Nutrition - How the Mediterranean-Style Eating Pattern and Other Diets Relate to Diabetes Management

Alison Evert, MS, RD, CDE
University of Washington Medical Center
Endocrine/Diabetes Care Center
## Disclosures

<table>
<thead>
<tr>
<th>AFFILIATION/FINANCIAL INTERESTS (prior 12 months)</th>
<th>CORPORATE ORGANIZATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grants/Research Support:</td>
<td>N/A</td>
</tr>
<tr>
<td>Scientific Advisory Board/Consultant:</td>
<td>N/A</td>
</tr>
<tr>
<td>Speakers Bureau:</td>
<td>N/A</td>
</tr>
<tr>
<td>Stock Shareholder:</td>
<td>N/A</td>
</tr>
<tr>
<td>Other</td>
<td>Book Royalties – Academy of Nutrition &amp; Dietetics, American Diabetes Association</td>
</tr>
</tbody>
</table>
So...where do our patients really get advice about their nutrition advice?
To Complicate Things…

- Over time nutrition recommendations change

For example:

Therefore – thanks for the invitation!
Nutrition Terminology Update

- Diet: “a term that implies intake of specific intake of nutrition or calorie level for weight management or health, with the two often being unrelated”
- Diet: “die” with a “t”
- Eating Pattern: “describes combinations of foods or food groups that characterize relationships between nutrition, health promotion and disease prevention”

Outline

• Historical perspective – evolution of recommendations
• Frame of reference – what do people with diabetes really eat?
• Review nutrition research about eating plans or eating patterns for people with diabetes, or lack there of…
• Provide tips and strategies – for clinical practice
Hope to Answer the Question: What Can My Patient Eat?
Goals of Diabetes Nutrition Therapy

- Promote healthful eating – focus on the quality of the food (more whole, less processed)
- Assist in achieving glycemic, lipid and blood pressure goals
- Thorough assessment, address individual needs in a collaborative process - a variety of nutrition therapy interventions are effective
- Maintain pleasure of eating while limiting food choices only when indicated by scientific evidence!

*Diabetes Care.* 36:3821-3842, 2013
Historically Focus on “Ideal” Macronutrient Percentages

Table 1—Historical perspective of nutrition recommendations

<table>
<thead>
<tr>
<th>Year</th>
<th>Carbohydrate</th>
<th>Protein</th>
<th>Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before 1921</td>
<td>20</td>
<td>Starvation diets</td>
<td>70</td>
</tr>
<tr>
<td>1921</td>
<td>20</td>
<td>10</td>
<td>70</td>
</tr>
<tr>
<td>1950</td>
<td>40</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>1971</td>
<td>45</td>
<td>20</td>
<td>35</td>
</tr>
<tr>
<td>1986</td>
<td>≤60</td>
<td>12–20</td>
<td>&lt;30</td>
</tr>
<tr>
<td>1994</td>
<td>*</td>
<td>10–20</td>
<td>*†</td>
</tr>
</tbody>
</table>

*Based on nutritional assessment and treatment goals. †Less than 10% of calories from saturated fats.
There Is No “ADA DIET”


• Mean carbohydrate intake for adults > 20 years (% of kilocalories):
  – Women: 50.7%
  – Men: 48%

• “Medical nutrition therapy (MNT) for people with diabetes should be individualized, with consideration given to usual eating habits and other lifestyle factors”

2Diabetes Care. 21(S1):S32-S35, 1998
Macronutrient Percentages In Participants With Diabetes

- Look AHEAD Trial: Type 2 diabetes (n=5125)
- Food frequency survey of participants (n=2757)
  - 44% calories from carbohydrate,
  - 40% calories from fat
  - 2/3 consuming > 10% calories from saturated fats
  - less than 50% met minimum DGA recommendations for servings fruit, vegetables, dairy foods, and whole grains

How Are Nutrition Recommendations Developed?
Evidence-based Recommendations

- ADA Position Statements
- Based on systematic review, follow IOM guidelines, including critical peer review
- Provides a scientific rationale for position statements
- Search criteria: adults with DM, sample size >10, excluded meal studies, > 12 wks, retention >80%; studies published Jan 2001 to Oct 2010¹

- Recent Academy of Nutrition and Dietetics – Evidence Analysis Library 2015 Diabetes Update²

Issues with Nutrition Research

• Large, rigorous clinical trials lacking
• Nutrition therapy trials – difficult to control treatment arms & very expensive
• Most studies short term (12 - 52 wks) – diabetes life long disease!

Can outcomes be implemented long-term with “real-world” eating?
Question: Is there an \textit{optimal} macronutrient ratio for glycemic management and CVD risk reduction in people with diabetes?
Evidence suggests that there is not an ideal percentage of calories from carbohydrate, protein, and fat for all people with diabetes (B), therefore macronutrient distribution should be based on individualized assessment of current eating patterns, preferences, and metabolic goals. (E)

Diabetes Care. 36:3821-3842, 2013
Academy of Nutrition and Dietetics
Ideal Macronutrient Amount?

- No significant effects on A1c or insulin levels when differing amounts of carb (39-57% of energy intake), independent of weight loss

- What emerges from the evidence is the importance of total energy intake rather than the source of the energy

American Academy of Nutrition and Dietetics Evidence Analysis Library. Available at: http://www.andeal.org
ADA 2013 Nutrition Recommendations  
Included NEW Section  
~ Eating Patterns ~

- A variety of eating patterns (combinations of different foods or food groups) are acceptable for the management of diabetes. Personal preferences (e.g., tradition, culture, religion, health beliefs and goals, economics) and metabolic goals should be considered when recommending one eating pattern over another (E).

Diabetes Care. 36:3821-3842, 2013
What Can My Patient Eat?
Paleo Eating Plan
Paleo Food/Beverage Choices

- YES
  - Wild Seafood, Free-range Fowl & Eggs
  - Grass-feed Red Meat & Wild Game
  - Vegetables
  - Fruits
  - Nuts/Seeds
  - Animal Fat
  - Coconut & Olive Oil
  - Avocado
  - Water, Coffee, Tea

- NO
  - Grains, Soy, Corn
  - Potatoes
  - Legumes
  - Dairy
  - Refined Oils
  - Alcohol
  - Sugar & Artificial Sugar
  - Added Salt
  - Processed Foods
What’s the Evidence ~ Paleo

• PubMed search – “Paleolithic diet and diabetes” = 23 articles, many reviews and commentaries

• One Systematic Review and Meta-analysis (2015): Paleolithic nutrition and metabolic syndrome
  – 4 RCT, 159 subjects
  – Only 2 of the RCT, 55 subjects had T2D or “elevated BGs”
What’s the Evidence

• Subjects with elevated BGs* or T2D**:
  – Lindeberg (2007)*, n=38, 6 wk, 76% retention, Paleo vs. Med-style Eating Pattern,
  – Jonsson (2009)**, n=13, 3 mo, 76% retention, Paleo vs. “Diabetic Diet”, **

• Subjects with metabolic syndrome:
  – Melberg (2014), n=70, 6 mo, 84% retention, Paleo vs. “Nordic Nutr Rec”
  – Boers (2014), n=34, 2 week, 89% retention, Paleo vs. “Dutch Health Guidelines”

Paleolithic nutrition eating plans resulted in greater short-term improvements in 3 metabolic components:
- WC, TG, BP – both DBP & SBP than control eating plans

Did not reach significance in 2 components:
- HDL-chol & FBG

“Moderate” quality evidence of greater weight loss than control eating plans
Paleo ~ Implications for Practice & Future Research

- Long-term adherence?
- Costs?
- Conflicting research – dairy & whole grains may reduce risk T2D
- Longer trials needed
Paleo ~ Science to Table
Recommendations

• Bone health: lack of dairy – risk for deficiencies in calcium and vitamin D
• Saturated fat and protein: intakes beyond recommended levels – increasing the risk of kidney and heart disease and certain cancers
• As a dietetic professional - How legumes can be bad for you???
• For some people – it is easier to give up on categories of food
Paleo Resources
*(not an endorsement)*

- **Books:**
  - *Paleo Diet* by Loren Cordain, PhD
  - *Paleo Solution* by Robb Wolf
- **Recipes:**
  - [www.paleoplan.com/recipes](http://www.paleoplan.com/recipes)
Plant-Based Eating Plan
Plant-Based Food/Beverage Choices

• Vegetarian (lacto-ovo) or Vegan/Vegan-LF
• Grains: rolled oats, whole-grain bread, brown rice, quinoa, whole wheat pasta
• Beans, legumes
• Plant-based protein: tofu, tempeh, seitan
• Fruits
• Vegetables
• Milk-like products: soy, rice, almond, coconut
• Nuts, seeds
What’s the Evidence ~ Plant-Based

- ADA 2013 Nutrition Recommendations:
  - Literature review: 4 RCTs and 2 f/u studies
  - Participants in studies ranged from 11 to 99
  - Study length 12 to 24 weeks
- Results:
  - Might be beneficial for improving glycemic control and weight loss, more research needed

*Diabetes Care.* 36:3821-3842, 2013
Plant-Based ~ Implications for Practice & Future Research

- Gastro-intestinal issues
- Cost: food and preparation time
- Longer trials needed
- Metformin – long-term use & Vitamin B12 status, need to check
- Nutrient deficiencies?
Plant-Based Science to Table Recommendations

- **Vitamin B12 Supplementation**: 2.4μ/day and/or fortified foods - meat analogs, breakfast cereals
- **Iron**: green, leafy vegetables and legumes.
- **Protein**: assortment plant foods eaten over the day provides all essential amino acids and adequate nitrogen retention.
- **Omega-3’s**: ground flaxseeds, walnuts
- **Vitamin D**: Sun exposure, ergocalciferol from non-animal sources
- **Calcium**: Bok choy, broccoli, kale, and fortified foods - juices, breakfast cereals, non-dairy milk
Plant-Based Resources

- Becoming Vegetarian or Becoming Vegan
  - By Brenda Davis, RD and Vesanto Melina, MS, RD
- www.vegankit.com or www.recipe.kitchen
- Physicians Committee for Responsible Medicine:
  - Power Plate: www.PowerPlate.org
  - 21-Day Vegan Kickstart: www.21DayKickstart.org
  - Patient Education Materials: http://www.pcrm.org/health/healthcare-professionals
Low Carbohydrate Eating Plan
Terminology Review: What is Low-Carb Eating Plan?

• Definitions for carbohydrate intake not well defined: $\geq 45\% - 55\% = \text{HIGH}$ and $< 25\% = \text{LOW}$
• Ketogenic diet $< 20 \text{ g/day}$ whereas others define as $< 50 \text{ g/day}$
Low-Carb Diet (LCD) Food/Beverage Choices

- **Protein**: (meat, poultry, fish, shellfish, eggs, cheese, nuts and seeds)
- **Fats**: (oils, butter, olives, avocado),
- **Vegetables low in carb**: (salad greens, cucumbers, broccoli, cauliflower, etc…)
- **Fruit and “starchy” vegetables** usually allowed in moderation
- **Sugar-containing foods and grain products** such as pasta, rice, and bread are generally avoided.
Before You Spend $26,000 on Weight-Loss Surgery, Do This

By SARAH HALLBERG and OSAMA HAMDY  SEPT. 10, 2016
ADA 2013 Nutrition Recommendations

• Did not have a LCD graded recommendation
• LCD studies did not meet inclusion criteria for >80% retention rate
• Results mixed:
  – Some studies comparing LCD vs HCD revealed improvements in HDL-chol, total-chol, and triglycerides
  – A few found no significant differences
• In many, weight loss occurred – confounding the results
Systematic review & meta-analysis (2015)
- Inclusion criteria PWD > 18 yrs, ≥ 4 wks, carb intake ≤ 45% total energy intake
- 12 RCT
- Stated “issues with adherence” – but did not specify

Results ~ Low Carb

- Carb intake between LCD and HCD converged to moderate intake by studies end
- Carb intake at 1 yr on LCD (< 50g) ranged from 132-162 g = 8g at 104 wks
- Based on these studies no greater in improvements clinical outcomes b/w LCD/HCD
- Total energy intake best predictor of body weight
- LCD not significantly different from HCD – effect on metabolic markers or glycemic control.

Results ~ Low Carb
Since 2013 ADA Nutr Rec

- RCT; n=115 obese, T2D, 1 year
- Compared effects hypo-caloric LCD <50g CHO (14% CHO, 28% Pro, 58% Fat) vs. hypo-caloric HCD (53% CHO, 17% Pro, 30% Fat)
- Nutrition interventions: 6 (1:1) and 9 (group)
- Results:
  - completion rates LCD – 71%, HCD – 65%
  - Weight: LCD – 9.8kg, HCD – 10.1kg
  - A1C: both -1.0%

Results ~ Low Carb
Since 2013 ADA Nutr Rec

• Results Continued:
  – LCD greater mean reductions in diabetes medication
  – LCD achieved greater improvements in HDL-chol and triglycerides (P<0.001)
Low Carb – “food for thought”

• American Diabetes Association 2013 Nutrition Recommendations:
• The amount of carbohydrates and available insulin may be the most important factor influencing glycemic response after eating and should be considered when developing the eating plan. (A)

*Diabetes Care.* 36:3821-3842, 2013
NATURAL HISTORY OF T2D

Adapted from International Diabetes Center (Minneapolis, MN).

Years of Diabetes

Glucose (mg/dL)

Relative Function (%)

Diabetes

Insulin resistance

Insulin Deficiency

PPG

FPG

Adapted from International Diabetes Center (Minneapolis, MN).
Low Carb – Discussion

- Maximum therapeutic effect LCD maybe more pronounced in PWD with less available insulin?
- LCD option may beneficial for individuals with worse baseline glycemic control or longer duration of diabetes?
- Monitoring carb intake effect via review of structured meal-based SBGM (pair-testing) may help to determine individual response
- Need for medication if limiting carb and BG rises
- Reveals – unlikely no set carb level for all PWD

Low Carb ~ Implications for Practice and Research

- Costs?
- May need to adjust medications
- Constipation?
- Conflicting research – dairy & whole grains may reduce risk T2D
- Long-term adherence issues?
- Longer trials needed
Mediterranean-style Eating Plan

“Heartfelt” thanks for slides in this section: Jackie Boucher, MS, RD, CDE
Typical Food Intake for 1 Week: Do you see a difference?
Common Components

• **Plant-based foods**
  - High intake of fruits, vegetables, nuts, legumes, whole-grain cereals
  (Animal sources of protein are consumed relatively infrequently)

• **Olive oil (extra-virgin)**
  - Used almost exclusively over other fats, such as butter or other shortenings

• **Omega-3 Fatty Acids**
  - Includes fatty fish, flaxseed, and walnuts
Other Key Aspects of Med-Style

- It has been shown that the order of the courses in a meal and the pattern of meals is strong
- Mid-day is the main meal
- Sharing of meals with family or colleagues and an absence of snacking
- Physically active lifestyle
- "Siesta"

Tessier S, Gerbere M. Appetite. 2005; 45(2):121-126
Health Benefits of the Med-Style

- Evidence-based studies point to protection against:
  - Coronary heart disease
  - Type 2 diabetes
  - Hypertension
  - Cognitive function decline and dementia
  - Osteoporosis
  - Some cancers (e.g. breast, stomach, colorectal, prostate)
PREDIMED Study
(PREvencion can Dieta MEDiterranea Study)

• Parallel group, multicenter, randomized single-blinded trial; n=7,447;
• Purpose: Assess the effects of two intensive behavioral counseling and nutrition education interventions compared with a control group on the major risk of cardiovascular events
• “Older” Men 55 to 80 yrs; Women 60 to 80 yrs;
• Higher risk: either had diabetes or three or more major cardiovascular risk factors; all were free of cardiovascular disease at baseline.

Estruch R. et al. NEJM. 368:1279-90., 2013
Three arms (all energy unrestricted):  
1) Control (low-fat);  
2) Med-Style + olive oil (1 Liter (33 oz)/week);  
3) Med-Style + mixed nuts (30 g/day consisting of 15g walnuts, 7.5g hazelnuts, 7.5 g almonds)  
   • Participants received quarterly individual and group education, and depending on group assignment free olive oil or mixed nuts or small nonfood incentives (control group)
PREDIMED Study

- The two Med-Style groups had good adherence based on diet adherence scores (self-report) and biomarker analyses.

- In the primary endpoint found significant (30% reduction) results for combined CVD end points and stroke but not MI.

- Participants in the Med-Style groups significantly increased weekly servings of fish (by 0.3 servings) and legumes (by 0.4 servings) compared to the control group. The main nutrient differences in the Med-Style reflected the fat content and supplemental foods.
Meta-analysis on Med-Style and Metabolic Syndrome

- 2011 meta-analysis – 50 studies (35 clinical trials, 2 prospective studies and 13 cross-sectional studies, > 500,000 subjects)
- 2013 systematic review – 14 studies (10 observational studies, 4 clinical trials, > 9000 subjects)
- Results: Evidence supports the beneficial role of adherence to the Med-Style regarding metabolic syndrome and progression.

In people with type 2 diabetes, a Mediterranean-style, MUFA-rich eating pattern may benefit glycemic control and CVD risk factors and can therefore be recommended as an effective alternative to a lower-fat, higher-carbohydrate eating pattern (B).

*Diabetes Care.* 36:3821-3842, 2013
Eat a More Plant-based Foods

- Eat 5 or more servings of fruits and vegetables each day. In Mediterranean countries fruit is often the dessert for meals.
- Eat 3 or more servings/ounces of whole grains each day
- Focus is on quality of food choices!
Eat More Nuts, Legumes and Fish

• Use nuts and legumes as primary protein source

• Eat fish twice a week (salmon, tuna, trout, halibut, sardines and mackerel).

• Eat low fat dairy foods (milk, cheese and yogurt)

• Eat less high fat and processed meats
Choose Healthful Fats

• Omega-3 fatty acids
  – Fatty fish: salmon, tuna, trout, and herring
  – Flaxseed oil
• Monounsaturated fat
  – Olive, peanut, canola oil
  – Avocados
  – Nuts and seeds
• Polyunsaturated fats
  – Safflower, sesame, soy, corn and sunflower-seed oils
  – Nuts and seeds
Choose the Right Olive Oil

• Look for extra virgin olive oil rather than refined olive oil. Extra virgin olive oil is the highest of all the grades and offers a minimum guarantee of quality.
• The USDA is working on new standards. New laws now exist in some states.
• The California Olive Oil Council (www.cooc.com) certifies oils as extra virgin.
• Avoid oil in transparent glass bottles (light and heat affect the oil). Choose dark green, metal or opaque containers.
• Read the label, there should be a date stamp (either date of harvest or use-by-date).
The Mediterranean eating pattern is more than what you eat. It is a way of life that includes physical activity and includes social component.
Other Considerations
Translation Med-Style to USA

- Availability of these types of foods
  - Pacific Northwest vs Mid-west

- Cost
  - Buying food from local fisherman/farmer vs Costco warehouse
  - Wine, olive oil, fresh fish, fruit, veggies
  - Time spent – food preparation and cooking

- Lifestyle
  - Walking vs automobile
  - Families eating together vs eating on the go
Alcohol – Moderation is Key

Pair your drink with great food and healthful lifestyles:

– If you drink, have a moderate amount: one drink a day for women; two drinks a day for men.
– If you don’t drink, do not start now.

One Drink is:

12 oz beer
or
4 oz wine
or
1.5 oz 80-proof spirits
or
1 oz 100-proof spirits
Recipes and Resources

• Oldways:
  – http://oldwayspt.org/traditional-diets/mediterranean-diet

• American Diabetes Association:
  – www.diabetes.org - my food advisor

• American Heart Association:
  – http://www.heart.org/HEARTORG/HealthyLiving/HealthyEating/Recipes
Dietary Approaches to Stop Hypertension (DASH Diet)

- The DASH food pattern—which is rich in fruits and vegetables, low-fat dairy and nuts; low in sodium, total fat, and saturated fat; and adequate in calories for weight management is recommended. The DASH food pattern reduces SBP by 8–14 mmHg.
- Sodium: <2300 mg/day
- Milk: 2 to 3 servings/day (LF or NF)
- Fat: 2 to 3 servings/day vs daily intake of olive oil

Dietary Approaches to Prevent and Treat Hypertension. *Hypertension* 47:296, 2006
Summary

• Individuals eat foods in context of other meals and snacks, so keep focus on dietary or eating patterns when possible.

• Americans can benefit from eating more like Greeks, especially when it comes to adding extra-virgin olive oil, focusing more on plant-based eating, including some nuts and fish in eating pattern.
Summary

• What emerges from the evidence is the importance of total energy intake rather than the source of the energy
• Food quality is the key. Encouraging more fruits, vegetables, legumes, fish, whole grains, moderate alcohol and healthful types of fat and discouraging processed meats, refined grains, sugar-sweetened beverages, and other empty calories is key.
• Bottom-line: the most effective eating plan is - the one that the individual with diabetes chooses to follow long term.
• Michael Pollan - food writer
• “Cook it Yourself”
Alison B. Evert, MS, RD, CDE
atevert@uw.edu