

# **IL TRATTAMENTO NUTRIZIONALE DEL DIABETE MELLITO**

Giorgio Bedogni

# Obiettivi

- Discutere la base di evidenza disponibile per il trattamento nutrizionale del diabete mellito e la sua implementazione in forma di linee guida per la pratica professionale (Academy of Nutrition and Dietetics, AND ex ADA)
- Valutare l'applicabilità delle linee guida AND - scritte da dietisti per dietisti - alla propria pratica professionale

# Base di evidenza AND (ADA)

 American Dietetic  
Association  
**Review**

**RESEARCH**



*Meets Learning Need Codes 5000, 5190, 9000, and 9020. To take the Continuing Professional Education quiz for this article, log in to ADA's Online Business Center at [www.eatright.org/obc](http://www.eatright.org/obc), click the "Journal Article Quiz" button, click "Additional Journal CPE Articles," and select this article's title from a list of available quizzes.*

## The Evidence for Medical Nutrition Therapy for Type 1 and Type 2 Diabetes in Adults

MARION J. FRANZ, MS, RD; MARGARET A. POWERS, PhD, RD; CAROLYN LEONTOS, MS, RD; LEA ANN HOLZMEISTER, RD; KARMEEN KULKARNI, MS, RD; ARLENE MONK, RD; NAOMI WEDEL, MS, RD; ERICA GRADWELL, MS, RD

*J Am Diet Assoc. 2010;110:1852-1889*

# Obiettivo

- This article reviews the evidence and nutrition practice recommendations from the ADA nutrition practice guidelines for type 1 and type 2 diabetes in adults
- The research literature was reviewed to answer nutrition practice questions and resulted in 29 recommendations



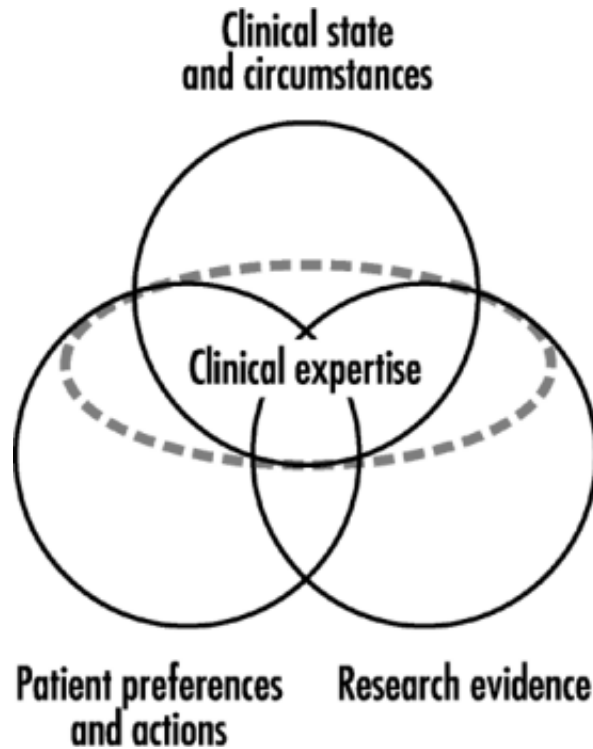
# MNT e diabete

- MNT [Medical Nutrition Therapy] plays a critical role in managing diabetes and reducing the potential complications related to poor glycemic, lipid, and blood pressure control
- The need to provide patients with evidence-based nutrition care is essential to providing optimum diabetes care

## **\*Io sono un asterisco**

- Quando vedete un asterisco accanto al titolo della diapositiva corrente, significa che stiamo facendo una deviazione per spiegare l'impostazione delle linee guida o aggiornare l'informazione ivi contenuta

# **\*Ricordate?**



Haynes RB. ACP Journal Club 2002;136:A11.

## **\*Cosa è l'MNT?**

- Nutritional diagnostic, therapy, and counseling services for the purpose of *disease management*, which are furnished by a registered dietitian or nutrition professional.

U.S. Department of Health and Human Services: Final MNT regulations. CMS-1169-FC. Federal Register, 1 November 2001. 42 CFR Parts 405, 410, 411, 414, and 415.

## \*Cosa è l'MNT?

- A supportive process to set priorities, establish goals, and create *individualized action plans* which acknowledge and foster responsibility for self-care.

[www.eatright.org](http://www.eatright.org)

## \*Cosa è l'MNT?

- In general, MNT consists of multiple, 1-on-1 sessions between an registered dietitian (RD) and a patient, in which the RD performs the nutrition assessment, analysis, counseling, and other therapy services according to the American Dietetic Association *MNT Evidence-Based Guide for Practice/Nutrition Protocol* or according to the best available current evidence in the nutrition community.

[www.eatright.org](http://www.eatright.org)

## \*Cosa è l'MNT?

- After an RD receives a recommendation from a physician, the framework of counseling is standardized and documented as part of the American Dietetic Association *Nutrition Care Process (NCP)*.

[www.eatright.org](http://www.eatright.org)

## **\*Cosa è l'NCP?**

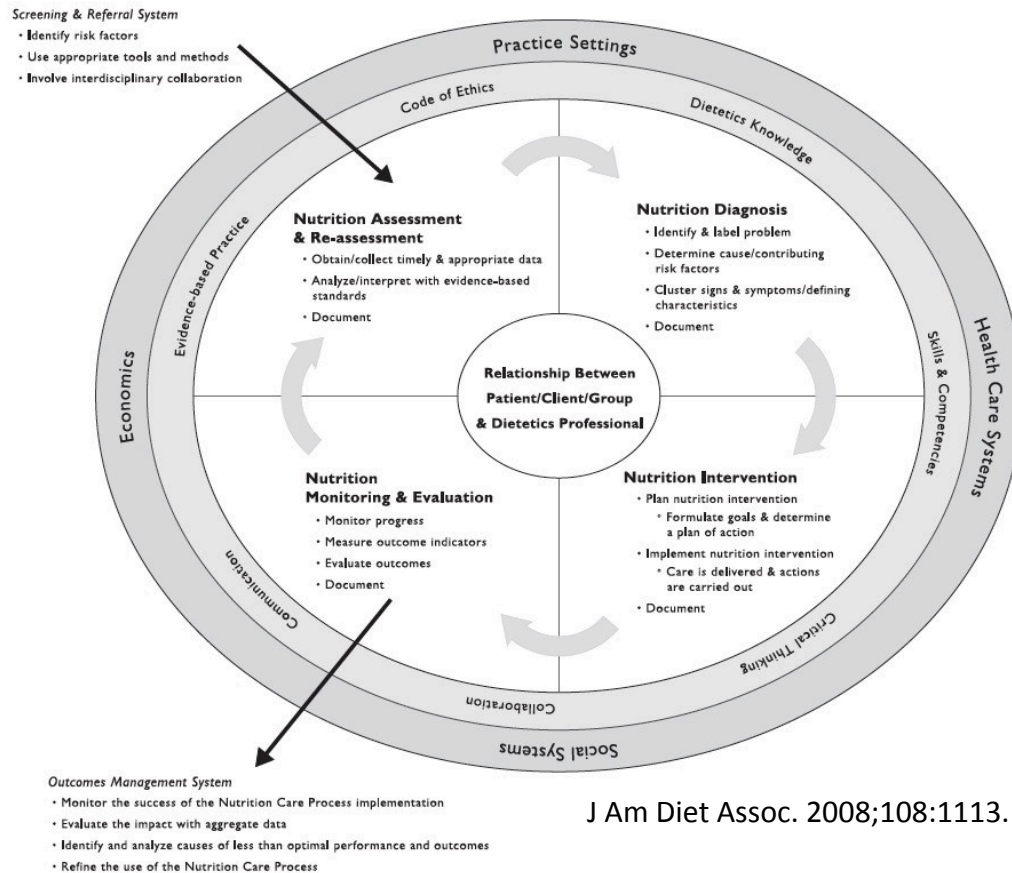
- The Nutrition Care Process is a *systematic approach* to providing high quality nutrition care.

Writing Group of the Nutrition Care Process/Standardized Language Committee. J Am Diet Assoc. 2008;108:1113.



# \*Cosa è l'NCP?

The Nutrition Care Process



J Am Diet Assoc. 2008;108:1113.

## \*Cosa è l'NCP?

- **Nutrition Assessment:** The RD collects and documents information such as food or nutrition-related history; biochemical data, medical tests and procedures; anthropometric measurements, nutrition-focused physical findings and client history.
- **Diagnosis:** Data collected during the nutrition assessment guides the RD in selection of the appropriate nutrition diagnosis (i.e., naming the specific problem).
- **Intervention:** The RD then selects the nutrition intervention that will be directed to the root cause (or etiology) of the nutrition problem and aimed at alleviating the signs and symptoms of the diagnosis.
- **Monitoring/Evaluation:** The final step of the process is monitoring and evaluation, which the RD uses to determine if the patient/client has achieved, or is making progress toward, the planned goals.

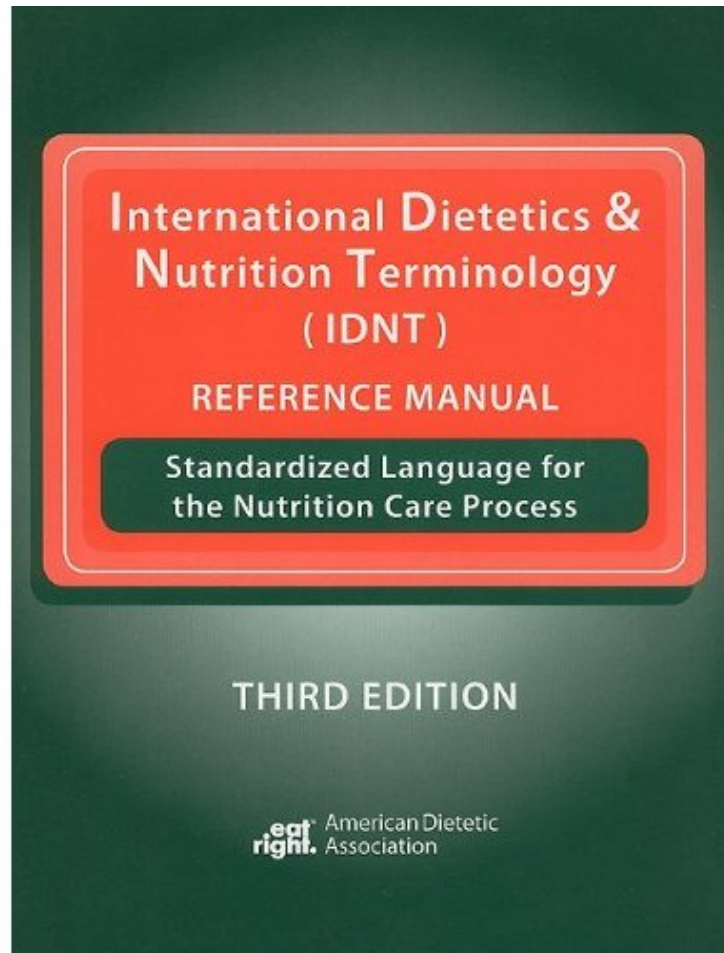
# **\*Cosa è l'NCP?**

**practice applications**  
TOPICS OF PROFESSIONAL INTEREST

## **Nutrition Care Process Part II: Using the International Dietetics and Nutrition Terminology to Document the Nutrition Care Process**

Writing Group of the Nutrition Care Process/Standardized Language Committee.  
J Am Diet Assoc. 2008;108:1287.

# **\*Cosa è l'IDNT?**



# **\*Cosa è lo scope of practice?**

## **RESEARCH**

### **Perspectives in Practice**

## **Evidence-Based Nutrition Practice Guidelines for Diabetes and Scope and Standards of Practice**

MARION J. FRANZ, MS, RD; JACKIE L. BOUCHER, MS, RD; JOYCE GREEN-PASTORS, MS, RD; MARGARET A. POWERS, PhD, RD

*J Am Diet Assoc. 2008;108:S52-S58.*

*It describes the range of roles, functions, responsibilities, and activities which dietetics practitioners are educated and authorized to perform; individualized as determined by state practice acts and facility policies and privileges.*



It is a tool with resources to assist in making decisions about appropriate levels of safe and effective scope of practice for the dietetics professional. Resources include the Code of Ethics, Standards of Practice in Nutrition Care, Standards of Professional Performance, Scope of Practice Decision Analysis Tool, Decision Tree, and Definition of Terms.



*The four standards of practice in nutrition care and six standards of professional performance describe a competent level of dietetics practice and professional performance.*



*These standards build on the core Standards and serve as a guide for the registered dietitian to evaluate and improve practice and demonstrate competence in diabetes care. The standards are also reflective of the knowledge and skills required for additional certifications (ie, Certified Diabetes Educator [CDE] and Board Certified—Advanced Diabetes Management [BC-ADM]).*



An RD who is new to diabetes care and is learning the principles that underpin practice. An RD who provides medical nutrition therapy for a number of medical conditions. The generalist recognizes that a nutrition intervention is necessary.



An RD who has developed a deeper understanding of diabetes care and has the ability to modify his or her diabetes practice as needed depending on the situation. The specialist RD recommends the intervention (solution) to the client and provider.



An RD who has developed a more intuitive understanding of diabetes care and whose practice reflects a broad range of skills and judgments acquired through a combination of experiences and education. The advanced RD makes changes in various aspects of a person's diabetes care in collaboration with the client's provider.

[www.giorgiobedogni.it](http://www.giorgiobedogni.it)



## **\*Cosa sono gli standards of practice?**

# American Dietetic Association Revised Standards of Practice and Standards of Professional Performance for Registered Dietitians (Generalist, Specialty, and Advanced) in Diabetes Care

*Jackie L. Boucher, MS, RD, LD, CDE; Alison Evert, MS, RD, CDE; Anne Daly, MS, RD, BC-ADM, CDE;  
Karmeen Kulkarni, MS, RD, BC-ADM, CDE; Jo-Anne Rizzotto, MEd, RD, LDN, CDE;  
Kathryn Burton, MS, RD, LD, CDE; Beverly G. Bradshaw, PhD, RD*

*J Am Diet Assoc. 2011;111:156-166.e1-27.*

# **\*Cosa sono gli standards of practice?**

## **How to Use the *Revised Standards of Practice and Standards of Professional Performance for Registered Dietitians (Generalist, Specialty, and Advanced)* in Diabetes Care as part of the *Professional Development Portfolio Process*<sup>a</sup>**

- |                                      |  |
|--------------------------------------|--|
| 1. Reflect                           | Assess your current level of practice and whether your goals are to expand your practice or maintain your current level of practice. Review the Standards of Practice and Standards of Professional Performance document to determine what you want your future practice to be, and assess your strengths and areas for improvement. These documents can help you set short- and long-term professional goals. |
| 2. Conduct learning needs assessment | Once you have identified your future practice goals, you can review the Standards of Practice and Standards of Professional Performance document to assess your current knowledge, skills, behaviors, and define what continuing professional education is required to achieve the desired level of practice.  |
| 3. Develop learning plan             | Based on your review of the Standards of Practice and Standards of Professional Performance, you can develop a plan to address your learning needs as they relate to your desired level of practice.   |
| 4. Implement learning plan           | As you implement your learning plan, keep reviewing the Standards of Practice and Standards of Professional Performance document to re-assess knowledge, skills, and behaviors and your desired level of practice.   |
| 5. Evaluate learning plan process    | Once you achieve your goals and reach or maintain your desired level of practice, it is important to continue to review the Standards of Practice and Standards of Professional Performance document to re-assess knowledge, skills, and behaviors and your desired level of practice.   |

**Figure 4.** Application of the Commission on Dietetic Registration *Professional Development Portfolio Process*.<sup>a</sup>The Commission on Dietetic Registration *Professional Development Portfolio* process is divided into five interdependent steps that build sequentially upon the previous step during each 5-year recertification cycle and succeeding cycles.



# **\*Cosa sono gli standards of practice?**

## **Standard 1: Nutrition Assessment:**

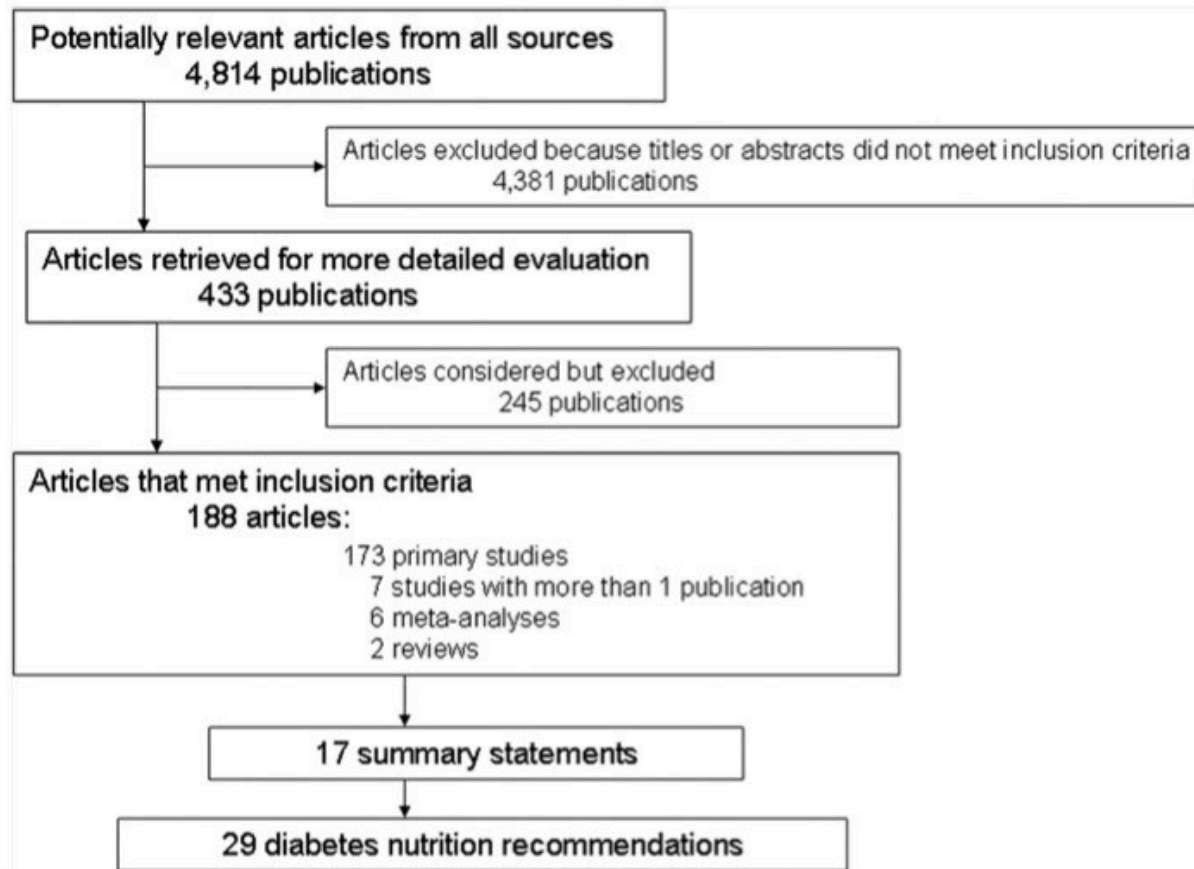
*Registered dietitians (RDs) use accurate and relevant data and information to identify nutrition-related problems.*

**Rationale:** Nutrition assessment is the first of four steps of the Nutrition Care Process. Nutrition Assessment is a systematic process of obtaining, verifying, and interpreting data in order to make decisions about the nature and cause of nutrition-related problems. It is initiated by referral and/or screening of individuals or groups for nutrition risk factors. Nutrition Assessment is an ongoing, dynamic process that involves not only initial data collection, but also reassessment and analysis of client or community needs. It provides the foundation for Nutrition Diagnosis, the second step of the Nutrition Care Process.

Indicators for Standard 1: Nutrition Assessment			The "X" signifies the indicators for the level of practice		
(Bold Font Indicators are American Dietetic Association (ADA) Core RD Standards of Practice Indicators)			Generalist	Specialty	Advanced
Each RD:					
1.1	<b>Evaluates dietary intake for factors that affect health and conditions including nutrition risk</b>		X	X	X
	1.1A	<b>Evaluates adequacy and appropriateness of food, beverage and nutrient intake (eg, macro and micronutrients; meal patterns; food allergies)</b>	X	X	X
	1.1A1	Evaluates appetite changes and possible associated gastrointestinal problems (eg, problems with chewing and swallowing, reflux, vomiting, diarrhea, constipation, irritable bowel syndrome, gastroparesis)	X	X	X
	1.1A2	Evaluates type and distribution of macronutrient intake	X	X	X
	1.1B	<b>Assesses adequacy and appropriateness of current diet prescription</b>	X	X	X
	1.1B1	Evaluates current meal planning approach (eg, carbohydrate counting, Exchange Lists for Meal Planning, calorie counting, food pyramid, plate method)	X	X	X
1.2	<b>Evaluates health and disease condition(s) for nutrition related consequences</b>		X	X	X
	1.2A	<b>Evaluates diabetes history, medical history, and family history comorbidities, substance use and abuse behavior and preventative care</b>	X	X	X
	1.2A1	Evaluates diabetes history; including assessment of diabetes self-management education/training, skills and behaviors (DSME/T) (eg, National Standards for Diabetes Self Management Education-Standard 3; American Association of Diabetes Educators-7 (AADE7) Self-Care Behaviors-healthy eating, being active, monitoring, taking medication, problem solving, healthy coping, reducing risks)	X	X	X
	1.2A2	Evaluates diabetes history of the intensively managed patient/client, including self-management education/training, skills and behaviors, (eg, insulin pump therapy and/or use of continuous glucose monitoring [CGM])		X	X
	1.2A3	Evaluates medical history of health, disease conditions and other comorbidities, (eg, cardiovascular disease, lipid disorders, hypertension, overweight/obesity, kidney disease, peripheral vascular disease, cancer, gastric bypass/banding, stroke, chronic obstructive pulmonary disease [COPD], congestive heart failure [CHF])	X	X	X
	1.2A4	Evaluates family history (eg, diabetes, cardiovascular disease, lipid disorders, hypertension, overweight/obesity, kidney disease, cancer, peripheral vascular disease, stroke)	X	X	X
	1.2A5	<b>Reviews the history of previous diabetes nutrition care services/medical nutrition therapy</b>	X	X	X
	1.2A6	Evaluates associated autoimmune comorbidities, (eg, thyroid conditions, Addison's disease, celiac disease, cystic fibrosis related diabetes, pernicious anemia)	X	X	X
	1.2A7	Determines history of tobacco, alcohol, drug use	X	X	X

**Figure 2.** American Dietetic Association Revised Standards of Practice for Registered Dietitians (Generalist, Specialty, and Advanced) in Diabetes Care.

# Base di Evidenza ADA (AND)



**Figure.** Flow chart of article selection for the development of diabetes nutrition recommendations. The literature search based on predetermined criteria resulted in a review of 173 primary studies from which summary statements and recommendations were written.

Franz, MJ JADA 2010;110:1852.

# Carbohydrate intake

- In persons receiving either MNT alone, glucose-lowering medications, or fixed insulin doses, meal and snack carbohydrate intake should be *consistently distributed throughout the day on a day-to-day basis*, as consistency in carbohydrate intake has been shown to result in improved glycemic control
- Diets too low in carbohydrate may eliminate too many foods that are important sources of vitamins, minerals, fiber, and energy

## **\*Low-carb?**

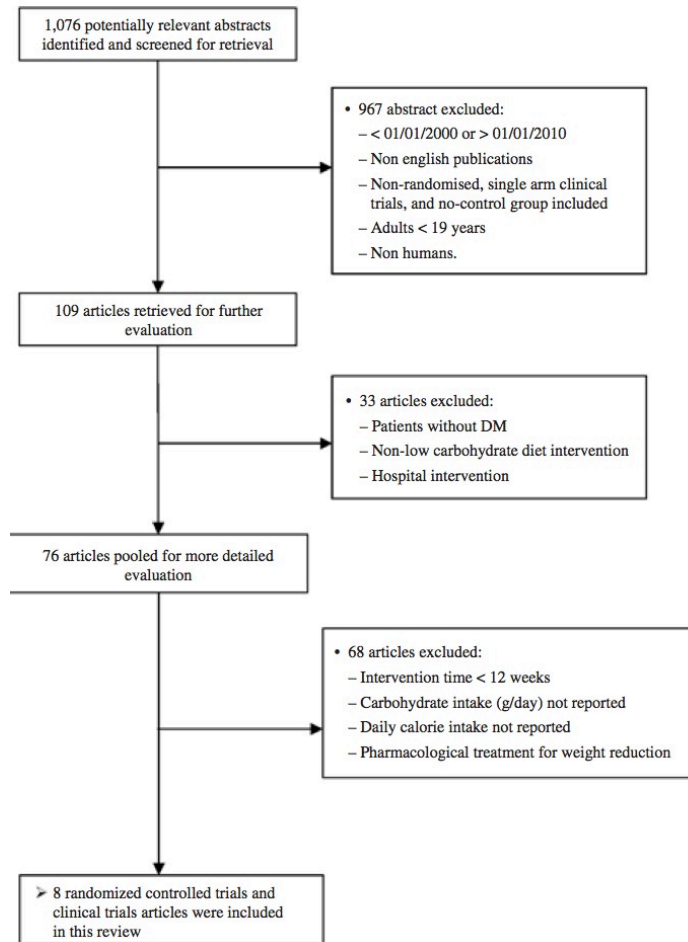
# **Effects of low carbohydrate diets on weight and glycemic control among type 2 diabetes individuals: a systemic review of RCT greater than 12 weeks**

L. M. Castañeda-González<sup>1</sup>, M. Bacardí Gascón<sup>2</sup> and A. Jiménez Cruz<sup>2</sup>

***Conclusions:*** This review shows that there are no consistent differences in weight and A1C changes over the long-term treatment with LCD and LFD, UCD or LGID.

*(Nutr Hosp. 2011;26:1270-1276)*

# \*Low-carb?





## \*Low-carb?

<i>Author</i>	<i>(n)</i>	<i>Age (range)</i>	<i>IT (months)</i>	<i>Intervention (diets)</i>	<i>CHO'S g/day</i>	<i>Weight difference (kg)</i>	<i>Afc difference</i>	<i>Observations</i>	<i>Grade scale</i>
Samaha et al., 2003 <sup>19</sup>	52	> 18	6	a) LCD b) LFD	≤ 30	NA	-0.6 ± 1.2 -0.0 ± 1.0	– Greater reduction on serum glucose levels in LCD (p = 0.01)	4
Nielsen et al., 2006 <sup>20</sup>	31	> 18	6	a) LCD b) LFD	75-95	-11.4 ± 4.0** -1.8 ± 3.8	-1.4 ± 1.2 -0.6 ± 1.4	– No difference between group variables was reported	2 No ITT No RMR
Daly et al., 2006 <sup>21</sup>	102	> 18	3	a) LCD b) LFD	70	-3.5 ± 0.63*** -0.92 ± 0.40	-0.55 ± 0.17 -0.23 ± 0.13	– No significant difference between groups on lipid variables.	3 No ITT
McLaughlin et al., 2007 <sup>22</sup>	29	> 18	4	a) LCD b) UCD	75	-5.9 ± 3.5 -7.0 ± 4.7	NA	– No difference between group variables was reported	2 ID No RMR
Dyson et al., 2007 <sup>23</sup>	13	> 18	3	a) LCD b) HED	≤ 40	-8.0** -0.8	-0.4 -0.2	– Increase on HDL and LDL on LCD (p = 0.05)	4
Westman et al., 2008 <sup>24</sup>	97	18-65	4	a) LCD b) LGID	≤ 20	-11.1** -6.9	-1.5** -0.5	– Greater reduction of A1C, fasting glucose, trig. and BMI in LCD. – Greater increase of HDL in LCD (p = 0.05)	3 No ITT No RMR REP
Davis et al., 2009 <sup>25</sup>	105	> 18	12	a) LCD b) LFD	20-25	-3.1 ± 4.8 -3.1 ± 5.8	-0.02 ± 0.9 0.24 ± 1.4	– Greater increase of HDL in LCD (p = 0.002)	3 No ITT
Esposito et al., 2009 <sup>26</sup>	215	30-75	48	a) LCMD b) LFD	< 50	-3.8 -3.2	-0.9** -0.5	– Greater reduction of A1c, HOMA, TC and insulin on LCMD – Greater increase of HDL on LCMD	4

# Carbohydrate Intake

- In persons with type 1 (or type 2) diabetes who adjust their mealtime insulin doses or who are on insulin pump therapy, insulin doses should be adjusted to match carbohydrate intake (insulin-to-carbohydrate ratios)
- This can be accomplished by comprehensive nutrition education and counseling on interpretation of blood glucose patterns, nutrition-related medication management, and *collaboration with the health care team*



# Carbohydrate Intake

- Adjusting insulin doses based on planned carbohydrate intake has been shown to improve glycemic control and quality of life without any adverse effects
- However, protein and fat content (total energy intake) cannot be ignored as excessive energy intake may lead to weight gain

# Carbohydrate Intake

- Registered dietitians (RDs) should encourage consumption of macronutrients *based on the Dietary Reference Intakes (DRI) for healthy eating* as research does not support any ideal percentage of energy from macronutrients in meal plans for persons with diabetes

# **Limitations of Research for Carbohydrate Intake**

- Studies examining consistency vs. inconsistency of carbohydrate distribution are limited in number
- Conclusions are, therefore, drawn from studies in which carbohydrate intake was kept consistent, although this was not always the primary study question

## **Limitations of Research for Carbohydrate Intake**

- The majority of the studies examining differing percentage of carbohydrate intake are of short duration, have small sample sizes, and are predominately non-randomized trials
- They frequently have no assessment of actual dietary intake and vary in definitions of low and high carbohydrate intakes

# Sucrose

- If persons with diabetes choose to eat foods containing sucrose, the sucrose-containing foods can be substituted for other carbohydrate foods
- Sucrose intakes of 10 to 35 of total energy do not have a negative effect on glycemic or lipid level responses when substituted for isocaloric amounts of starch

## **Limitations of Research for Sucrose**

- It is unknown whether individuals will substitute excessive amounts of sucrose for starches that will contribute to inadequate intake of foods contributing essential nutrients or if sucrose-containing foods habitually added to usual intake will lead to excessive energy intake

# Non-nutritive sweeteners (NNS)

- If persons with diabetes choose to consume products containing FDA-approved NNS at levels that do not exceed the ADIs, the RD should advise that some of these products might contain energy and carbohydrate from other sources that needs to be accounted for
- However, research reports that NNS intake does not effect changes in glycemic responses

## **Limitations of reaserch for NNS**

- The number of studies examining the safety and use of NNS in persons with diabetes is limited - only 5 studies were identified
- However, these products are widely tested and proven to be safe in animal studies before being marketed. The FDA determines their safety and acceptable daily intake [ADI].
- Additional studies are needed to monitor long-term metabolic outcomes and effects on appetite in humans, especially in adults and children with diabetes, and to determine amounts consumed.



**\*NNS**

# **Nonnutritive Sweeteners: Current Use and Health Perspectives**

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A Scientific Statement from the American Heart Association and the American Diabetes Association

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DOI: 10.2337/dc12-9002

## **Needs for Further Research**

—Because of the paucity of well-designed human studies that address the specific, practical, public health issues, as presented above, further research is warranted in several areas.

\*NNS

Wiebe *et al. BMC Medicine* 2011, **9**:123  
<http://www.biomedcentral.com/1741-7015/9/123>



*Metabolism, diet and disease*



RESEARCH ARTICLE

Open Access

## A systematic review on the effect of sweeteners on glycemic response and clinically relevant outcomes

Natasha Wiebe<sup>1</sup>, Raj Padwal<sup>1</sup>, Catherine Field<sup>2</sup>, Seth Marks<sup>3</sup>, Rene Jacobs<sup>2</sup> and Marcello Tonelli<sup>1\*</sup>

**Conclusions:** Considering the public health importance of obesity and its consequences; the clearly relevant role of diet in the pathogenesis and maintenance of obesity; and the billions of dollars spent on non-caloric sweeteners, little high-quality clinical research has been done. Studies are needed to determine the role of hypocaloric sweeteners in a wider population health strategy to prevent, reduce and manage obesity and its consequences.

# \* E il fruttosio ?!

## META - ANALYSIS

### Effect of Fructose on Glycemic Control in Diabetes

A systematic review and meta-analysis of controlled feeding trials

**RESULTS**—Eighteen trials ( $n = 209$ ) met the eligibility criteria. Isocaloric exchange of fructose for carbohydrate reduced glycated blood proteins (SMD  $-0.25$  [95% CI  $-0.46$  to  $-0.04$ ];  $P = 0.02$ ) with significant intertrial heterogeneity ( $I^2 = 63\%$ ;  $P = 0.001$ ). This reduction is equivalent to a  $\sim 0.53\%$  reduction in  $HbA_{1c}$ . Fructose consumption did not significantly affect fasting glucose or insulin. A priori subgroup analyses showed no evidence of effect modification on any end point.

**CONCLUSIONS**—Isocaloric exchange of fructose for other carbohydrate improves long-term glycemic control, as assessed by glycated blood proteins, without affecting insulin in people with diabetes. Generalizability may be limited because most of the trials were  $<12$  weeks and had relatively low MQS ( $<8$ ). To confirm these findings, larger and longer fructose feeding trials assessing both possible glycemic benefit and adverse metabolic effects are required.

*Diabetes Care* 35:1611–1620, 2012

# Glycemic index

- If the use of GI is proposed as a method of meal planning, RDs should advise on the *conflicting evidence* of effectiveness of this strategy
- Studies comparing high- vs low-GI diets report mixed effects on HbA1c levels
- These studies are complicated by differing definitions of high-GI or low-GI diets or quartiles, as well as possible confounding dietary factors

# **\*Ricordate?**

## **Low glycaemic index, or low glycaemic load, diets for diabetes mellitus (Review)**

Thomas D, Elliott EJ



This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in *The Cochrane Library* 2009, Issue 1

<http://www.thecochranelibrary.com>

## **Limitations of research on glycemic index**

- Definitions of low- vs high-GI diets vary widely
- Other problems include the variability of GI responses from carbohydrate-containing foods within and among individuals
- When reported, it appears that persons with diabetes already consume a moderate-GI diet

# Fiber

- Recommendations for fiber intake for people with diabetes are similar to the recommendation for the general public (daily recommended intake [DRI]: 14 g/1000 kcal)
- While diets containing 44 to 50 g/day of fiber are reported to improve glycemia in persons with diabetes, more usual fiber intakes (up to 24 g/day) have not shown beneficial effects on glycemia

# Fiber

- It is recommended that persons with diabetes include foods containing 25 to 30 g fiber per day, with special emphasis on soluble fiber sources (7 to 13 g)
- Studies in participants without diabetes show that diets high in total and soluble fiber, as part of cardioprotective nutrition therapy, can further reduce total cholesterol by 2 to 3 and LDL cholesterol up to 7%



## Limitations of research on fiber

- Consuming diets high in total dietary fiber and their association with decreased risk of CVD have primarily been done in participants who *do not have* diabetes
- Studies determining the actual effects from consuming diets high in total and soluble fiber as part of a cardio-protective diet also have primarily been conducted in persons *without* diabetes
- Also of interest is determining if high-fiber diets (44 to 50 g/day) shown to improve glycemic control can be sustained in a free-living environment

# Protein intake

- In persons with type 1 or type 2 diabetes with normal renal function, RDs should advise that usual protein intake of approximately 15 to 20% of daily energy intake does not need to be changed
- Although protein intake has an acute effect on insulin secretion, usual protein intake in longer-term studies has minimal effects on glucose, lipid levels, and insulin concentrations

# Protein intake

- Exceptions for change in protein intake are in persons who consume excessive protein choices high in saturated fatty acids, in those who have a protein intake less than the RDA, or in patients with diabetic nephropathy

## **Limitations or research on protein intake**

- The number of studies on protein intake in persons with diabetes and normal renal function is limited
- As percentage of energy from protein intake changes, if energy intake remains constant, either carbohydrate or fat percentages also change making it difficult to determine which change contributes to effects on metabolic outcomes

# Protein and diabetic nephropathy

- In persons with diabetic nephropathy, a protein intake of <1.0 g/kg/day is recommended
- Diets with <1.0 g/kg/day have been shown to improve albuminuria in persons with nephropathy; however, they have not been shown to have significant effects on glomerular filtration rate [GFR]
- For persons with late stage diabetic nephropathy (CKD stages 3 through 5), hypoalbuminemia and energy intake must be monitored and changes in protein and energy intake made to correct deficits and to prevent potential risk of malnutrition

# **\*Proteine e nefropatia diabetica**

## **Protein restriction for diabetic renal disease (Review)**

Robertson L, Waugh N, Robertson A



## **\*Proteine e nefropatia diabetica**

- The present body of evidence is limited, and we need studies which are long term and which report *important outcomes* such as end-stage renal disease and which examine the balance between efficacy, safety and compliance

## **\*Proteine e nefropatia diabetica**

- All studies investigated renal function by GFR or creatinine clearance
- One study (Hansen, 2002) assessed the relative risk of end-stage renal disease or death



# **\*Proteine e nefropatia diabetica**

*Kidney International, Vol. 62 (2002), pp. 220–228*

Effect of dietary protein restriction on prognosis in patients with diabetic nephropathy

**HENRIK P. HANSEN, ELLIS TAUBER-LASSEN, BERIT R. JENSEN, and HANS-HENRIK PARVING**

*Steno Diabetes Center, Gentofte, Denmark*

# \*Proteine e nefropatia diabetica

(il calcolo illustrato è limitato perché considera solo punto finale ma è didatticamente utile)



Welcome to the UBC Clinical Significance Calculator

**Instructions:** Input the data in the fields below as decimals, e.g. 0.3, for the event rates and as integers, e.g. 320, for the numbers of patients. Then hit calculate. If you make an error, hit reset.

Rate of events in the experimental arm:	<input type="text" value="0.10"/>	Number of patients in the experimental arm:	<input type="text" value="41"/>
Rate of events in the control arm:	<input type="text" value="0.27"/>	Number of patients in the control arm:	<input type="text" value="41"/>

## Output Fields

CLINICAL SIGNIFICANCE MEASURE	Value	Lower 95% confidence boundary	Upper 95% confidence boundary
Absolute Risk Reduction (ARR):	<input type="text" value="0.17"/>	<input type="text" value="0.0059860684"/>	<input type="text" value="0.3340139315"/>
Relative Risk Reduction (RRR%):	<input type="text" value="63%"/>	<input type="text" value="-6%"/>	<input type="text" value="87%"/>
Odds Ratio:	<input type="text" value="0.3004115226"/>	<input type="text" value="0.0876809807"/>	<input type="text" value="1.0292663492"/>
Number Needed to Treat (NNT):	<input type="text" value="6"/>	<input type="text" value="3"/>	<input type="text" value="167"/>

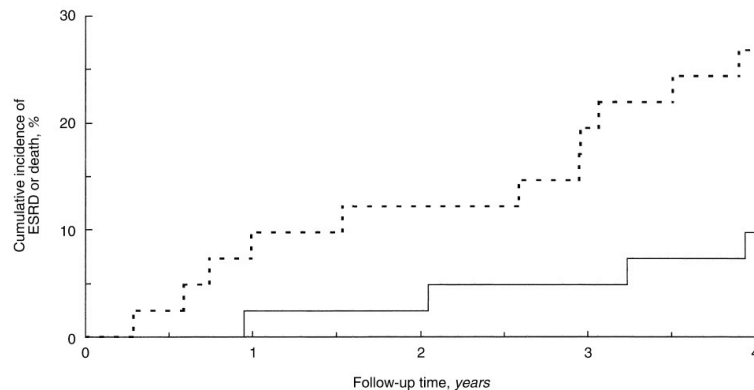


Fig. 3. Cumulative incidence of end-stage renal disease (ESRD) or death in type 1 diabetic patients with progressive diabetic nephropathy in the usual-protein group (dashed lines) and the low-protein diet group (solid line). Log rank test,  $P = 0.042$ . The numbers at the bottom denote the number of patients in each group at risk for the event at baseline and after each six month period.

## **\*Malnutrizione**

Recent publications clearly support the contention that controlled protein restriction (low protein diets or keto-acid/ amino acid-supplemented very low protein diets during the predialysis phase do not lead to malnutrition or influence mortality at the start of dialysis or during subsequent treatment with renal replacement therapy

Aparicio M. J Ren Nutr 2009;19:S5.

## **\*Malnutrizione**

One could object that these patients were carefully selected and monitored. This point is important because a nutritional survey should be the main feature of an adequate, long-term follow-up of chronic kidney disease patients before renal replacement therapy

Aparicio M. J Ren Nutr 2009;19:S5.

## **\*Malnutrizione**

# **Implementation of Standardized Nutrition Guidelines by Renal Dietitians Is Associated With Improved Nutrition Status**

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*Journal of Renal Nutrition, Vol 19, No 2 (March), 2009: pp 136–144*

# **Limitation of research on protein and diabetic nephropathy**

- Studies in patients *without diabetes* have supported a reduced protein intake in the treatment of nephropathy
- This has not been consistently duplicated in patients with diabetic nephropathy

# Prevention and treatment of cardiovascular disease (CVD)

- Cardioprotective nutrition interventions for the prevention and treatment of CVD should be implemented in the initial series of MNT encounters as both glycemic control and cardioprotective nutrition interventions improve the lipid profile
- Cardioprotective nutrition interventions include reduction in saturated and trans-fatty acids and dietary cholesterol, and interventions to improve blood pressure
- Studies in persons with diabetes using these interventions report a reduction in CVD risk and improved CVD outcomes

# **Limitations of current research on prevention and treatment of CVD**

- Research is needed to assist in the prioritization of nutrition interventions and to further define macronutrient recommendations such as the role of specific fatty acids, including n-3 fatty acids
- Although a Mediterranean diet is reported as being beneficial, a clearer understanding of the protective mechanisms from differing components of the diet and its role in the management of diabetes is needed



# \*ORIGIN

*The NEW ENGLAND JOURNAL of MEDICINE*

## ORIGINAL ARTICLE

# n-3 Fatty Acids and Cardiovascular Outcomes in Patients with Dysglycemia

The ORIGIN Trial Investigators\*

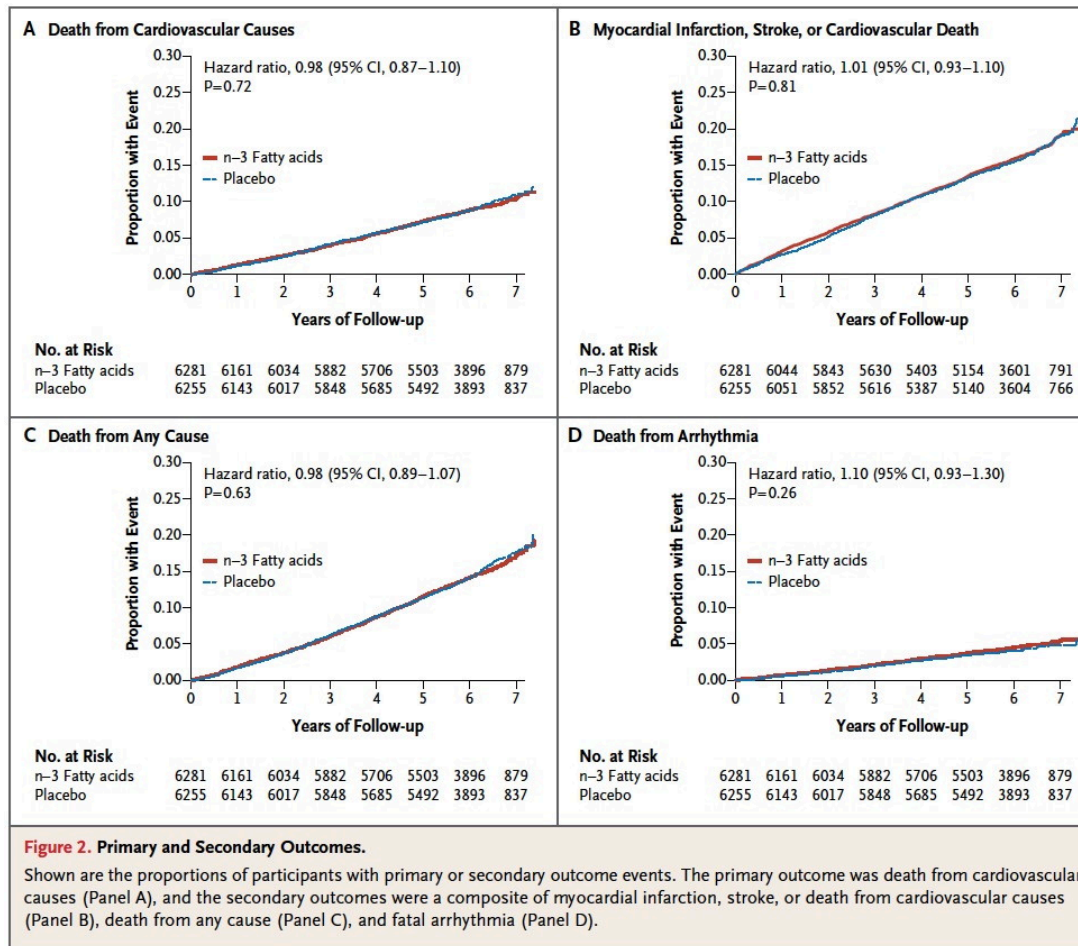
## ABSTRACT

N Engl J Med 2012;367:309-18.





DOI: 10.1056/NEJMoa1203859

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# \*ORIGIN



# \*Look ahead



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Dear Look AHEAD participants,  
Welcome to the Look AHEAD participant website! We hope you find it to be a valuable information resource on health and diabetes.  
Here's what you'll find here, every time you log on:

- Learning Corner archives
- Newsletter story archives
- Links to health and diabetes-related websites
- 2006 Look AHEAD art contest website winners
- Look AHEAD research and links


We'll report study results here as they come in. And when important diabetes news comes out, we'll provide a link to that information for you.  
So please think of this website as a continued source for helpful health and diabetes information!  
Sincerely,

Linda Delahanty, R.D., MS, Diabetes Center, Boston  
Kathy Dotson B. A., Wake Forest University Health Sciences  
Sharon Jackson, M.S., R.D., C.D.E., Joslin Diabetes Center, Boston  
Richard Rubin, Ph.D., Johns Hopkins University  
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The Look AHEAD Website Committee

Website last updated 01/20/2011



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# \*Look ahead

## Research UPDATE

from *Look AHEAD*

September 2010 ISSUE No. 6

### Dear Look AHEAD Participants,

**We are proud to report that the Year 4 results of the Look AHEAD trial will be published soon in *The Archives of Internal Medicine*. This is a very well-known journal. It is read by over 100,000 doctors in 75 countries. This paper could not have been written without YOU and the other 5000-plus participants in Look AHEAD!**

We presented these Year 4 findings at the American Diabetes Association meetings in 2009. We shared the results with you at that time in *Research Update* #4. However, it takes many months for researchers to fully review the data, write the paper, and get it published in a journal. We thought it would be helpful to remind you about our Year 4 findings, since the paper will soon be published.

Participants in both the Intensive Lifestyle Intervention (ILI) and the Diabetes Support and Education (DSE) groups of Look AHEAD have had positive changes in their health over the first four years of the study. On average, participants in both groups have lost weight over the course of the four years. This is nice to see when you read daily about the rapid increase of serious weight problems in our country. Both groups have had improvements in their blood pressure and triglyceride levels. The levels of LDL cholesterol (the bad cholesterol) have come down and the levels of HDL cholesterol (the good cholesterol) have gone up in both groups. Both LDL and HDL cholesterol keep getting better and better in each year of the study. The number of participants meeting the American Diabetes Association goals for blood sugar, blood pressure, and LDL cholesterol has also increased over time in both groups!

Some of you have asked about how the ILI group has done compared to the DSE group. At the end of Year 1, the ILI group tended to have larger weight losses and greater improvements in health measures than DSE. But at Year 4 the differences between ILI and DSE were smaller. The average weight loss for the ILI group at Year 4 was 4.7% (about 10 pounds). The average weight loss for DSE was 1.1% (about 2 pounds). The ILI group also had somewhat greater improvements in fitness, and on some blood pressure and cholesterol measures. The DSE group had larger reductions in LDL cholesterol. The key question is what will happen over the next few years? We look forward to sharing the final, most important news that will come at the end of the entire study in 2014. Then we will compare the two groups on risk factors, weight, and on some major health problems related to the complications of diabetes.

The Look AHEAD trial will continue through 2014. We are thrilled that over 94% of our participants are still actively involved in the trial. Some of you are now coming into our clinics for your Year 9 visits! We look forward to many more years of working with you in the Look AHEAD trial.

**THANK YOU again for all your participation and support.**



# Weight management

- RDs should advise that glycemic control is the primary focus for diabetes management
- Although decreasing energy intake may improve glycemic control, it is unclear whether weight loss alone will improve glycemic control
- Sustained weight loss interventions using lifestyle interventions only and lasting 1 year or longer report inconsistent effects on HbA1c

# Weight management

- Studies support a reduced energy intake with reduced total and saturated fats, an increase in dietary fiber and whole grains, and a decrease in sodium
- Physical activity should be strongly encouraged, especially for its contribution to weight maintenance after weight loss
- A weight loss of 5 to 10 % of body weight from lifestyle interventions is a realistic goal

## **Limitations or research on weight management**

- Attrition can be a problem in trials that are 1 year and longer, especially in lifestyle trials
- (Data on study completers has important value to practitioners because it clarifies what can be expected if participants complete a weight management intervention)

# Physical activity

- In persons with *type 2 diabetes*, 90 to 150 minutes of accumulated moderate-intensity aerobic physical activity per week as well as resistance/strength training three times per week is recommended
- Both aerobic and resistance training improve glycemic control, independent of weight loss
- Individuals who are already exercising at moderate intensity may be encouraged to consider increasing the intensity of their exercise to obtain additional benefits in both aerobic fitness and glycemic control



# Physical activity

- Physical activity also improves insulin sensitivity and decreases risk for CVD and all-cause mortality
- Individuals with type 1 diabetes should be encouraged to engage in regular physical activity
- Although exercise is *not reported* to improve glycemic control in persons with type 1 diabetes, individuals may receive the same benefits from exercise as the general public-decreased risk of CVD and improved sense of well-being

## **Limitations of research on physical activity**

- Research regarding the benefits and risks of physical activity in persons with type 1 diabetes is more limited
- Very little research has been done on type and amounts of carbohydrate to consume with exercise

# Glucose monitoring

- For persons with type 1 or type 2 diabetes on insulin therapy, *at least 3 to 8 glucose tests per day* are recommended to determine the adequacy of the insulin dose(s) and to guide adjustments in insulin dose(s), food intake, and physical activity.
- Some insulin regimens require more testing to establish the best integrated therapy (i.e. food, insulin, and activity).
- Once established, some insulin regimens will require less frequent Self-Monitoring Of Blood Glucose [SMBG].

# Glucose monitoring

- Intervention studies that include self-management training and adjustment of insulin doses based on SMBG report improved glycemic control

# Glucose monitoring

- For individuals receiving nutrition therapy alone or nutrition therapy in combination with glucose-lowering medications, SMBG can be recommended
- Frequency and timing is dependent on diabetes management goals and therapies (i.e. MNT, diabetes medications, and physical activity)
- When SMBG is incorporated into diabetes education programs and the information from SMBG is used to make changes in diabetes management, SMBG is associated with improved glycemic control

# Glucose monitoring

- RDs should instruct individuals taking insulin or insulin secretagogues on safety guidelines to prevent hypoglycemia (e.g. frequent blood glucose monitoring, possible adjustments in insulin dose or carbohydrate intake, and to carry carbohydrate food/beverages while exercising)
- Carbohydrate should be ingested if pre-exercise glucose levels are  $< 100$  mg/dL (5.55 mmol/L)
- Research indicates that the incidence of hypoglycemia during exercise may depend on baseline glucose levels

# Glucose monitoring

- It is essential that persons with diabetes receive education as to how to use a continuous glucose monitoring device and how to interpret and apply the results
- Studies have proven the accuracy of continuous glucose monitoring and most show that using the trend data pattern data from continuous glucose monitoring can result in less glucose variability and improved glucose control

## Limitations of research on glucose monitoring

- Research on use of SMBG by persons with type 2 diabetes continues to be studied *and debated*
- Research on how foods and nutrients affect blood glucose responses and how to make adjustments in carbohydrate and insulin for exercise will be especially helpful
- (Continuous glucose monitoring is also the next step in the development of closed loop insulin therapy)



# \*Efficacia di SMBG?

## **Self-monitoring of blood glucose in patients with type 2 diabetes mellitus who are not using insulin (Review)**

Malanda UL, Welschen LMC, Riphagen II, Dekker JM, Nijpels G, Bot SDM



This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in *The Cochrane Library* 2012, Issue 1

<http://www.thecochranelibrary.com>

## **\*Efficacia di SMBG?**

- For the comparison of the effect of self-monitoring versus no self-monitoring in patients with a diabetes duration of one year or more 2324 patients with a 6 months follow-up and 493 patients with a 12 months follow-up were available
- Pooled results of studies including patients diagnosed with type 2 diabetes for at least 1 year show that self-monitoring of blood glucose has a minimal effect in improving glucose control at 6 months, which disappears after 12 months follow-up
- *The clinical benefit resulting from this effect is limited*

# **Effectiveness of MNT for T1DM and T2DM**

- Articles on the effectiveness of diabetes MNT interventions have been published in a supplement to the Journal of the American Dietetic Association

# Effectiveness of MNT for T1DM and T2DM

## RESEARCH

### Perspectives in Practice

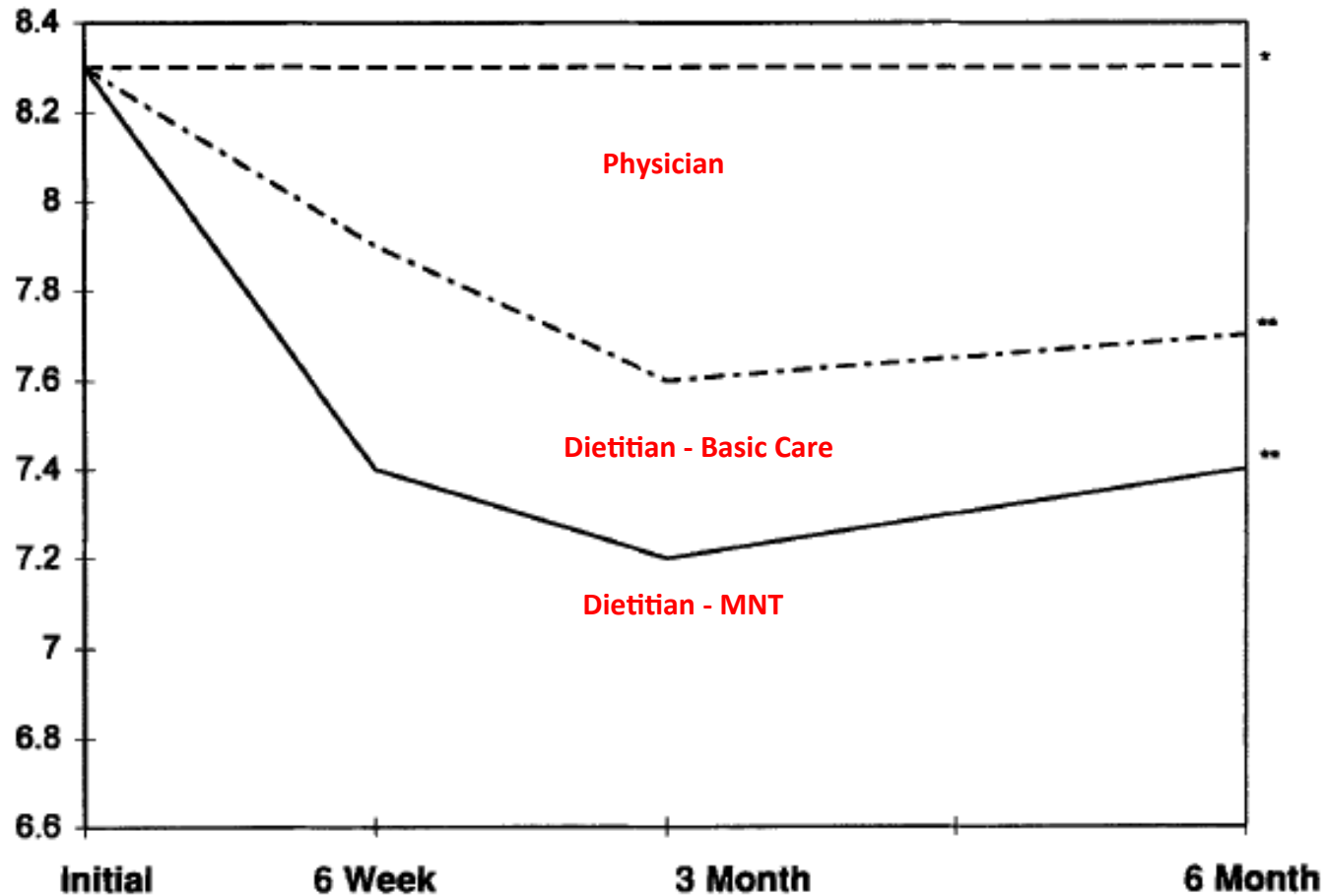
## Evidence-Based Nutrition Practice Guidelines for Diabetes and Scope and Standards of Practice

MARION J. FRANZ, MS, RD; JACKIE L. BOUCHER, MS, RD; JOYCE GREEN-PASTORS, MS, RD; MARGARET A. POWERS, PhD, RD

*J Am Diet Assoc. 2008;108:S52-S58.*

# Effectiveness of medical nutrition therapy provided by dietitians in the management of non-insulin-dependent diabetes mellitus: A randomized, controlled clinical trial

MARION J. FRANZ, MS, RD; ARLENE MONK, RD; BARBARA BARRY, MS, RD; KATHRYN McCLAIN, RD;  
TANYA WEAVER, RD; NANCY COOPER, RD; PAUL UPHAM; RICHARD BERGENSTAL, MD; ROGER S. MAZZE, PhD



Franz MJ et al. *J. Am. Diet. Assoc.* 1995;95:1009

# Effectiveness of MNT for T1DM1 and T2DM

- The studies document decreases in HbA1c ranging from 0.5 to 2.6% (average of 1 to 2%), similar to the effects of many glucose-lowering medications
- Multiple individual or group sessions were employed initially and on a continued basis
- Although MNT is effective at any time in the disease process, it appears to have its greatest affect in lowering HbA1c at initial diagnosis
- Outcomes of the MNT interventions are evident by 6 weeks to 3 months and evaluation should be done at these times

# Effectiveness of MNT for T1DM1 and T2DM

- At 3 months, if no clinical improvement in glycemic control is evident, an RD needs to recommend combining MNT with medication therapy or an adjustment in medication therapy
- T2DM is a progressive disease, and as beta-cell function decreases, blood glucose lowering medication(s), including insulin, need to be combined with MNT to achieve glucose goals

# MNT implementation

- An initial series of 3 to 4 encounters with an RD lasting from 45 to 90 minutes is recommended
- This series, beginning at diagnosis of diabetes or at first referral to an RD for MNT for diabetes, should be completed within 3 to 6 months
- An RD should determine whether additional MNT encounters are needed
- At least one follow-up encounter is recommended annually to reinforce lifestyle changes and to evaluate and monitor outcomes that indicate the need for changes in MNT or medication(s).



## **NCP: nutrition assessment**

- An RD should assess food intake (focusing on carbohydrate), medication, metabolic control (e.g. glycemia, lipids, and blood pressure), anthropometric measurements, and physical activity to serve as the basis for implementation of the nutrition prescription, goals and intervention
- An RD should assess glycemic control and focus MNT to achieve and maintain blood glucose levels in the target range
- An RD should assess the relative importance of weight management for persons who are overweight or obese

## NCP: nutrition assessment

- An RD should implement MNT selecting *from a variety of nutrition interventions* that will assist patients/clients to achieve nutrition therapy goals
- An RD should encourage consumption of macronutrients based on the DRI for healthy adults
- An RD should implement nutrition education and counseling with an emphasis on the recommendations from the major and contributing factors to nutrition therapy reviewed above

## NCP: nutrition monitoring

- An RD should coordinate care with an interdisciplinary team
- An RD should monitor and evaluate food intake, medication, metabolic control (e.g., glycemia, lipids, and blood pressure), anthropometric measurements, and physical activity
- An RD should primarily use *blood glucose monitoring* results in evaluating the achievement of goals and effectiveness of MNT

## **NCP: nutrition monitoring**

- Glucose monitoring results can be used to determine whether adjustments in foods and meals will be sufficient to achieve blood glucose goals or if medication additions or adjustments need to be combined with MNT

# **ADA Diabetes Type 1 and 2 Evidence-based Nutrition Practice Guideline for Adults**

<http://andevidencelibrary.com/topic.cfm?cat=3252&auth=1>

(last updated 2008; under revision)

# AND (ex ADA) EAL



## Academy of Nutrition and Dietetics (formerly American Dietetic Association) Evidence-Based Nutrition Practice Guidelines

The Academy of Nutrition and Dietetics (formerly American Dietetics Association) does **not** accept any external funding for evidence-based nutrition practice guidelines. [Learn more](#).

- The public has access to the executive summary of recommendations for all evidence-based nutrition practice guidelines. Full access to all of the content of all the guidelines is provided to Academy members and subscribers to the EAL. [Learn more](#) about subscriptions.
- [What is an evidence-based nutrition practice guideline?](#)
- [What is a guideline practice toolkit?](#)
- [How can I print information from evidence-based nutrition practice guidelines?](#)

Academy (ADA) Evidence-Based Nutrition Practice Guidelines	Date Published	Presentations	Toolkits	Guideline Tutorials	Educator Modules
<a href="#">Adult Weight Management</a> (AWM)	May 2006 (under revision)	<a href="#">AWM PPT</a>	<a href="#">AWM Toolkit</a>	--	
<a href="#">Celiac Disease</a> (CD)	May 2009	<a href="#">CD PPT</a>	<a href="#">CD Toolkit</a>	<a href="#">CD Brief</a>	<a href="#">CD Ed. Module</a>
<a href="#">Chronic Kidney Disease</a> (CKD)	July 2010	<a href="#">CKD PPT</a>	2012	--	--
<a href="#">Chronic Obstructive Pulmonary Disease</a> (COPD)	Oct 2008	<a href="#">COPD PPT</a>	2011	--	--
<a href="#">Critical Illness 2012</a> (CIU)	Apr 2012	<a href="#">CI PPT</a> (2012)	<a href="#">CI Toolkit</a> (2006)	--	--
<a href="#">Diabetes Mellitus Type 1 and 2</a> (DM)	Mar 2008 (under revision)	<a href="#">DM PPT</a>	<a href="#">DM Toolkit</a>	--	<a href="#">DM Ed. Module</a>

# AND forza dell'evidenza

## Strong

A **Strong** recommendation means that the workgroup believes that the benefits of the recommended approach clearly exceed the harms (or that the harms clearly exceed the benefits in the case of a strong negative recommendation), and that the quality of the supporting evidence is excellent/good (grade I or II).\* In some clearly identified circumstances, strong recommendations may be made based on lesser evidence when high-quality evidence is impossible to obtain and the anticipated benefits strongly outweigh the harms.

Practitioners should follow a **Strong** recommendation unless a clear and compelling rationale for an alternative approach is present.

# AND forza dell'evidenza

## Fair

A **Fair** recommendation means that the workgroup believes that the benefits exceed the harms (or that the harms clearly exceed the benefits in the case of a negative recommendation), but the quality of evidence is not as strong (grade II or III).<sup>\*</sup> In some clearly identified circumstances, recommendations may be made based on lesser evidence when high-quality evidence is impossible to obtain and the anticipated benefits outweigh the harms.

Practitioners should generally follow a **Fair** recommendation but remain alert to new information and be sensitive to patient preferences.



# AND forza dell'evidenza

## Weak

A **Weak** recommendation means that the quality of evidence that exists is suspect or that well-done studies (grade I, II, or III)\* show little clear advantage to one approach versus another.

Practitioners should be cautious in deciding whether to follow a recommendation classified as **Weak**, and should exercise judgment and be alert to emerging publications that report evidence. Patient preference should have a substantial influencing role.

# AND forza dell'evidenza

## Consensus

A **Consensus** recommendation means that Expert opinion (grade IV) supports the guideline recommendation even though the available scientific evidence did not present consistent results, or controlled trials were lacking.

Practitioners should be flexible in deciding whether to follow a recommendation classified as **Consensus**, although they may set boundaries on alternatives. Patient preference should have a substantial influencing role.

# AND forza dell'evidenza

## Insufficient Evidence

### An **Insufficient Evidence**

recommendation means that there is both a lack of pertinent evidence (grade V)\* and/or an unclear balance between benefits and harms.

Practitioners should feel little constraint in deciding whether to follow a recommendation labeled as **Insufficient Evidence** and should exercise judgment and be alert to emerging publications that report evidence that clarifies the balance of benefit versus harm. Patient preference should have a substantial influencing role.

## AND (ex ADA) EAL

- *Recommendations can be worded as conditional or imperative statements.*
- Conditional statements clearly define a specific situation, while imperative statements are broadly applicable to the target population without restraints on their pertinence.

# **MNT and Number/Length of Initial Series of Encounters**

- MNT provided by an RD is recommended for individuals with type 1 and type 2 diabetes
- An initial series of 3 to 4 encounters each lasting from 45 to 90 minutes is recommended
- This series, beginning at diagnosis of diabetes or at first referral to an RD for MNT for diabetes, should be completed within 3 to 6 months

# MNT and Number/Length of Initial Series of Encounters

- The RD should determine if additional MNT encounters are needed after the initial series based on the nutrition assessment of learning needs and progress towards desired outcomes
- Studies based on a range in the number (1-5 individual sessions or a series of 6-12 group sessions) and length (45-90 minutes) report sustained positive outcomes at 1 year and longer
- Studies implementing a variety of nutrition interventions report a reduction in HbA1c levels, and some studies also report improved lipid profiles, improved weight management, adjustments in medications, and reduction in the risk for onset and progression of comorbidities
- **Strong, imperative**

# MNT Long-Term Follow-up Encounters

- At least 1 follow-up encounter is recommended annually to reinforce lifestyle changes and to evaluate and monitor outcomes that impact the need for changes in MNT or medication
- The RD should determine if additional MNT encounters are needed.
- Studies involving regular lifestyle intervention sessions (up to 1 per month) report sustained positive outcomes at one year and longer
- **Strong, Imperative**

# Nutrition Assessment

- The RD should assess food intake (focusing on carbohydrate), medication, metabolic control (glycemia, lipids, and blood pressure), anthropometric measurements and physical activity to serve as the basis for implementation of the nutrition prescription, goals and intervention
- Individuals who have diabetes should receive MNT tailored by the RD
- **Strong, Imperative**



# Assessment of Glycemic Control

- The RD should assess glycemic control and focus medical nutrition therapy to achieve and maintain blood glucose levels in the target range (American Diabetes Association Standards of Medical Care in Diabetes)
- Studies evaluating the effectiveness of diabetes MNT at 3 to 6 months reported reductions in HbA1c ranging from 0.25% to 2.9%
- **Strong, Imperative**

# Assess Relative Importance of Weight Management

- The RD should assess the relative importance of weight management for persons with diabetes who are overweight or obese
- While modest weight loss has been shown to improve insulin resistance in overweight and obese insulin-resistant individuals, research on sustained weight loss interventions lasting 1 year or longer reported inconsistent effects on HbA1c
- **Strong, Conditional**

# Macronutrient Percentages

- The RD should encourage consumption of macronutrients based on the DRI for healthy adults
- Research does not support any ideal percentage of energy from macronutrients for persons with diabetes
- **Strong, Imperative**

# Carbohydrate Intake Consistency

- In persons receiving either MNT alone, glucose-lowering medications or fixed insulin doses, meal and snack carbohydrate intake should be kept consistent on a day-to-day basis
- Consistency in carbohydrate intake results in improved glycemic control
- **Strong, Conditional**

# Carbohydrate Intake and Insulin Dose Adjustment

- In persons with type 1 or type 2 diabetes who adjust their mealtime insulin doses or who are on insulin pump therapy, insulin doses should be adjusted to match carbohydrate intake (insulin-to-carbohydrate ratio)
- This can be accomplished by comprehensive nutrition education and counseling on interpretation of blood glucose patterns, nutrition-related medication management and collaboration with the healthcare team

# Carbohydrate Intake and Insulin Dose Adjustment

- Adjusting insulin dose based on planned carbohydrate intake improves glycemic control and quality of life without any adverse effects
- **Strong, Conditional**

# Sucrose Intake

- If persons with diabetes choose to eat foods containing sucrose, the sucrose-containing foods should be substituted for other carbohydrate foods
- Sucrose intakes of 10 to 35 % of total energy intake do not have a negative effect on glycemic or lipid responses when substituted for isocaloric amounts of starch
- **Strong, Conditional**

# NNS and Diabetes

- If persons with diabetes choose to consume products containing FDA-approved NSS, at levels that do not exceed the ADIs, the RD should advise that some of these products may contain energy and carbohydrate from other sources that needs to be accounted for
- Research on NSS reports no effect on changes in glycemic response
- **Fair, Conditional**



# Glycemic index

- If the use of glycemic index is proposed as a method of meal planning, the RD should advise on the conflicting evidence of effectiveness of this strategy
- Studies comparing high versus low GI diets report mixed effects on HbA1c
- **Fair, Conditional**

# Fiber Intake and Glycemia

- Recommendations for fiber intake for people with diabetes are similar to the recommendations for the general public (DRI: 14 g / 1000 kcal)
- While diets containing 44 to 50 grams of fiber daily are reported to improve glycemia; more usual fiber intakes (up to 24 grams daily) have not shown beneficial effects on glycemia
- It is unknown if free-living individuals can daily consume the amount of fiber needed to improve glycemia
- **Strong, Imperative**

# Fiber Intake and Cholesterol

- Include foods containing 25-30 grams of fiber per day, with special emphasis on soluble fiber sources (7-13 grams)
- Diets high in total and soluble fiber, as part of cardioprotective nutrition therapy, can further reduce total cholesterol by 2-3% and LDL cholesterol up to 7%
- **Strong, Imperative**

# Protein Intake and Normal Renal Function

- In persons with type 1 or type 2 diabetes with normal renal function, the RD should advise that usual protein intake of approximately 15 to 20% of daily energy intake does not need to be changed
- Although protein has an acute effect on insulin secretion, usual protein intake in long-term studies has minimal effects on glucose, lipids, and insulin concentrations
- **Fair, conditional**

# Protein Intake and Nephropathy

- In persons with diabetic nephropathy, a protein intake of 1 g or less per kg body weight per day is recommended
- Diets with less than 1 g protein / kg body weight / day have been shown to improve albuminuria in persons with nephropathy; however, they have not been shown to have significant effects on GFR
- **Fair, Conditional**

# Protein Intake and Late Stage Nephropathy

- For persons with late stage diabetic nephropathy (CKD Stages 3-5), hypoalbuminemia (an indicator of malnutrition) and energy intake must be monitored and changes in protein and energy intake made to correct deficits.
- A protein intake of approximately 0.7 grams / kg body weight / day has been associated with hypoalbuminemia, whereas a protein intake of approximately 0.9 grams / kg body weight / day has not.
- **Fair, Conditional**

# Blood Glucose Monitoring

- For individuals on nutrition therapy alone or nutrition therapy in combination with glucose-lowering medications, SMBG is recommended
- When SMBG is incorporated into diabetes education programs and the information from SMBG is used to make changes in diabetes management, SMBG is associated with improved glycemic control.
- **Fair, Conditional**

# Frequency of Blood Glucose Monitoring

- For persons with type 1 or type 2 diabetes on insulin therapy, at least 3 to 8 blood glucose tests per day are recommended to determine the adequacy of the insulin dose(s) and guide adjustments in insulin dose(s), food intake and physical activity.
- Some insulin regimens require more testing to establish the best integrated therapy (insulin, food, and activity). Once established, some insulin regimens will require less frequent self-monitoring of blood glucose (SMBG).
- Intervention studies that include self-management training and adjustment of insulin doses based on SMBG result in improved glycemic control.
- **Strong, Conditional**



# Need for Continuous Glucose Monitoring or More Frequent SMBG

- Persons experiencing unexplained elevations in HbA1C or unexplained hypoglycemia and hyperglycemia may benefit from use of continuous glucose monitoring (CGM) or more frequent SMBG
- It is essential that persons with diabetes receive education as to how to calibrate CGM and how to interpret CGM results.
- Studies have proven the accuracy of CGM and most show that using the trend/pattern data from CGM can result in less glucose variability and improved glucose control
- **Fair, Conditional**

# CVD and Cardioprotective Nutrition Therapy

- Cardioprotective nutrition interventions for the prevention and treatment of cardiovascular disease (CVD) should be implemented in the initial series of encounters
- Diabetes is associated with an increased risk for CVD and glycemic control may improve the lipid profile
- **Strong, Imperative**

# CVD and Cardioprotective Nutrition Interventions

- Cardioprotective nutrition interventions for prevention and treatment of CVD include reduction in saturated and trans fats and dietary cholesterol, and interventions to improve blood pressure
- Studies in persons with diabetes utilizing these interventions report a reduction in cardiovascular risk and improved cardiovascular outcomes
- **Strong, Imperative**

# Weight Management

- The RD should advise that glycemic control is the primary focus for diabetes management
- While decreasing energy intake may improve glycemic control, it is unclear whether weight loss alone will improve glycemic control
- Sustained weight loss interventions lasting 1 year or longer reported inconsistent effects on HbA1c
- **Fair, Conditional**

# Type 2 Diabetes and Physical Activity

- In persons with type 2 diabetes, 90 to 150 minutes of accumulated moderate-intensity aerobic physical activity per week as well as resistance/strength training 3 times per week is recommended
- Both aerobic and resistance training improve glycemic control, independent of weight loss
- Physical activity also improves insulin sensitivity and decreases risk for cardiovascular disease and all-cause mortality
- **Strong, Conditional**

# Type 1 Diabetes and Physical Activity

- Individuals with type 1 diabetes should be encouraged to engage in regular physical activity
- Although exercise is not reported to improve glycemic control in persons with type 1 diabetes, individuals may receive the same benefits from exercise as the general public—decreased risk for cardiovascular disease and improved sense of well-being
- **Fair, Conditional**

# Physical Activity and Insulin/Insulin Secretagogue Use

- The RD should instruct individuals on insulin or insulin secretagogues on the safety guidelines to prevent hypoglycemia (frequent blood glucose monitoring and possible adjustment in insulin dose or carbohydrate intake)
- Research indicates that the incidence of hypoglycemia during exercise may depend on baseline glucose levels
- **Fair, Conditional**

# Coordination of Care and Diabetes

- The RD should implement MNT and coordinate care with an interdisciplinary team
- An interdisciplinary team approach is necessary to integrate MNT for patients with diabetes into overall management
- **Consensus, Imperative**



# Monitoring and Evaluation

- The RD should monitor and evaluate food intake, medication, metabolic control (glycemia, lipids, and blood pressure), anthropometric measurements and physical activity
- Research reports sustained improvements in HbA1c at 12 months and longer with long-term follow-up encounters with an RD
- **Strong, Imperative**

# Monitoring and Evaluation

- The RD should primarily use blood glucose monitoring results in evaluating the achievement of goals and effectiveness of MNT
- Glucose monitoring results can be used to determine whether adjustments in foods and meals will be sufficient to achieve blood glucose goals or if medication additions or adjustments need to be combined with MNT
- **Consensus, Imperative**

# **Appendice: come eravamo**



# Centralità del paziente

The goal of nutrition intervention is to assist and facilitate *individual* lifestyle changes and behavior changes that will lead to improved metabolic control

Franz MJ *et al. Diabetes Care* 2002;**25**:148

# Centralità del paziente

Not surprisingly, the patient often found it difficult, if not impossible, to adhere to these recommendations [i.e. those given before 1994]

Franz MJ *et al. J. Am. Diet. Assoc.* 2003;**103**:977

# Obiettivi del trattamento

- Controllo di glicemia, trigliceridemia, colesterolemia e pressione arteriosa
- Controllo del peso corporeo
- Promozione dell'attività fisica
- Considerazione delle esigenze specifiche
- Prevenzione delle complicanze secondarie

Franz MJ *et al. Diabetes Care* 2002;**25**:148

# Carboidrati: evidenze A

- Preferire carboidrati da cereali interi, frutta, vegetali e latte a basso contenuto di grassi
- Per quanto attiene all' effetto sulla *glicemia*, la quantità totale di carboidrati è più importante della loro fonte o tipo
- Il saccarosio *non* aumenta la glicemia più di un equivalente isocalorico di amido
- Saccarina, aspartame, K-acesulfame e sucralosio sono sicuri (FDA) purché consumati entro i limiti consigliati



## **Carboidrati: evidenze B**

- La dose d'insulina somministrata prima dei pasti deve considerare il loro contenuto in carboidrati
- Non c'è sufficiente evidenza per consigliare routinariamente l'impiego dell'indice glicemico
- L'introito di fibra deve essere incoraggiato

# **Carboidrati: evidenze C**

- Pazienti con dosaggi fissi di insulina dovrebbero variare il meno possibile l'assunzione giornaliera di carboidrati

## Carboidrati: evidenze E

- Carboidrati e ac. grassi monoinsaturi dovrebbero fornire *insieme* il 60-70% dell' introito energetico
- Saccarosio e cibi contenenti saccarosio possono essere consumati nel contesto di una dieta salubre

## Proteine: evidenze B

- Nel diabete di tipo 2, l'assunzione di proteine *non* aumenta la glicemia

## **Proteine: evidenze E**

- Non vi è necessità di modificare l' introito proteico usuale (15-20% Energia) se la funzione renale è normale
- L' effetto a lungo termine di diete iperproteiche e a basso tenore di carboidrati è incerto

## Grassi: evidenze A

- Ac. grassi saturi < 10% Energia
  - < 7% Energia se colesterolemia LDL > 100 mg / dL
- Colesterolo < 300 mg / die
  - < 200 mg / die se colesterolemia LDL > 100 mg / dL

## Grassi: evidenze B

- In presenza di ipercolesterolemia, gli ac. grassi saturi possono essere ridotti se si desidera ottenere un calo ponderale; in caso contrario, possono essere sostituiti da ac. grassi monoinsaturi e carboidrati.
- La riduzione dei grassi può favorire un modesto calo ponderale e il miglioramento della dislipidemia.
- Si dovrebbe ridurre il consumo di acidi grassi della serie *trans*.

# Grassi: evidenze E

- PUFA  10% Energia



# **Micronutrienti: evidenza**

- Scarsa evidenza di utilità della supplementazione routinaria di vitamine o minerali (B)
- Scarsa evidenza di utilità della supplementazione routinaria di antiossidanti (B)

## **Alcool: evidenza**

- Limitare il consumo di alcool a 30 g/die nell' uomo e 15 g/die nella donna (B)
- Assumere col cibo per ridurre il rischio di ipoglicemia (B)

# Sodio e ipertensione: evidenza

- La riduzione dell' introito di sodio riduce la pressione arteriosa (A)
- Non consumare più di 100 mmol (2400 mg) di Na / die (E)
- Un calo ponderale moderato riduce la pressione arteriosa (A)

## Bilancio energetico: evidenza

- La *riduzione dell'introito di energia* e il calo ponderale riducono la resistenza insulinica (A)
- Programmi strutturati (attività fisica, calo ponderale, *incontri regolari col dietista*) possono produrre un calo ponderale del 5-7% (A)
- L' esercizio e le modificazioni del comportamento sono essenziali per ottenere il calo ponderale (A)
- L' impiego della sola dieta non è sufficiente per ottenere il calo ponderale (A)

# Bambini e adolescenti: evidenza

- Fornire piani dietetici e insulinici *flessibili* che considerino la variabilità degli orari dei pasti, dell' appetito e dell' attività fisica (E)
- Il fabbisogno in nutrienti dei bambini diabetici non differisce da quello dei bambini sani (E)

# Gravidanza e allattamento: evidenza

- Il fabbisogno in nutrienti delle donne diabetiche non differisce da quello delle donne sane (E)
- Gli obiettivi MNT per il diabete gestazionale sono: incremento ponderale appropriato, normoglicemia e assenza di chetonuria (E)
- In alcune donne con diabete gestazionale, una restrizione dell' introito energetico può essere appropriata (E)

## Anziano: evidenza

- Il fabbisogno in nutrienti degli anziani è inferiore a quello degli adulti (A)
- L'attività fisica deve essere incoraggiata (A)
- La malnutrizione per difetto è più frequente di quella per eccesso e occorre prestare attenzione alla prescrizione di regimi ipocalorici (E)

# Grazie