7	3.9	11.6	3.3	6.5
Hazelnuts	275	26.5	1.9	19.8	3.6	6.4
Macadamias	305	32.4	5.1	25.2	0.6	3.3
Peanuts	249	21.1	2.9	10.5	6.7	10.1
Pecans	302	31.6	2.7	18.7	8.7	4.0
Pistachios	243	19.6	2.4	10.3	5.9	9.1
Walnuts, English	278	27.7	2.6	3.8	20.1	6.5

Source: USDA, Agriculture Research Service, USDA Nutrient Data Laboratory, 2009. USDA National Nutrient Database for Standard Reference, Release 22. Available at: <http://www.ars.usda.gov/ba/bhnrc/ndl>

Frequency of Nut Consumption and Coronary Heart Disease Risk Reduction in a Dose-Response Manner



Note: Results are from four epidemiologic studies.
 Source: Sabaté J, Ang Y. *Am J Clin Nutr* 2009;89:1643S-1648S. Used with permission, American Society for Nutrition.

Question 11: What are the Health Effects Related to Consumption of Chocolate?

Conclusion:

Moderate evidence suggests that modest consumption of dark chocolate or cocoa is associated with health benefits in the form of reduced CVD risk. Potential health benefits need to be balanced with caloric intake

Evidence: 13 studies since 2000

Summary of Recommendations Related to Fatty Acids and Cholesterol

1. Limiting saturated fatty acid intake to less than 7 percent of calories, replacing these calories with those from mono-or polyunsaturated fatty acids, rather than carbohydrates. As an interim step toward this less than 7 percent goal, all individuals should immediately consume less than 10 percent of energy as saturated fats.
2. Limiting dietary cholesterol to less than 300 mg per day with further reductions of dietary cholesterol to less than 200 mg per day in persons with or at high risk for CVD or T2D.
3. Avoiding trans fatty acids from industrial sources in the American diet, leaving small amounts from trans fatty acids from natural (ruminant) sources.

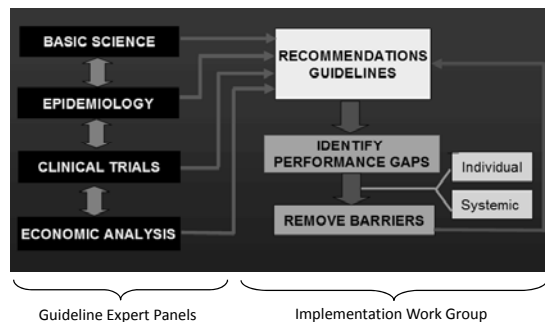
Summary of Recommendations Related to Fatty Acids and Cholesterol (Cont'd)

4. Redefining cholesterol-raising fats as saturated fats (exclusive of stearic acid) and trans fatty acids, with a recommended daily intake of less than 5 percent of energy.
5. Consuming two servings of seafood per week (4 oz. cooked, edible seafood per serving) which provide an average of 250 mg/day of n-3 fatty acids from marine sources.
6. Ensuring maternal dietary intake of long chain n-3 fatty acids, in particular DHA, during pregnancy and lactation through two or more servings of seafood per week, with emphasis on types of seafood high in n-3 fatty acids and with low methyl mercury content.

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Feedback Loop



Intake of Fats (grams/day) and Cholesterol (mg/day), USDA national surveys of all persons in US, 1977-2006

Dietary Component	NFCS 1977-78 (n=30,000) ¹ Mean (SE)	CSFII 1989-91 (n=15,128) ¹ Mean (SE)	CSFII 1994-96 (n=15,968) ² Mean (SE)	NHANES 2001-02 (n=9,033) ³ Mean (SE)	NHANES 2003-04 (n=8,273) ³ Mean (SE)	NHANES 2005-06 (n=8,549) ³ Mean (SE)
Total Fat (g)	84.6 (0.83)	71.8	74.4 (0.7)	81.0 (0.54)	82.7 (0.71)	81.9 (1.35)
SFA (g)	NA ⁴	25.7	25.6 (0.3)	26.7 (0.25)	27.7 (0.24)	27.8 (0.49)
PUFA (g)	NA	13.8	14.6 (0.2)	16.1 (0.13)	17.2 (0.25)	17.0 (0.31)
MUFA (g)	NA	26.7	28.6 (0.3)	30.1 (0.22)	31.0 (0.29)	30.1 (0.48)
Cholesterol (mg)	N/A	270	256 (3)	273 (2.7)	273 (4.6)	278 (3.3)

Sources: Published USDA, ARS reports What We Eat in America-national Health and Nutrition Examination Surveys (NHANES), Continuing Surveys of Food Intakes by Individuals (CSFII), and Nationwide Food Consumption Survey (NFCS), 1 day data.
¹Includes all persons from birth.
²Includes all persons from birth; excludes breast-fed children.
³Includes persons 2 years and over; excludes breast-fed children.
⁴SE=Standard error.
⁵Unpublished data from Food Surveys Research Group, ARS, USDA.
⁶NA = Not available.
This table is available at: <http://www.ars.usda.gov/ba/bhnrc/ftsg>

Intake of Fats as percent of energy, USDA national survey of all persons in US, 1977-2006

Dietary Component	NFCS 1977-78 (n=30,000) ¹ Mean (SE)	CSFII 1989-91 (n=15,128) ¹ Mean	CSFII 1994-96 (n=15,968) ² Mean (SE)	NHANES 2001-02 (n=9,033) ³ Mean (SE)	NHANES 2003-04 (n=8,273) ³ Mean (SE)	NHANES 2005-06 (n=8,549) ³ Mean (SE)
Total Fat (%)	40.1 (0.16)	34.4	32.2 (0.1)	33 (0.3)	33.4 (0.25)	33.6 (0.19)
SFA (%)	NA ⁴	12.3	11.3 (0.1)	NA ⁴	11.2 (0.11)	11.4 (0.09)
PUFA (%)	NA	6.6	6.4 (0.01)	NA	7.0 (0.09)	7.0 (0.08)
MUFA (%)	NA	12.7	12.5 (0.1)	NA	12.5 (0.09)	12.3 (0.07)
Energy (kcal)	1854 (12.9)	1839	2002 (16)	2178 (16.1)	2195 (15.6)	2157 (29.0)

Sources: Published USDA, ARS reports What We Eat in America-national Health and Nutrition Examination Surveys (NHANES), Continuing Surveys of Food Intakes by Individuals (CSFII), and Nationwide Food Consumption Survey (NFCS), 1 day data.
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Four Main Integrated Findings, Used in Developing 2010 Dietary Guidelines for Americans

1. Reduce the incidence and prevalence of overweight and obesity of the U.S. population by reducing overall caloric intake and increasing physical activity.
2. Shift food intake patterns to a more plant-based diet that emphasizes vegetables, cooked dry beans and peas, fruits, whole grains, nuts, and seeds. In addition, increase the intake of seafood and fat-free and low-fat milk and milk products, and consume only moderate amounts of lean meats, poultry, and eggs.

Four Main Integrated Findings, Used in Developing 2010 Dietary Guidelines for Americans (Cont'd)

3. Significantly reduce intake of foods containing added sugars and solid fats because these dietary constituents contribute excess intakes and few, if any, nutrients. In addition, reduce sodium intake and lower intake of refined grains, especially refined grains that are combined with added sugar, solid fat, and sodium.
4. Meet the 2008 Physical Activity Guidelines for Americans.