Current Nutrition Guidelines –
Incorporating the NLA
Recommendations Part 2

Lori Alexander, MSHS, RDN, CCRC,
CLS, FNLA

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Primary Learning Objectives

• Describe effective diet and lifestyle strategies for long-term dyslipidemia and obesity management
• Describe the association of specific dietary patterns and the role they play in the prevention and treatment of ASCVD
• Learn how nutritional supplements can enhance reductions in atherogenic cholesterol
• Compose a clinical care plan for reducing risk of CVD in patients with dyslipidemia
Presentation Outline

Part 1: NLA Part II Recommendations

Part 2: Impact of Dietary Patterns and Macronutrients on Lipids

Part 3: Practical Approach to Weight Loss

Part 4: Effect of Nutritional Supplements on Lipids
NLA Part II Nutrition Recommendations for Dyslipidemia Management

- NLA Part II recommends healthy dietary patterns as an integral component of treatment plans for management of dyslipidemia and ASCVD event risk reduction at all levels of risk
- <7% of energy from saturated fatty acids
- Minimal intake of trans fatty acids
- <200 mg/day dietary cholesterol
- Alcohol in moderation (if of legal drinking age!)
- Manage overweight or obesity; weight loss of 5-10%
- May use plant sterols/stanols and viscous fiber
- Manage TG levels >150 mg/dL with lifestyle therapy and TG >1000 mg/dL with <15% of calories from fat
NLA Part II Nutrition Recommendations for Dyslipidemia Management

- Therapeutic doses of EPA/DHA 2-4 g/day for TG lowering
- >2 servings/week of fish/seafood
- Consider 1 g/day EPA/DHA for patients with known ASCVD or heart failure
- ALA intake of 0.6-1.2 % of energy
- At least 3 servings/day of fiber-rich whole grains
- >4 servings/week of nuts/legumes
- Use of soy protein foods as replacement for foods high in saturated fat
- Nutrition education by a RDN with follow-up and monitoring
Part 2

The Impact of Dietary Patterns and Macronutrients on Lipids
Components of the DASH Diet (based on 2000 kcal daily)

<table>
<thead>
<tr>
<th>Food Group</th>
<th>Daily Servings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grains (whole grains recommended)</td>
<td>6-8 [½ cup servings]</td>
</tr>
<tr>
<td>Vegetables</td>
<td>4-5</td>
</tr>
<tr>
<td>Fruits</td>
<td>4-5</td>
</tr>
<tr>
<td>Fat-Free or Low-Fat Dairy</td>
<td>2-3</td>
</tr>
<tr>
<td>Lean Meat, Poultry, and Fish</td>
<td>6 or less [1oz lean meat/fish or 1 egg]</td>
</tr>
<tr>
<td>Nuts, Seeds, and Legumes</td>
<td>4-5 weekly</td>
</tr>
<tr>
<td>Fats and Oils</td>
<td>2-3</td>
</tr>
<tr>
<td>Sweets and Added Sugars</td>
<td>5 or less weekly</td>
</tr>
</tbody>
</table>

Predimed
Prevención con Dieta Mediterránea
Primary Prevention of Cardiovascular Disease with a Mediterranean Diet: The PREDIMED trial

- Participants (n = 7447) at high CVD risk with no CVD were randomly assigned to:
  - Mediterranean diet supplemented with \approx 50 \text{g/d of extra-virgin olive oil} (1 \text{L/week/family})
  - Mediterranean diet supplemented with mixed nuts (30 \text{g/d; 15 g walnuts; 7.5 g almonds; 7.5 g hazelnuts})
  - Control diet (advice to reduce dietary fat)

- Participants received quarterly individual and group education sessions and either free extra-virgin olive oil or mixed nuts.

- The primary end points was the rate of major CV events (myocardial infarction, stroke, or death from CV causes). The trial was stopped after 4.8 years and not continued for 6 years, as planned.

PREDIMED Trial: The Incidence of Acute Myocardial Infarction, Stroke, and Death from Cardiovascular Causes by Treatment

Primary End Point (acute myocardial infarction, stroke, or death from cardiovascular causes)

- Med diet, EVOO: hazard ratio, 0.70 (95% CI, 0.53–0.91); P=0.009
- Med diet, nuts: hazard ratio, 0.70 (95% CI, 0.53–0.94); P=0.02

<table>
<thead>
<tr>
<th>No. at Risk</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control diet</td>
<td>2450 2268 2020 1583 1268 946</td>
</tr>
<tr>
<td>Med diet, EVOO</td>
<td>2543 2486 2320 1987 1687 1310</td>
</tr>
<tr>
<td>Med diet, nuts</td>
<td>2454 2343 2093 1657 1389 1031</td>
</tr>
</tbody>
</table>

Effect of Dietary Cholesterol on Total-C and LDL-C Levels


• More recent meta-analysis of 40 studies (Berger et al. 2015)

• NLA Expert Panel – available data consistent with conclusion that dietary cholesterol has modest effects to increase total-C and LDL-C levels on average, although there are hypo- and hyper-responders in the population

• <200 mg/day dietary cholesterol
Types of Saturated Fat

- Lauric acid (12:0)
- Myristic acid (14:0)
- Palmitic acid (16:0)
- Stearic acid (18:0)*

*Saturated Fat (i.e., saturated fatty acid)  
Unsaturated Fat (i.e., unsaturated fatty acid)

- H H  
  ||  
  -C-C-  
  ||  
  H H  

*Effect is neutral as it is converted to monounsaturated fat in the body

Current intake of saturated fat in US  
= 11% of calories

http://www.cfsan.fda.gov/~dms/qatrans2.html#s1q2
TFAs

- Facts About TFA
  - More densely packed than the cis mono fatty acids
  - ~ 2-3 % of energy intake is TFA

- If TFA Are Consumed in High Amounts
  - ↑ LDL-C
  - ↓ HDL-C

- Major Sources of Dietary TFA
  - Baked goods (cookies, donuts, biscuits, pies)
  - Snack foods (crackers, chips)
  - Stick margarine, shortening (fries, fried foods)
Mono-Unsaturated Fatty Acids (MUFAs)

• National dietary guidelines increasingly recommend MUFAs*

• Consumption of MUFA
  – Promotes healthy lipid profiles
  – Mediates blood pressure
  – Improves insulin sensitivity
  – Regulates glucose levels

* Enhancing MUFA intakes up to 25% of energy

Poly-Unsaturated Fatty Acids (PUFAs)

- Fatty acids that contain more than one double bond in their backbone
- Some omega 3 (alpha-linolenic acid) and omega 6 (linoleic acid) are ‘Essential’ in diet since mammals lack ability to add double bonds in fatty acids beyond carbon 9 and 10
Replacements for Saturated and Trans Fatty Acids in the Diet

- OmniHeart – randomized, controlled feeding trial evaluated the effects of 2 variants of the DASH dietary pattern on lipoprotein lipids and BP in patients with pre-HTN and stage 1 HTN (Appel 2005):

1) high CHO, low sat. fat (58% CHO, 27% fat, 15% protein
2) higher protein diet where 10% of CHO replaced with mixed-source protein
3) unsat. Fat diet where 10% of CHO replaced with unsat. Fats (8% MUFA, 2% PUFA)
### Table 2. Changes from baseline lipoprotein lipid levels by diet in OmniHeart

<table>
<thead>
<tr>
<th>Diet (% Energy from carbohydrate/protein/fat)</th>
<th>Habitual Baseline Diet (Various)</th>
<th>Carbohydrate Diet (58/15/27)</th>
<th>Protein Diet (48/25/27)</th>
<th>Unsaturated Fat Diet (48/15/37)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean, mg/dL</td>
<td>Mean or Median Change from Baseline, mg/dL</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>LDL-C</td>
<td>129</td>
<td>-11.6&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-14.2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-13.1&lt;sup&gt;a,b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Non-HDL-C</td>
<td>154</td>
<td>-11.9&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-17.3&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-15.1&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>HDL-C</td>
<td>50</td>
<td>-1.4&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-2.6&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-0.3&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>102</td>
<td>0.1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-16.4&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-9.3&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Abbreviations: LDL-C, low density lipoprotein cholesterol; HDL-C, high-density lipoprotein cholesterol, non-HDL-C, non-high-density lipoprotein cholesterol. Different letters denote statistically significant differences in response, p < 0.05

Omega-3 Fatty Acids

- Consumption of 250-550 mg/day EPA and DHA associated with a 36% lower risk of CHD death and reduced mortality by 17% (Mozaffarian, Rimm 2006)
- 2010 DGA recommended 250 mg/day of EPA and DHA (USDA and HSHHS 2010)
- Academy of Nutrition and Dietetics recommends 500 mg/day (Vannice 2014)
- AHA 2020 issued impact goals to improve the CV health of all Americans included a recommendation for fish: > 2, 3.5 oz. servings/week (preferably oily fish) (Lloyd-Jones 2010)
Management of TG

- Weight loss – a 5-10% weight loss lowers TG about 20%
- Mediterranean diet pattern is consistently shown to lower TG
- A low fat diet that is high in refined starches and simple CHO’s is not recommended
- Partial replacement of refined grains and added sugars with fiber-rich whole grains and other complex CHO will lower TG
- Preferred dietary substitute for refined grains and ased sugars are foods high in unsat. Fats, protein and fiber-rich whole grains, nuts, seeds and legumes
Part 3

Practical Approach to Weight Loss
US Obesity Rates

• Rate inched up to 27.7% in 2014; was 27.1% in 2013 and 25.5% in 2008

• Increased most among Americans aged >65 since 2008 (Gallup-Healthways well-being index)

• Another self-reported government survey, the Behavioral Risk Factor Surveillance System – 29.4% for age >18 in 2013

• CDC uses clinical measurements of ht/wt as part of NHANES – latest from 2011-2012 – 34.9% obesity rate for adults age > 20
200-300 kcal Increase in Mean Caloric Intake in U.S. Since 1970’s (Mostly carbohydrates)

Total

- Carb
- Fat

Men

<table>
<thead>
<tr>
<th>Year</th>
<th>Calories</th>
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<tbody>
<tr>
<td>1970</td>
<td>1039</td>
</tr>
<tr>
<td>1975</td>
<td>904</td>
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<tr>
<td>1980</td>
<td>898</td>
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<td>1285</td>
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<tr>
<td>1995</td>
<td>1282</td>
</tr>
<tr>
<td>2000</td>
<td>2618</td>
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Women

<table>
<thead>
<tr>
<th>Year</th>
<th>Calories</th>
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<tbody>
<tr>
<td>1970</td>
<td>557</td>
</tr>
<tr>
<td>1975</td>
<td>548</td>
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<tr>
<td>1980</td>
<td>601</td>
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<td>1985</td>
<td>616</td>
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<tr>
<td>1990</td>
<td>910</td>
</tr>
<tr>
<td>1995</td>
<td>969</td>
</tr>
<tr>
<td>2000</td>
<td>1877</td>
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http://www.cdc.gov.revproxy.brown.edu/nchs/data/hus/hus05.pdf#027
Effects of Weight Loss on Lipoprotein Levels

• Review of RCT’s show clinically meaningful changes in CVD risk indicators are associated with a loss of at least 2.5-3% of body weight (Bays 2013)
• Sustained weight loss of 5-8 kg results in a mean LDL-C reduction of 5 mg/dL, a mean increase in HDL-C of 2-3 mg/dL and > 15 mg/dL decrease in TG
• Loss of at least 3% body weight also produces favorable changes in other ASCVD risk indicators – blood pressure, glycemia and insulin resistance (Bays 2013)
**Exercise or Caloric Restriction for Weight Loss: Achieving 300 kcal Negative Energy Balance**

**Reduce intake by:**
- Eliminating 2 oz potato chips
- Or

**Or increase activity by:**
- Running 3 miles in 30 min
- Or

- Substituting 2 diet sodas for 2 regular sodas
- Bicycling 8 miles in 30 min
Weight Changes During 2 Years with a Low-Carbohydrate, Mediterranean, or Low-Fat Diet

322 moderately obese subjects were randomly assigned to one of three diets:
- Low-fat, restricted-calorie (n=104);
- Mediterranean, restricted-calorie, (n=109);
- Low-carbohydrate, non-restricted-calorie (n=109).

Comparison of weight-loss diets with different compositions of fat, protein, and carbohydrates

- 811 overweight adults were randomly assigned to one of four diets.
- The diets consisted of similar foods and met guidelines for cardiovascular health. The participants were offered group and individual instructional sessions for 2 years. The primary outcome was the change in body weight after 2 years in two-by-two factorial comparisons of low fat versus high fat and average protein versus high protein and in the comparison of highest and lowest carbohydrate content.

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Low Fat, Average Protein</th>
<th>Low Fat, High Protein</th>
<th>High Fat, Average Protein</th>
<th>High Fat, High Protein</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHO (%)</td>
<td>- 65, 58, 53 (51)</td>
<td>- 55, 53, 51</td>
<td>- 45, 49, 49</td>
<td>- 35, 43, 43</td>
</tr>
<tr>
<td>Protein (%)</td>
<td>- 15, 18, 20</td>
<td>- 25, 22, 21</td>
<td>- 15, 18, 20</td>
<td>- 25, 23, 21</td>
</tr>
<tr>
<td>Fat (%)</td>
<td>- 20, 26, 27</td>
<td>- 20, 26, 28</td>
<td>- 40, 34, 33</td>
<td>- 40, 34, 35</td>
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<tr>
<td>SFA (%)</td>
<td>- &lt;8%, 8, 8</td>
<td>- &lt;8%, 8, 9</td>
<td>- &lt;8%, 9, 10</td>
<td>- &lt;8%, 9, 11</td>
</tr>
</tbody>
</table>

Breakfast Makeover: Replace Simple Carbohydrates with Fiber, MUFA/PUFA

**Original Breakfast**
- 12 oz café mocha
- Blue Berry Muffin 120 g
- 16 oz juice

270 Calories + 460 calories + 204 calories = 934 cal

**Breakfast Makeover**
- Coffee with 2 oz skim milk
- 2 medium slices of Turkey bacon
- 1 small Bran muffin (66g)
- Small banana

40 calories + 80 calories + 180 calories + 120 calories = 420 cal
Address the Obesity Epidemic via Small Changes Approach*

- Small changes are more feasible to achieve and maintain than large changes
  - 2000 more steps/day (expends extra 100 kcal)
  - Simple food substitutions (Replace regular 12-oz soda with diet soda, ↓ caloric intake 150 kcal)
- Small changes can impact body weight regulation
  - Slight energy discrepancy (higher intake + lower output) has created an “energy gap” → weight gain
  - Average energy gap in adults is ~ 100-200 kcal/day

*Report of the Joint Task Force of the American Society for Nutrition, Institute of Food Technologists, and International Food Information Council; Endorsed by the American Dietetics Association, the American Heart Association and the American Cancer Society

Resources:  [www.smallstep.gov](http://www.smallstep.gov)  [www.surgeongeneral.gov/priorities/prevention/]

Practical Approach to Maximize Satiety and Achieve Meaningful Weight Loss and Weight Management

1. Individualized balance of Carbs / Fats / Protein for sustained adherence—Focus on FOOD
   - Right Fats (mono- and poly- unsaturated, omega 3’s)
   - Right Carbs (high fiber, low glycemic index, complex)
   - Right Protein (plant, marine, and lean animal sources)

2. Limit or eliminate sugar, high fructose corn syrup, and refined starches and snack foods

3. Reduce or eliminate all calories from beverages

4. Smaller portions, low energy density, high nutrient density

5. Consider book-keeping of calories, points, etc

6. Drink (and eat) water

7. Exercise for life

8. Get adequate sleep
Part 5

The Effect of Nutritional Supplements on Lipids
Plant Sterols and Stanols

- Occur naturally
- Are structurally similar to cholesterol
- Mechanism of action – reduces intestinal cholesterol absorption by competing with cholesterol for limited space in mixed micelles, results in reduced hepatic cholesterol content, upregulation of hepatic LDL-C receptors that remove apo-B containing lipoproteins
- ~150-400 mg/d provided by typical western diet
- Higher intakes (1-3 g/d) are needed to ↓ atherogenic lipoproteins
- >40 (also called phytosterols)
Viscous Fibers for Lowering Atherogenic Lipoproteins

- TC, LDL-C, Apo B, and non-HDL-C are lowered by viscous fibers
- Insufficient evidence available to determine if the type of viscous fiber has a material impact on clinical response
- Meta-analysis from 55 studies of oat fiber, psyllium, pectin, and guar gum indicates that each gram of viscous fiber in the “practical” range of 2-10 g/d → ↓1.7 mg/dL in LDL-C
- Adding 5-10 g/d of viscous fiber to the diet would be expected to → ↓ LDL-C by ~6.5-13%

Apo B = apolipoprotein B

1. FDA. 2008.
Interventions in Dietary Portfolio Study

1. **Control Diet**
   - Very low in saturated fat
   - Whole wheat cereals
   - Low-fat dairy foods

2. **Control Diet + Lovastatin 20 mg/day**

3. **Portfolio Diet (high in 4 components)**
   - Plant sterols (1 g/1000 kcal)
   - Soy protein (21.4 g/1000 kcal)
   - Viscous fibers (9.8 g/1000 kcal)
   - Almonds (14 g/1000 kcal)

Results of Portfolio Diet: Lipids and CRP

Summary
NLA Part II Nutrition Recommendations – Take Home Pearls

- Decrease consumption of saturated fats and *trans* fatty acid, limit cholesterol intake
- Increase dietary intake of MUFA and PUFA
- Increased dietary and supplemental fiber
- Plant sterols and stanols (2 g/d)
- Fish/seafood or EPA/DHA supplements
- Soy protein, nuts
- Weight loss if needed, exercise
- Alcohol in moderation
- Referral to a registered dietitian nutritionist
Resources


AHA

• Fat Calculator - http://www.myfatstranslator.com/
• Healthy Lifestyle Page - http://www.americanheart.org/presenter.jhtml?identifier=1200009
• AHA – My Life Check™ - http://mylifecheck.heart.org/

NHLBI


AND

• Find a Registered Dietitian - http://www.eatright.org/cps/rde/xchg/ada/hs.xsl/index.html

USDA/HHS