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\(^1-4\)

What are the Recommendations for Medical Nutrition Therapy?

Clinical Treatment Guidelines
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

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

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)

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

# Healthful Eating Recommendations: Nutritional Components

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

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

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.

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

<table>
<thead>
<tr>
<th>BMI (kg/m²)</th>
<th>P-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.5 to 25.0</td>
<td>0.02</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>25.0 to &lt;30</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>≥30</td>
<td>0.51</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.5 to 25.0</td>
<td>0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>25.0 to &lt;30</td>
<td>0.15</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>≥30</td>
<td>0.12</td>
<td>0.002</td>
</tr>
</tbody>
</table>

Favors Mediterranean diet

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

### Key Features of Specialized Diets 1 of 2

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

**DASH** = Dietary Approaches to Stop Hypertension

### Key Features of Specialized Diets-2 of 2

<table>
<thead>
<tr>
<th>Meal Plan</th>
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<th>Composition</th>
<th>Recommended food choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ornish²</td>
<td>Unrestricted unless goal is to lose weight ≤10% of calories from fat &lt;10 mg cholesterol/d</td>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

1. [https://authoritynutrition.com/the-nordic-diet-review/](https://authoritynutrition.com/the-nordic-diet-review/)
2. [https://www.ornish.com/proven-program/nutrition/](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
# Soluble vs Insoluble Fiber

<table>
<thead>
<tr>
<th>Soluble Fiber</th>
<th>Insoluble Fiber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolvable in water</td>
<td>Improves digestion and constipation</td>
</tr>
<tr>
<td>Found in oats, barley, beans, peas, apples, citrus fruits, carrots, and seaweed</td>
<td>Increases satiety and removes toxins</td>
</tr>
<tr>
<td>Lowers cholesterol and blood glucose</td>
<td>Found in vegetables (asparagus, celery), wheat bran, whole grains, and nuts</td>
</tr>
</tbody>
</table>
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%\(^9-^\text{12}\)
  - 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.
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

Practical Tips

- Get personal histories and preferences—be culturally sensitive
- Physician personal behaviors are important
- Avoid using abstract quantifiers (e.g., calories and grams)
- Use easy descriptors (e.g., 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