Dietary Strategies for Improving Cardiovascular Health

Introduction

- What dietary factors increase the risk of CVD?

- What is the place of nutrition in reducing the risk of CVD and improving cardiovascular health in patients with dyslipidemia?

- How do different nutrients contribute to improving CVD health?

Strategies to Improve Cardiovascular Health

- Patients require comprehensive, individualized, multifaceted approach:
  - Lifestyle therapy + pharmacotherapy + patient education[1,2]

- Lifestyle therapy = medical nutrition therapy + physical activity + smoking cessation + sufficient sleep + stress reduction[2]
  - Including medically assisted weight loss
  - Key component of treatment guidelines for ASCVD, T2D, dyslipidemia, and overweight/obesity[1-4]
  - First-line—underlies all other interventions[1-4]

1. Jellinger et al. *Endocr Pract.* 2017 Apr;23(Suppl 2):1-87.
2. Handelsman et al. *Endocr Pract.* 2015;21:1-87
3. Garvey et al. *Endocr Pract.* 2016 Jul;22 Suppl 3:1-203.
4. Garber et al. *Endocr Pract.* 2018 May;24(5):499.

What are the Recommendations
for Medical Nutrition Therapy?

Clinical Treatment Guidelines

AMERICAN ASSOCIATION OF CLINICAL ENDOCRINOLOGISTS AND AMERICAN COLLEGE OF ENDOCRINOLOGY GUIDELINES FOR MANAGEMENT OF DYSLIPIDEMIA AND PREVENTION OF CARDIOVASCULAR DISEASE

Research has shown that diet can have a substantial effect on lipid levels and may be an important determinant of ASCVD risk. Therefore, medical nutrition therapy provides an important tool for the management of dyslipidemia.

Duration and Diagnostic Significance of Nutrition Therapy

In primary prevention, nutrition therapy should be applied as the sole therapeutic approach for dyslipidemia management for at least 3 months. Depending on individual progress, nutritional therapy may be extended through 6 months before initiating lipid-lowering drug therapy (8 [EL 4; NE]). For high-risk individuals, it is appropriate to institute nutrition therapy and pharmacotherapy simultaneously.

Medical Nutrition Therapy Defined

- Personalized, supportive, one-on one, discussions with RD or knowledgeable MD[1]

- Includes nutrition assessment (including food diaries), diagnosis, intervention (counseling), monitoring, and evaluation[2]

- Counseling may cover topics such as:
  - Calories, grams, and other metrics[1]
  - Goal setting[2]
  - Individualized action plans for implementing dietary recommendations[1,2]
  - Should be culturally sensitive

1. Handelsman et al. *Endocr Pract.* 2015;21:1-87
2. Morris et al. *Clin Diabetes.* 2010 Jan;28(1):12-18

Nutritional Guidelines for the Reduction of CV Risk

- Consume diet rich in:
  - Fruits and vegetables
    - Combined ≥5 servings/day; ≥1 of these servings/day of dark green or orange vegetables
  - Grains (primarily whole grains)
  - Legumes
  - High-fiber cereals
  - Non-Dairy or Nonfat or Low Fat Milk products preferred over Whole Milk
  - Fish and skinless poultry preferred over processed meats

Jellinger et al. *Endocr Pract.* 2017 Apr;23(Suppl 2):1-87.

Nutritional Guidelines for the Reduction of CV Risk

- Limit intake of the following:

    - Saturated fat (<7% of total calories)

    - *Trans* fats (<1% of total calories)

    - Cholesterol (<200 mg/day)

- Polyunsaturated and monounsaturated fatty acids may comprise up to 10% and 20% of total caloric intake, respectively

- Total dietary fat can be as high as 25%-35% of calories consumed

- Overall, salt consumption and total caloric intake should be reduced

- LDL-C-lowering macronutrient intake may include plant stanols/sterols (~2 g/day) to substitute for typical fats and should include soluble fiber (10-25 g/day)

Jellinger et al. *Endocr Pract.* 2017 Apr;23(Suppl 2):1-87.

General Healthful Eating Recommendations

- Eat regular meals and snacks; intermittent fasting to lose weight is still controversial

- Ideally, consume mostly a plant-based diet

- High in fiber, low calories/glycemic index, high in phytochemicals/antioxidants

- Understand Nutrition Facts Label information

- Incorporate beliefs and cultures into discussions

- Use mild cooking techniques instead of high-heat cooking

Handelsman et al. *Endocr Pract.* 2015;21:1-87

Healthful Eating Recommendations: Nutritional Components

|	Recommendation
Carbohydrates	• Understand health effects of the 3 types of carbohydrates: sugars, starch, and fiber • Target 7-10 servings per day of healthful carbohydrates (fresh fruits and vegetables, pulses, whole grains) • Lower-glycemic index foods may facilitate glycemic control:* multigrain bread, pumpernickel bread, whole oats, legumes, apple, lentils, chickpeas, mango, yams, brown rice
Fat	• Eat healthful fats: low-mercury/low-contaminant-containing nuts, avocado, certain plant oils, fish • Limit saturated fats (butter, fatty red meats, tropical plant oils, fast foods) **and trans fats** • Use no- or low-fat dairy products
Protein	• Consume protein from foods low in saturated fats (fish, egg whites, beans) • Avoid or limit processed meats
Micronutrients	• Routine supplementation not necessary except for patients at risk of insufficiency or deficiency • Chromium; vanadium; magnesium; vitamins A, C, and E; and CoQ10 not recommended for glycemic control and/or cardiovascular risk reduction

*Insufficient evidence to support a formal recommendation to educate patients that sugars have both positive and negative health effects.

Handelsman et al. *Endocr Pract.* 2015;21:1-87

Effect of Different Diets on Weight and Lipids Over Time

- Dietary Intervention Randomized Control Trial (DIRECT)
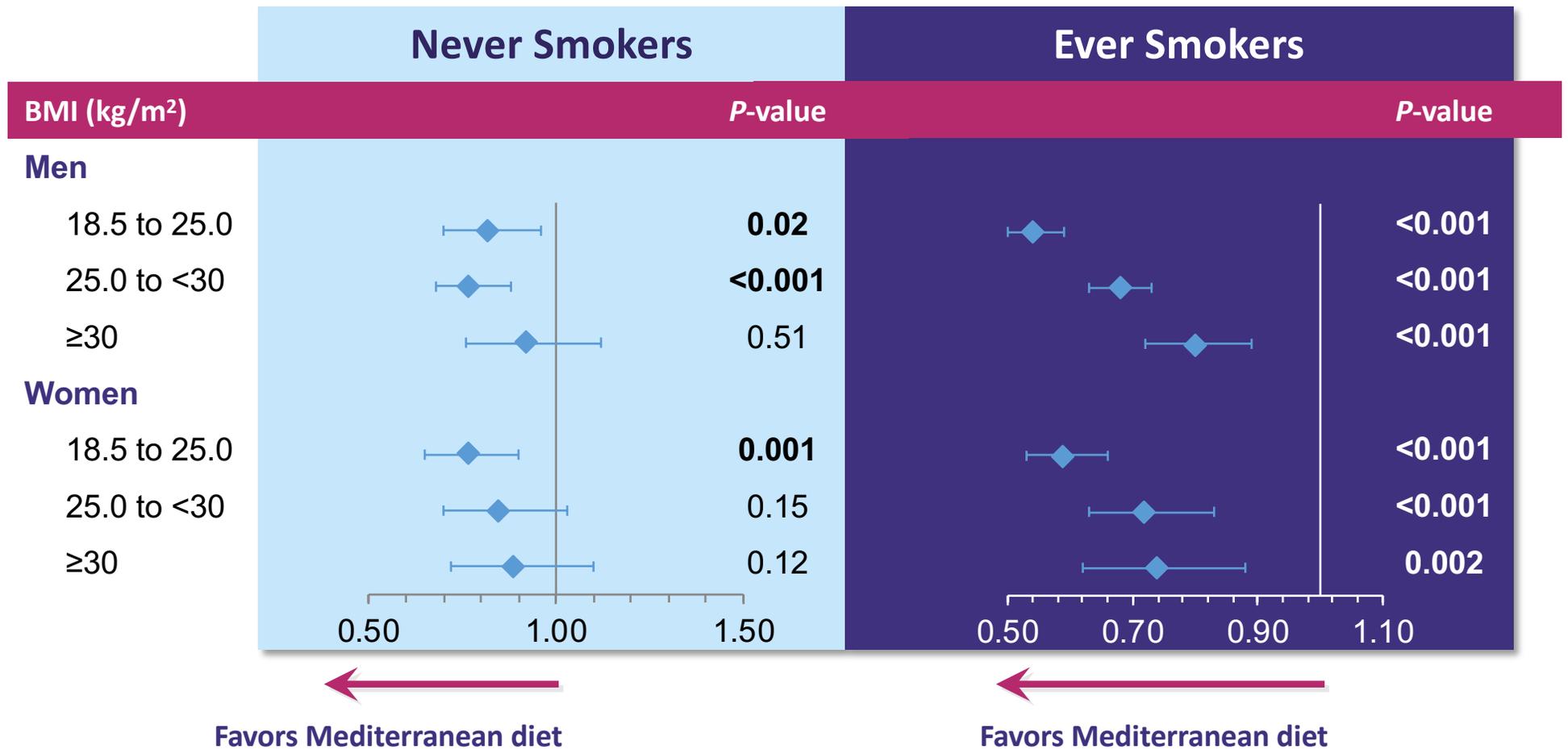- Effect on lipids at 2 and 6 Years

*P<0.001 vs other diets.
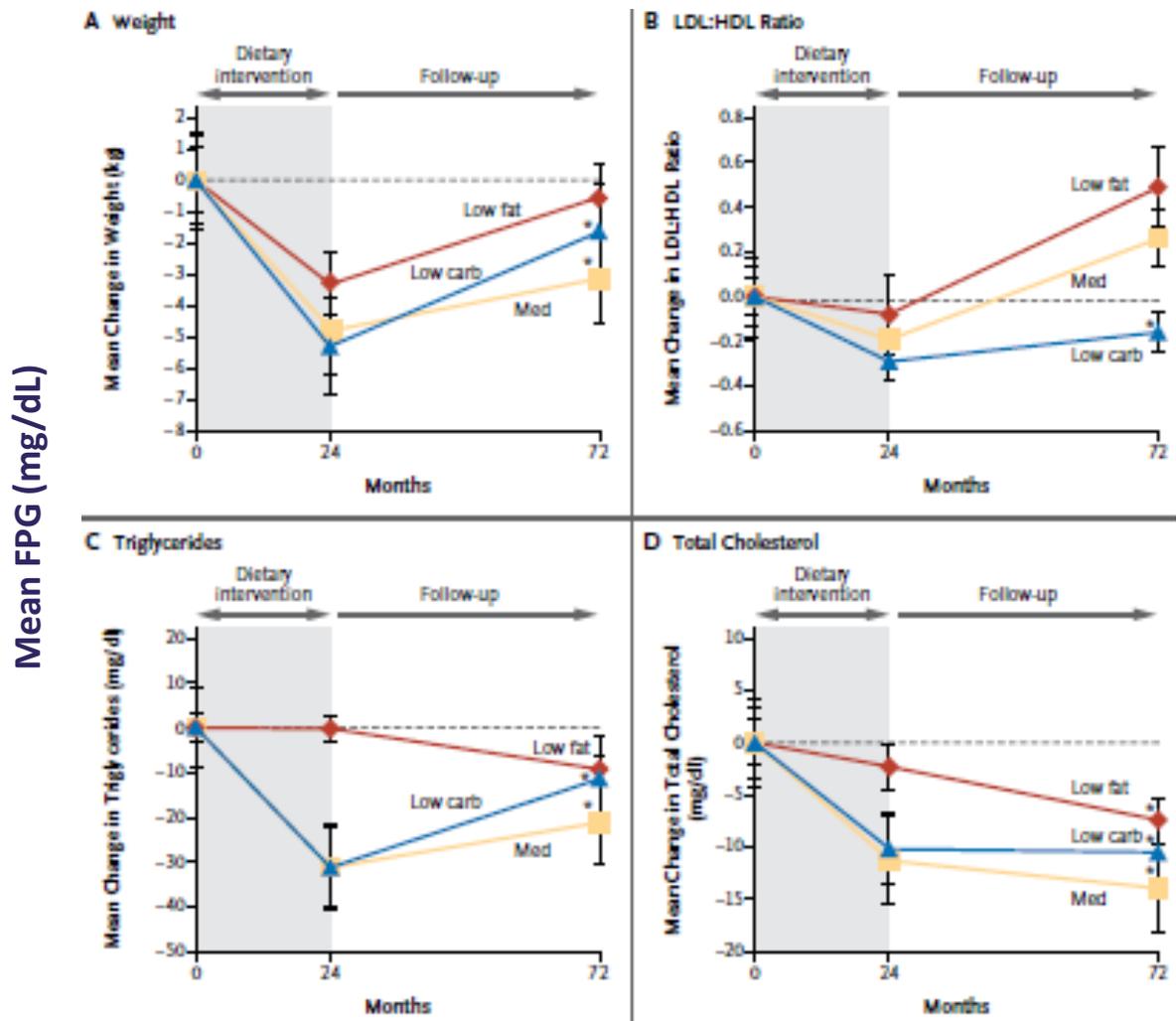
FPG = fasting plasma glucose; HDL = high density lipoprotein; LDL = low density lipoprotein; T2D = type 2 diabetes.

Shai I, et al. *N Engl J Med*. 2008;359:229-241. Schwarzfuchs D, et al. *N Engl J Med*. 2012;367:1373-1374.

Effect of Mediterranean Diet Pattern on All-Cause Mortality

NIH-AARP Diet and Health Study (n=214,284 men; n=166,012 women), by smoking history

BMI (kg/m²)	Never Smokers	P-value	Ever Smokers	P-value
Men				
18.5 to 25.0		**0.02**		**<0.001**
25.0 to <30		**<0.001**		**<0.001**
≥30		0.51		**<0.001**
Women				
18.5 to 25.0		**0.001**		**<0.001**
25.0 to <30		0.15		**<0.001**
≥30		0.12		**0.002**

Never Smokers axis: 0.50 1.00 1.50

Ever Smokers axis: 0.50 0.70 0.90 1.10

Favors Mediterranean diet

Favors Mediterranean diet

AARP = American Association of Retired Persons; BMI = body mass index; NIH = National Institutes of Health

Mitrou PN, et al. *Arch Intern Med*. 2007;167:2461-2468.

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Key Features of Specialized Diets 1 of 2

Meal Plan	Calories	Composition	Recommended food choices
DASH	1600-3100 kcal/d depending on individual needs	≤27% fat calories ≤6% saturated fat calories ≤150 mg/day cholesterol ≤3 g/day sodium	Fruits, vegetables, and low-fat dairy foods.
Low-carbohydrate (Atkins)	No restrictions	20 g/day carbohydrates during 2-month induction phase; gradual increase to ≤120 g/day carbohydrates	Vegetarian sources of fat and protein preferred. Avoid trans fat.
Low-fat	Women: 1500 kcal/d Men: 1800 kcal/d	30% fat calories ≤10% saturated fat calories ≤300 mg/day cholesterol	Low-fat grains, vegetables, fruits, and legumes. Limit sweets and high-fat snacks
Mediterranean	Women: 1500 kcal/d Men: 1800 kcal/d	≤35% of calories from fat	Vegetables , poultry, and fish. Main fat source: 30-45 g/day olive oil and 5-7 nuts (<20 g/ day). Limited red meat.

DASH = Dietary Approaches to Stop Hypertension

Appel LJ, et al. *N Engl J Med*. 1997;336:1117-1124. Shai I, et al. *N Engl J Med*. 2008;359:229-241.

Key Features of Specialized Diets-2 of 2

| Meal Plan	Calories	Composition	Recommended food choices
Nordic[1]	Unrestricted	Not specified	Emphasizes locally grown, sustainable food sources. Fruits, berries, vegetables, legumes, potatoes, whole grains, nuts, seeds, rye breads, fish, seafood, low-fat dairy, herbs, spices, canola oil. Moderation: game meat, free-range eggs, cheese, yogurt. Rare: other red meats and fats. Never: Sugary, processed foods, additives, refined fast food.
Ornish[2]	Unrestricted unless goal is to lose weight	≤10% of calories from fat <10 mg cholesterol/d	Fruits, vegetables, whole grains, legumes, soy. Non-fat dairy foods (≤2 servings/d) and egg-whites. Eliminate meat, poultry, fish. Added/refined sugars limited to ≤2 servings/d.

1. https://authoritynutrition.com/the-nordic-diet-review/
2. https://www.ornish.com/proven-program/nutrition/

Whole vs Refined Carbohydrates

Whole (Complex) Grains

- Derived from seeds of grasses
- Include rice, oats, rye, wheat, wild rice, quinoa, barley, buckwheat, bulgur, corn, millet, amaranth, and sorghum
- Zero cholesterol and low in fat

Refined (Simple) Grains

- Bran and germ removed, leaving only endosperm
- End-product is stripped of vitamins, minerals, and fiber

Endosperm
Bran
Germ

Grain Anatomy
WholeGrainsCouncil.Org
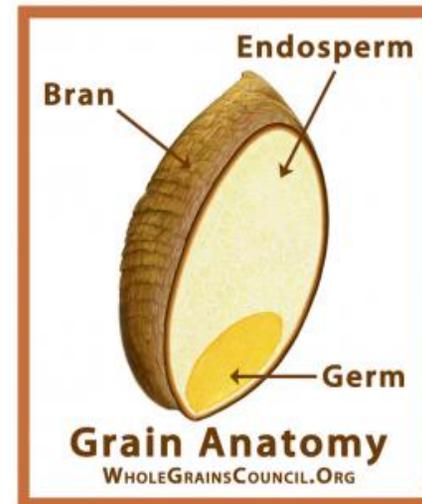
Soluble vs Insoluble Fiber

Soluble Fiber

- Dissolvable in water
- Found in oats, barley, beans, peas, apples, citrus fruits, carrots, and seaweed
- Lowers cholesterol and blood glucose

Insoluble Fiber

- Improves digestion and constipation
- Increases satiety and removes toxins
- Found in vegetables (asparagus, celery), wheat bran, whole grains, and nuts

Plant Stanol Esters and Soluble Fiber

- Plant stanol esters (~2 g daily) and soluble fiber (10-25 g daily) augment lipid value improvements[1-3]

- Diets higher in soluble fiber produced total cholesterol reductions of 5%-19% and LDL-C reductions of 8%-24%[4-8]

- Substitution of conventional home dietary fats with margarine containing plant stanol esters can reduce LDL-C levels by 15%-20% [9-12]

  - Have been incorporated spreads and dressings, breads and cereals, low-fat milk and yogurt, and, in the U.S., orange juice[13]

LDL-C = low-density lipoprotein cholesterol.
See notes for references.

Types of Fats

- **MUFA** (monounsaturated fatty acids)
  - Found in olives, peanuts, avocados, pecans, almond oil and canola oil

- **PUFA** (polyunsaturated fatty acids)
  - Make up omega-3 and omega-6
  - Found in walnuts, flaxseeds, hempseeds, vegetable oils (soybean, and flaxseed), fish, and marine oils

- **SFA** (saturated fatty acids)
  - Found primarily in animal products
  - Raise cholesterol and promote heart disease

- **TFA** (trans fatty acids)
  - If you see *hydrogenated* or *partially hydrogenated*, stay away!

LDL-C = low-density lipoprotein cholesterol.

See notes for references.

CV Risks and Fat Intake

- Substituting MUFAs and PUFAs for saturated fatty acids leads to decreased LDL-C levels[1-2]

  - Slightly greater LDL-C reductions with PUFAs than MUFAs

- High intake of PUFAs may reduce HDL-C and TG levels[1-6]

  - Substitution of MUFAs for saturated fatty acids minimally effects HDL-C values and does not raise TG levels

- Diets high in *trans* fatty acids are associated with an increased risk of ASCVD[5]

  - Intake of *trans* fatty acids associated with both increased LDL-C and decreased HDL-C levels

  - On a per calorie basis, risk with trans fatty acids higher than with any other macronutrient

ASCVD = atherosclerotic cardiovascular disease; HDL-C = high-density lipoprotein cholesterol; LDL-C = low-density lipoprotein cholesterol; MUFA = monounsaturated fatty acid; PUFA = polyunsaturated fatty acid; TG = triglycerides.
See notes for references.

How Much Protein Do We Need?

- The average American diet contains ~ 120 grams of protein

- RDA for adults is 0.8 gram/kg/day

- Multiple studies correlate meat consumption with diabetes, inflammation, obesity, CVD, dyslipidemia, hypertension, CKD, and Cancer
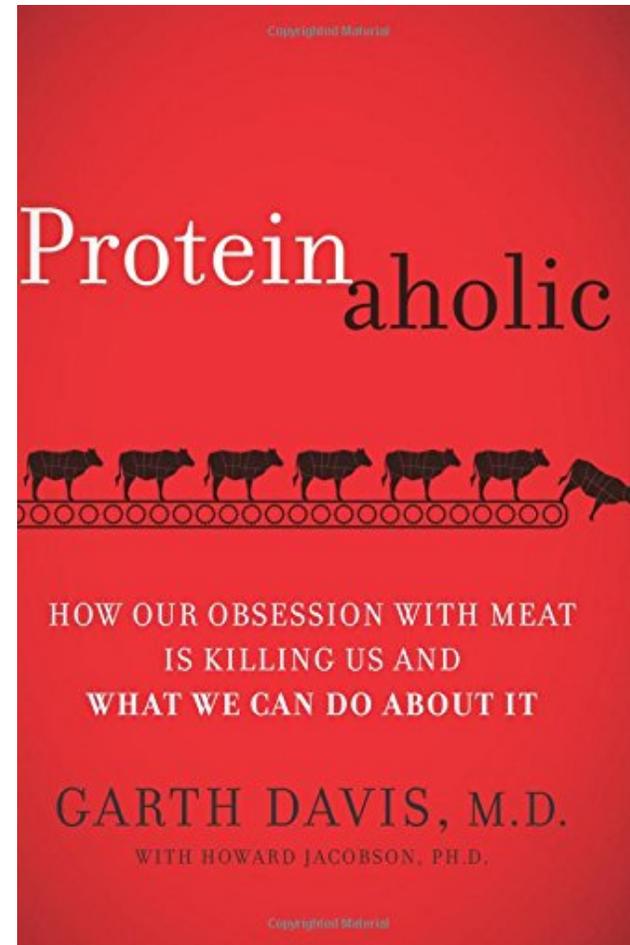
Red Meat Consumption and Mortality

- **Results from 2 Prospective Cohort Studies**
  - 1980-2008 Nurses Health Study: N=83,644 women, aged 35-55 years
  - 1986-2008 Health Professionals Follow-up Study: N=37,698 men, aged 40-75 years

- **1 serving per day (3 oz) increase in red meat corresponded to:**
  - 13% increase in total mortality (unprocessed red meat)
  - 20% increase in total mortality (processed red meat)
  - 3 oz meat is the same size as a deck of cards

Pan et al. *Arch Intern Med*. 2012 Apr 9;172(7):555-63.

Practical Tips

- Get personal histories and preferences-be culturally sensitive

- Physician personal behaviors are important

- Avoid using abstract quantifiers (eg, calories and grams)

- Use easy descriptors (eg, palm size, "small", cup, etc.)

- Provide web-based (free) resources for patients (e.g., DASH, Mediterranean)

- Teach food safety and basic cooking

- Encourage patients to make shopping lists (shop for food after meals)

- Teach patients how to read nutrition facts labels

Conclusions

- Many factors cluster and contribute to CVD risk

- Nutrition and diet are key components of lifestyle therapy, which underlies prevention and treatment of CVD and many of its contributing factors (dyslipidemia, diabetes, overweight/obesity, dyslipidemia)

- Consume plant-based diet, high in fiber, low in calories/glycemic index, and high in phytochemicals/antioxidants

- Nutrition and specialized diets can augment lipid value reductions, reduce CVD risk, and improve health