Effective Medical Nutrition Therapy for Diabetes: Cutting Through the Controversies and Discovering Evidence

Objectives

• State the effectiveness of evidence-based diabetes nutrition therapy recommendations and interventions
• Address common diabetes nutrition controversies head-on by implementing, monitoring and evaluating individualized evidence-based MNT for adults with diabetes
• Integrate evidence-based diabetes nutrition therapy recommendations into the nutrition care process (the RDN) and into diabetes education sessions (non-RDN diabetes educators)

Disclosure to Participants

• Notice of Requirements for Successful Completion
  – Please refer to learning goals and objectives
  – Learners must attend the full activity and complete the evaluation in order to claim continuing education credits/hours
• Speakers & Conflict of Interest (COI) and Financial Relationships Disclosures:
  – Marion Franz, MS, RDN, CDE: No COI/Financial Relationship to disclose
  – Catherine Brown, MS, RDN, CDE: Employee of WellDoc
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Academy of Nutrition and Dietetics Nutrition Practice Guideline for Type 1 and Type 2 Diabetes in Adults: Systematic Review and Recommendations

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Publications

• MacLeod J, et al. Academy of Nutrition and Dietetics Nutrition Practice Guideline for Type 1 and Type 2 Diabetes in Adults: nutrition intervention evidence reviews and recommendations. J Acad Nutr Diet. 2017;117: in press. DOI: 10.1016/j.jand.2017.03.023

Academy’s 5-Steps for Conducting Systematic Reviews and Developing Evidence-Based Nutrition Practice Guidelines

1. Write evidence analysis questions
2. Gather evidence based on study inclusion criteria
3. Evaluate each article
4. Summarize the evidence
5. Write and grade conclusion statement

Based on evidence reviews and conclusion statements write NPG recommendations

Potential Problems with Systematic Reviews

• Inappropriate study inclusion criteria
• Studies included are of too short in duration
• Requiring low drop-out rates eliminates studies in which the intervention is difficult to maintain long-term

Example: Study Inclusion Criteria

Cochrane Review (2009): Low-GI diets for diabetes, study review criteria:
– Study inclusion criteria: diabetes not already optimally controlled; 4 wks or longer
– Excluded Wolever 2008: n=162 T2D; 1-yr; high-CHO/high-GI, high-CHO/low-GI, low CHO/high MUFA diets; A1C between groups NS at 1-year
– Conclusion based on 11 studies: 1988-2004; n= 4 to 63; 10 studies 4 to 24 wks, 1 in children 1-yr
– “A1C decreased by 0.5% with low GI diet, statistically and clinically significant.”


Academy’s Review Study Criteria and Conclusion on GI

… relationship of differing levels of GI intake, independent of weight loss on glycemia, insulin and CVD risk factors?
– Study inclusion criteria: adults with db; ...≥10 subjects in study groups; >80% completion rate; study trial 12 wks or longer in duration; search back to 1980
– 4 studies:
  • no significant effect from the GI diet on A1C in adults with T2D; no studies in T1D

Example: Study Duration

Canadian Trial of Carbohydrates in Diabetes

• 162 subjects with type 2 diabetes managed by nutrition therapy alone
• Randomized to high-CHO(high GI, high-GI/low GI, low CHO/high MUFA for 1 y
• NS: A1C, lipids or body weight
• Low GI: decreased at 6-wks

Wolever et al. Am J Clin Nutr 2008;87:114
Example: Requiring Low Drop-Out Rates

Question: could low-CHO diets achieved in short-term (6-12 mo) high-intensity interventions be achieved long-term (24 mo) with lower intensity interventions (what is feasible in outpatient practice)?

- 144 T2D: low-CHO diet (< 30 g/d) or a low-fat diet
- 53% returned at 12-mo and 47% at 24-mo
- Low-CHO results: 24% CHO at 3-mo; 40% CHO at 5-mo; back to baseline at 12- mo; 48% CHO (↑ 8% from baseline) at 24-mo
- Researchers’ comments:
  - “…suggests that low-carb diets may be difficult to sustain.”

Iqbal et al. Obesity 2010;18:1733

Systemic Reviews: Today’s Best Option!

- Potential problems with research studies
  - Small number of usually motivated subjects with frequent counseling and support provided
  - Short-term—diabetes a life-long disease
  - Baseline food intake often not reported
  - Compare equal caloric intakes but do not compare study caloric intake to usual caloric intake
  - Can outcomes be implemented long-term with “real-world” eating rarely asked
- However, systematic reviews (and meta-analyses) are today’s best option!

Study Inclusion Criteria:

- Adults over 18-yrs
- Subjects with T1D or T2D
- Outpatient and ambulatory care
- RCTs, cohort studies, non-randomized clinical studies, observational/non-controlled trials
- Study duration of at least 12-wks (3-mos)
- 10 more subjects per study group
- 80% completion rate

Effectiveness: Primary Questions

- How effective is MNT on
  - Glycemia (A1C and/or glucose);
  - CVD risk factors (lipids and blood pressure);
  - Weight management (weight, WC, BMI);
  - Medication usage (insulin and/or other glucose-lowering medications);
  - Quality of life?
- Additional study inclusion criteria:
  - Individualized MNT provided by an RDN over more than one visit
  - Definition of nutrition intervention provided

Effectiveness: Secondary Questions

- How many encounters are needed for implementation of effective MNT?
- What types of MNT interventions (in clinical practice) are effective?
MNT and Glycemia (A1C)

**T2D**
- 21 study arms (18 studies), n=4,181
  - 0.3% to 2.0% ↓ A1C at 3 mo (13 study arms)
  - 0.3% to 1.8% ↓ A1C at 6 mo (12 study arms)
  - 0.3% to 1.6% ↓ A1C, with ongoing MNT support, at 12 mo (6 study arms)
  - 0.6% to 1.8% ↓ A1C at >12 mo (4 study arms)
- Although MNT effective throughout the disease process, ↓ largest in newly diagnosed persons and/or persons with baseline A1C >8.0%; ↓ 0.5% to 2.0%

**T1D**
- 3 studies, n=808, MNT contributed to:
  - 1.0% and 1.9% ↓ A1C during first 6 mo
  - Maintained to 1-yr
  - Continued for up to 6.5 yrs (DCCT)

Usual Care (reported in 6 studies)
- 0 to +0.2% A1C change

MNT effectiveness on glycemia:
Grade: Level I/Strong

MNT and CVD Risk Factors

16 studies:
- Mixed effects on total cholesterol, LDL-C, HDL-C, TG
  - Normal or mildly elevated lipid levels (TC, LDL, TG); normal to mildly low HDL
  - ~50 to 75% of participants on lipid-lowering medications
- Mixed effects on blood pressure
  - Near-normal BP
  - ~50% to 75% on anti-hypertensive medications

MNT effectiveness on CVD risk factors:
Grade: Level II/Fair

MNT and Weight Management

18 studies:
- Body weight: T2D and T1D outcomes mixed
  (10 studies: ↓ 2.4 – 6.2 kg; 6 studies: NS)
- BMI: T2D and T1D outcomes mixed
- WC: T2D outcomes mixed

MNT effectiveness on weight management:
Grade: Level II/Fair

MNT and Impact on Medication Usage

**T2D**
- 12 study arms: Decreases in doses or number of glucose-lowering meds
  - Weight gain with initiation of insulin therapy prevented

**T1D**
- 2 studies
  - CHO counting implemented, although number of insulin injections increased, A1C improved without an increase in total insulin dose
  - Weight gain with insulin pump therapy prevented

MNT effectiveness on medication usage:
Grade: Level I/Strong

MNT and Quality of Life

**T1D**
- 3 studies SS improvements in QOL despite increases in number of insulin injections and/or MNT requirements (satisfaction with treatment, improved psychological well-being)

**T2D**
- 3 studies QOL SS improvements (improved self perception of health status, ↑ knowledge and motivation, ↓ emotional stress)

MNT effectiveness on quality of life:
Grade: Level I/Strong
MNT Encounters: Effectiveness Studies

T2D
- Initial series (first 3-6 mo)
  - Minimum of 3; ranging from 3 to 12 encounters
  - Minimum of 2 hrs; ranging from 2 to 16 hrs
- Follow-up visits (next 6-15 mo)
  - Minimum of 1; ranging from 1 to 6 encounters
  - Minimum of 1-hr; ranging from 1 to 6 hrs

T1D
- Initial series (first 6 mo)
  - Ranged from 4 to 6
  - One long-term study, monthly visits

Nutrition Therapy Interventions by RDNs in Effectiveness Studies

T2D
- Individualized nutrition therapy, energy restriction, portion control, sample menus, CHO counting, exchange lists, simple meal plans low-fat vegan—implemented and effective
- All resulted in a reduced energy intake

T1D
- Carbohydrate counting used to determine mealtime insulin doses

Diabetes NPG Recommendations

- Screening and Referral
  - In collaboration with other health care team members ensure that all overweight/obese adults at risk are screened for T2D
  - In collaboration with other health care team members ensure that all adults with T1D and T2D are referred for MNT
  - Implement 3 to 6 MNT encounters during the first 6 mo and determine if additional MNT encounters are needed
  - Implement a minimum of 1 annual MNT follow-up encounter
- Nutrition Assessment
- Nutrition Intervention
- Nutrition Monitoring and Evaluation

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Reminders!

- Recommendations for non-pregnant adults with type 1 or type 2 diabetes
- Not all recommendations carry the same weight
  — Strong, Fair, Weak, Consensus, Insufficient Evidence
- Not all recommendations apply to all people with diabetes.
  — Imperative or Conditional
- Implement in collaboration with the patient and based on patient’s ability (literacy/numeracy), preferences, and management goals
MYTH #1: People with diabetes should follow a diabetic diet.

Reality: Individualize nutrition prescription using evidence-based guidelines

- A variety of eating patterns can work
  - Quality and Quantity matter with any plan!
- Consider personal preferences (e.g., tradition, culture, religion, health beliefs and goals, economics), comorbidities, and metabolic goals

Quantity matters...

- For BMI>25: Reduced-energy, healthful eating plan, with a goal of weight loss, weight maintenance, and/or prevention of weight gain
  - Significant in A1C of 0.3% to 2.0% in adults with type 2 diabetes, with improvements in medication adjustments and QOL

- For BMI<25: Energy for weight maintenance and/or prevention of weight gain
Macronutrients may not

- Limited research on differing amounts of carbohydrates (39-57% of energy) and fat (27-40% of energy), reported no significant effects on A1C or insulin levels in adults with diabetes, independent of weight loss
- No ideal % of energy from macronutrients
- Individualize macronutrient composition
- Usual intake
  - 44-46% carb, 36-40% fat, 16-18% protein

MYTH #2: People with diabetes should count carbs.

MYTH #2: People with diabetes should count carbs.

Reality: Carb management strategies can be adapted to the treatment plan

Multiple daily injections or insulin pump

- Carb counting using insulin-to-carb ratios
- ↓ A1C 0.4% to 1.6% and ↑ QOL for up to 44 months without significant change in weight

Fixed insulin doses or insulin secretagogues

- Carbohydrate consistency (timing and amount) using one of the following strategies
  - Carbohydrate counting alone
  - Plate Method, portion control and simplified meal plan
  - Food lists (such as Choose Your Foods. Food Lists for Diabetes) and carbohydrate choices
- Can improve glycemic control and reduce risk for hypoglycemia

MNT or other diabetes medications

- Monitoring carbohydrate intake (carb counting or experience-based estimation) is a key strategy in achieving glycemic control
  - Carbohydrate counting alone
  - Plate Method, portion control and simplified meal plan
  - Food lists (such as Choose Your Foods. Food Lists for Diabetes) and carbohydrate choices
MYTH #3: People with diabetes should avoid sugar.

**Reality:** It’s all about substitution

- Nutritive sweeteners: No effect on A1C or insulin levels when substituted isocalorically for other carbohydrates
- Avoid excessive intake of nutritive sweeteners
  - May displace nutrient-dense foods
  - May add excessive calories and carbohydrates
- 2015 Dietary Guidelines: Limit added sugars for all Americans

...and enjoying life!

MYTH #4: People with diabetes should eat foods with a low glycemic index.

**Reality:** Might be more trouble than it’s worth

- Lowering glycemic index or glycemic load may or may not have a significant effect on glycemic control
- Studies longer than 12 weeks report no significant impact of glycemic index or glycemic load, independent of weight loss, on A1C

MYTH #5: Protein helps prevent hypoglycemia from reoccurring.
**Reality:** Carbs prevent hypoglycemia!

- 15-15 rule
- Adding protein to meals and/or snacks does not prevent or assist in the treatment of hypoglycemia
- Protein increases insulin response without increasing plasma glucose concentrations

**MYTH #6:** Protein should be limited in people with DKD.

**Reality:** No need to restrict protein

- No significant impact of protein intake (ranging from 0.7 to 2.0 g/kg/day) on GFR

**MYTH #7:** Low fat eating patterns are best for preventing heart disease.

**Reality:** Type of fat matters more

- ↓ saturated fat intake and ↑ unsaturated fat intake to reduce total cholesterol and LDL cholesterol
- No significant effect of differing amounts of saturated fat, unsaturated fat, and omega-3 fatty acids on glycemia, independent of weight loss

**Focus on replacements**

- Fish instead of beef
- Oil instead of butter
- Avocado instead of cheese
- Nuts instead of chips
Cardioprotective Eating Pattern

- ADA: An eating plan, such as a Mediterranean eating pattern, rich in monofats may improve glucose metabolism and lower CVD risk
  - An effective alternative to a diet low in total fat but relatively high in carbohydrates
- Mediterranean eating pattern shows advantages
  - A1C reduction, delayed need for diabetes meds\(^1\)
  - Reduced incidence of major CVD events (stroke)\(^2\)

### MYTH #8: Checking BG helps people manage diabetes.

### MYTH #9: People with diabetes need to eat on a regular schedule.

### MYTH #10: Cutting 500 calories per day will lead to 1 pound of weight loss per week.
Reality: Not for everyone

- The 3500 kcal rule overestimates weight loss and weight loss trajectory
- Newer, validated dynamic models of weight change

**Weight Loss Predictions**

**Weight Loss Calculator**

bwsimulator.niddk.nih.gov

Obesity treatment guidelines have evolved

<table>
<thead>
<tr>
<th>Table 7.3—Treatment for overweight and obesity in type 2 diabetes</th>
<th>BMI category (kg/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>&lt;23.0</td>
</tr>
<tr>
<td>Diet, physical activity, and behavioral therapy</td>
<td>+</td>
</tr>
<tr>
<td>Pharmacotherapy</td>
<td>+</td>
</tr>
<tr>
<td>Metabolic surgery</td>
<td>+</td>
</tr>
</tbody>
</table>

*Cut-off points for Asian American individuals.
†Treatment may be indicated for selected motivated patients.

**Eating Healthy education:**
The whole team plays a role

- **Shared Decision Making**
- **Critical Thinking**
- **DSMES/MNT**
- **Keeping up with the Evidence**

Bridging the gap between what we know and what we do...

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**People make decisions, not evidence**

- **Clinical expertise and experience**
- **Research evidence**
- **Patient’s preferences & actions**

SHARED DECISION MAKING

Evidence based practice

Research enhanced health care

Patient Centered Care

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**Bridging the Gap:**

What we know vs. what we do

Top 3 Behaviors Attributable to Chronic Disease:
1. Tobacco use
2. Dietary pattern
3. Physical activity level

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**Mindful ➔ Mindless**

Paving the way to health so that its pursuit may shift to a path of lesser resistance

“All things are hard until they are easy.”

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**We eat food, not nutrients**

Total Diet Approach to Healthy Eating

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**Leveraging the power of mobile health**

24/7 personalized coaching and self-management support

Contextualized, individualized, on-demand diabetes education

Connection to the care team enabling more timely care plan changes

The next blockbuster drug: Engaged patients partnering with their informed, engaged health care team ➔ improved outcomes
Critical Thinking

“Thinking about your thinking while you are thinking in order to make your thinking better”

Lost in a sea of information . . .
Or misinformation???

Keep a healthy skepticism

Before you share → Check out the source

Nutrition research is challenging . . .

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Truth, Lies, and Rumors in the Media: Consider the Source. JAND, 2012;112(5):602

Nutrition research is challenging . . .

Complex interplay between nutrients

Replacing a nutrient or food

with another affects other aspects of the diet

Confounding by other healthy lifestyle behaviors

Collinearity among dietary exposures

Effect modification

Accuracy in recording food intake

Subjects often not blinded to intervention
Red Flags Of Junk Science (Fake News):
- Claims that sound too good to be true
- Quick fixes
- Dire warnings
- Speculative conclusions
- Dramatic statements rely on reputable scientific organizations
- Lists of “good” and “bad” foods
- Recommendations made to sell a product
- Claims based on studies published without peer review
- Making conclusions based on a single study

Words matter
- Ship vs. will
- Suggest vs. prove
- Linked to associated with or contributes to vs. causes
- Breakthrough
- Significant
- Disables the risk (2% vs. 1%)

Be research savvy

Sorting through the acronyms

MNT
Healthy Eating
DSMES
Patient Education

Recommended reading
- Academy’s Knowledge Center - Subscribe to daily nutrition research and news knowledge@eatright.org
- AMDEO Diabetes - http://www.amedeo.com
- DiabetesPro Smartbeat - Subscribe to daily diabetes news update from the American Diabetes Association <diabetespro@smartariel.com>

Keeping up with the evidence
- “Have You Read” - Clinical research summary every 4 months in NewsFlash, a publication of the Academy of Nutrition & Dietetics Diabetes Care and Education Practice Group
- Academy’s Knowledge Center - Subscribe to daily nutrition research and news knowledge@eatright.org
- AMDEO Diabetes - http://www.amedeo.com
- DiabetesPro Smartbeat - Subscribe to daily diabetes news update from the American Diabetes Association <diabetespro@smartariel.com>

Recommended reading
- Academy of Nutrition and Dietetics online Evidence Analysis Library https://www.amedeo.com/

Relevant articles:
QUESTIONS?????