

ΚΑΡΔΙΟΜΕΤΑΒΟΛΙΚΗ ΙΑΤΡΙΚΗ

«Η διατροφή του ατόμου με ΣΔ τύπου 1»



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Εντατικοποιημένο σχήμα ινσουλίνης

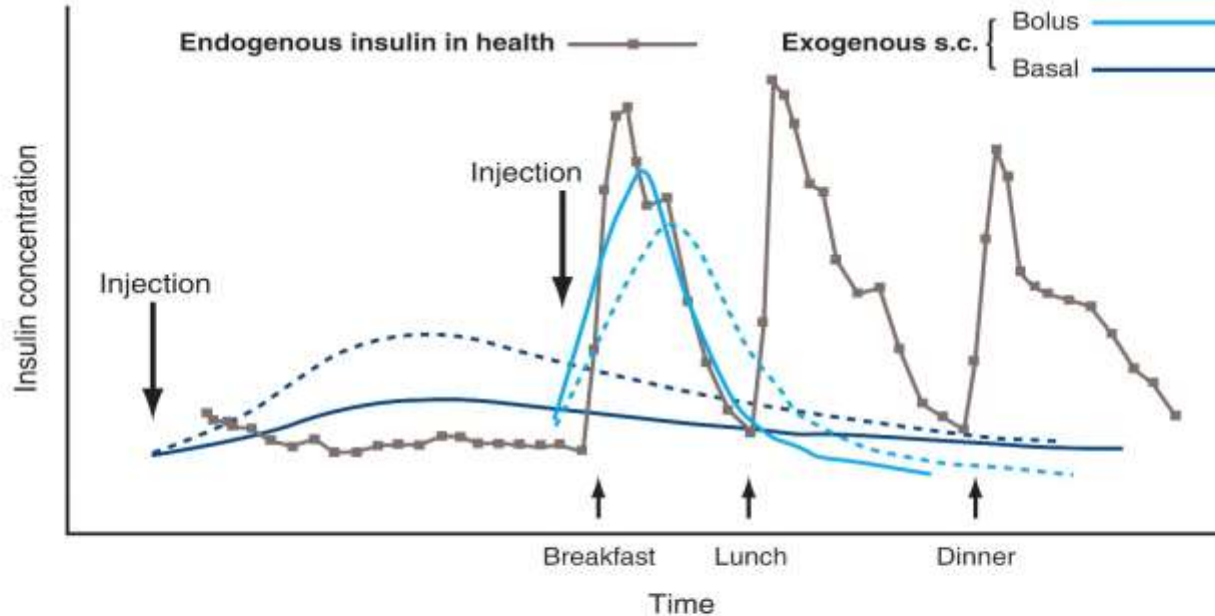


Fig. 1 – The rationale for basal + bolus insulin replacement therapy. Schematic insulin kinetic profiles following subcutaneous injection super-imposed on genuine data showing healthy endogenous insulin concentrations [6]. Solid lines represent refined profiles of analogue products versus human insulin-based products (dotted lines). (From K.S. Polonsky et al. Twenty-four-hour profiles and pulsatile patterns of insulin secretion in normal and obese subjects. *J. Clin. Invest.* 81 (1988) 442–448. Reproduced with permission from the American Society for Clinical Investigation.)

Χρήση αντλίας ινσουλίνης

Continuous Subcutaneous Insulin Infusion (CSII)

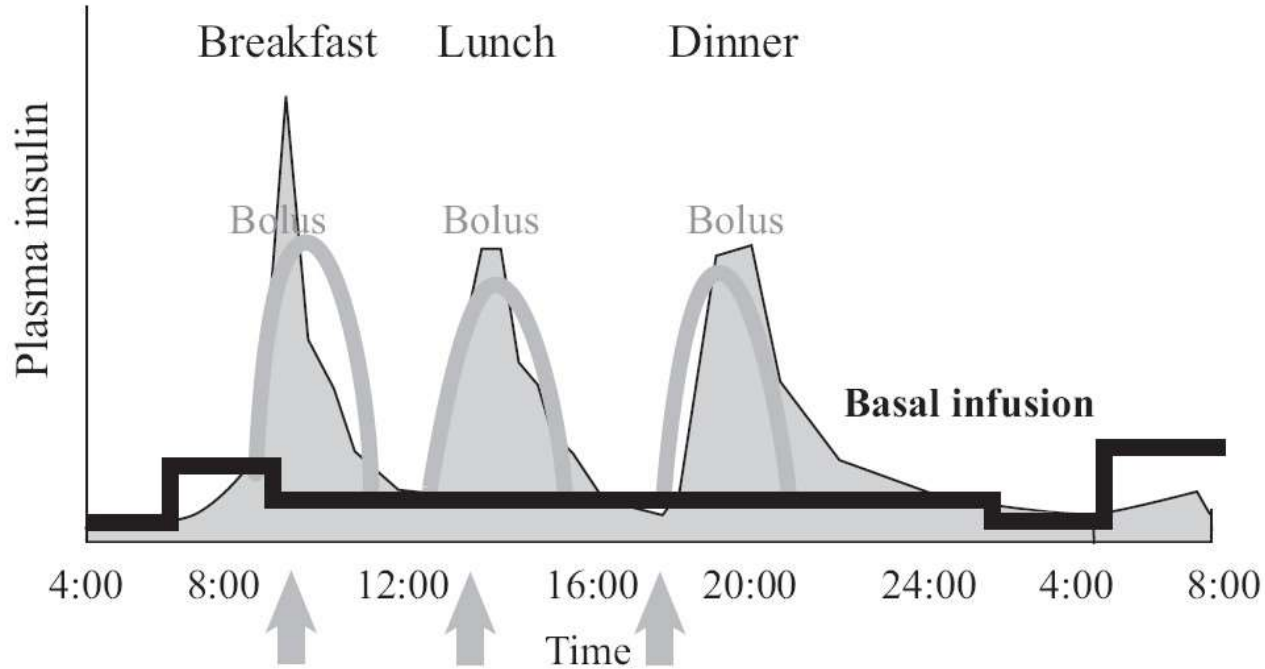
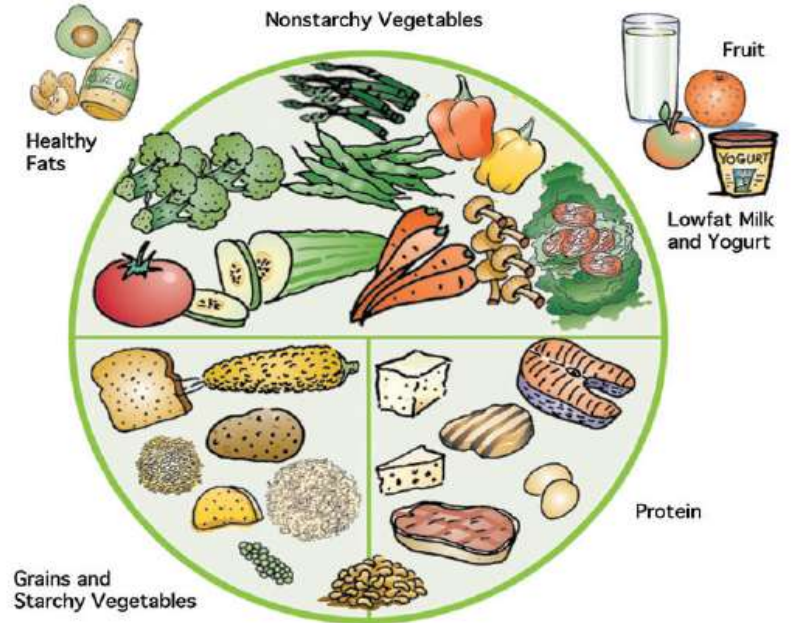


Fig. 1. Variable basal rates using a CSII programme.

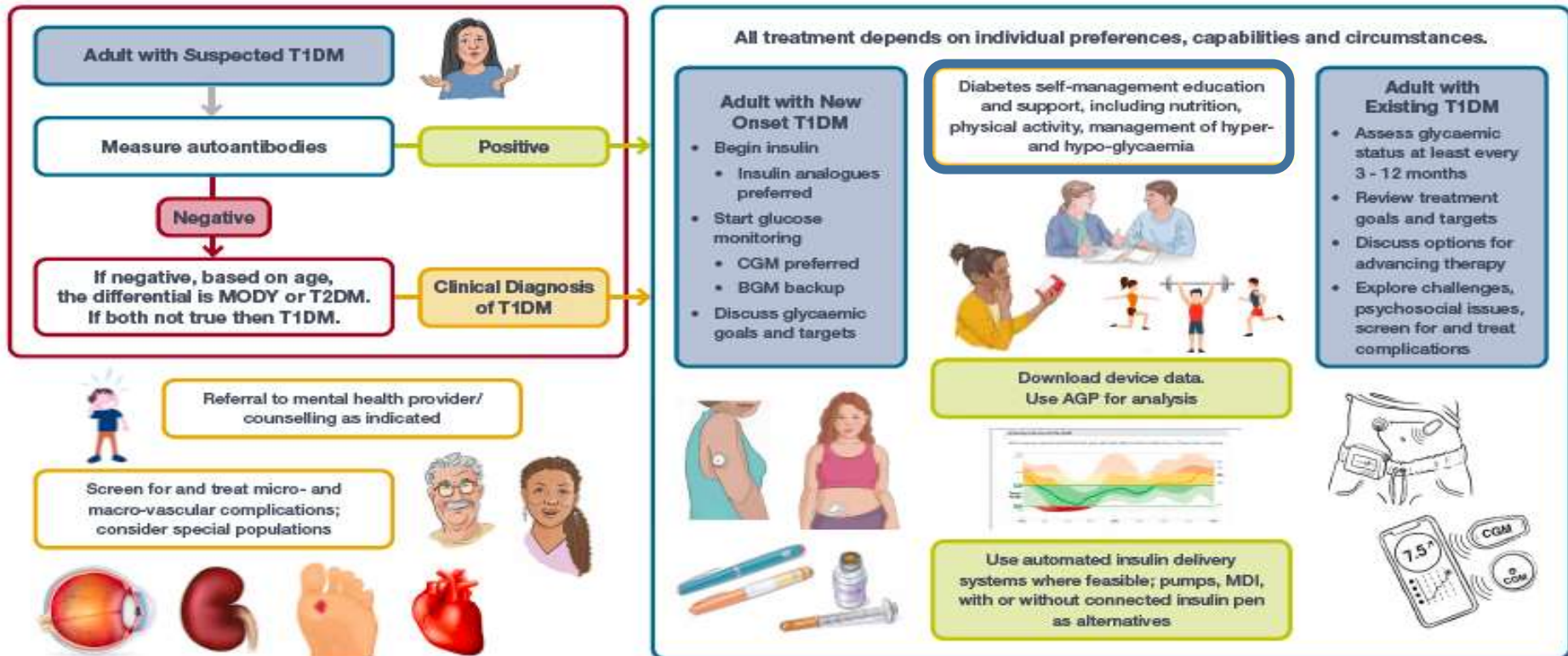
ISPAD Clinical Practice Consensus Guidelines 2018: Nutritional management in children and adolescents with diabetes

Carmel E. Smart^{1,2} | Francesca Annan³ | Laurie A. Higgins⁴ | Elisabeth Jelleryd⁵ | Mercedes Lopez⁶ | Carlo L. Acerini⁷

Evidence suggests that it is possible to improve diabetes outcomes through attention to nutritional management and an individualized approach to **education**. This requires a clear focus on dietary goals in relation to glycemic control and the reduction in cardiovascular risk.



The management of type 1 diabetes in an adult



T1DM = type 1 diabetes mellitus, T2DM = type 2 diabetes mellitus, MODY = maturity onset diabetes of the young, CGM = continuous glucose monitoring, BGM = blood glucose monitoring, AGP = ambulatory glucose profile, MDI = multiple daily injections

We thank the Leona M. and Harry B. Heimsley Charitable Trust for their assistance with the images.

The management of type 1 diabetes in adults. A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD)

Richard I. G. Holt^{1,2} · J. Hans DeVries^{3,4} · Amy Hess-Fischl⁵ · Irl B. Hirsch⁶ · M. Sue Kirkman⁷ · Tomasz Klupa⁸ · Barbara Ludwig⁹ · Kirsten Norgaard^{10,11} · Jeremy Pettus¹² · Eric Renard^{13,14} · Jay S. Skyler¹⁵ · Frank J. Snoek¹⁶ · Ruth S. Weinstock¹⁷ · Anne L. Peters¹⁸

Schematic for management of new-onset type 1 diabetes in an adult

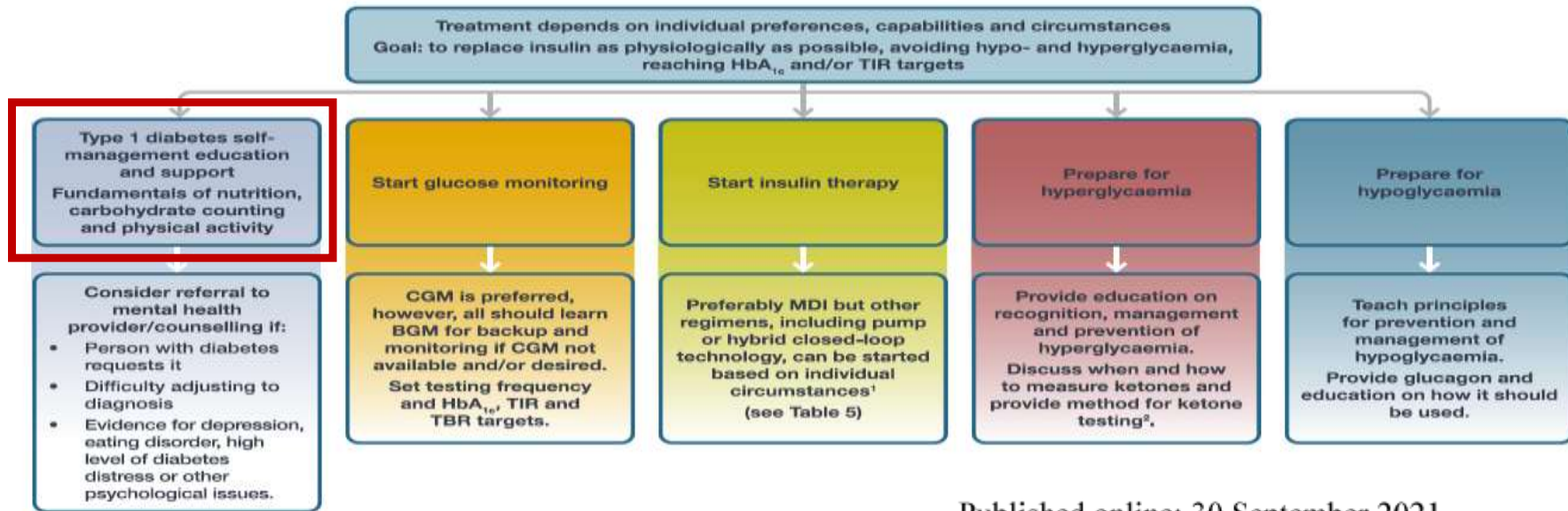


Fig. 3 A framework for initial assessment and treatment of an individual with newly diagnosed type 1 diabetes. In most people, frequent follow-up until the diabetes is stabilised is needed. ¹People can switch back and forth between MDI and pump or hybrid closed-loop therapy based on preference and circumstances; however, all people must be prepared to use injected insulin therapy if pump or hybrid closed-loop systems fail or are not available. ²The availability of blood and urine ketone measurement varies across healthcare systems



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/job, 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

INTEGRATING RECOMMENDATIONS INTO THE NUTRITION CARE PROCESS

The EBNPG recommendations are integrated throughout the Nutrition Care Process. The following summarizes how the recommendations are applied throughout the Nutrition Care Process.

Implementation of MNT:

- An initial series of three to four encounters with an RD lasting from 45 to 90 minutes is recommended;
- this series, beginning at diagnosis of diabetes or at first

Nutrition interventions:

- 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 Dietary Reference Intakes for healthy adults; and

3-4 συναντήσεις διάρκειας 45-90 λεπτών με εξειδικευμένο διαιτολόγο θεωρούνται αναγκαίες

Ο εξειδικευμένος διαιτολόγος θα πρέπει να παρέχει διαιτητική εκπαίδευση δίνοντας έμφαση στις ισχύουσες συστάσεις σχετικά με τα βασικά στοιχεία της διατροφής

whether additional MNT encounters are needed.

Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report



EFFECTIVENESS OF DIABETES NUTRITION THERAPY

Consensus recommendations

- Refer adults living with type 1 or type 2 diabetes to individualized, diabetes-focused MNT at diagnosis and as needed throughout the life span and during times of changing health status to achieve treatment goals. Coordinate and align the MNT plan with the overall management strategy, including use of medications, physical activity, etc., on an ongoing basis.
- Refer adults with diabetes to comprehensive diabetes self-management education and support (DSMES) services according to national standards.

- Diabetes-focused MNT is provided by a registered dietitian nutritionist/registered dietitian (RDN), preferably one who has comprehensive knowledge and experience in diabetes care.
- Refer people with prediabetes and overweight/obesity to an intensive lifestyle intervention program that includes individualized goal-setting components, such as the Diabetes Prevention Program (DPP) and/or to individualized MNT.

Goals of nutrition therapy for type 1 diabetes

- Promote healthful eating patterns, emphasizing a variety of nutrient-dense foods in appropriate sizes to improve overall health and to:
 - Improve HbA1C, blood pressure, cholesterol and aid in maintaining weight
 - Focus on weight management in overweight and obesity

Goals of nutrition therapy for type 1 diabetes

- Individualize nutrition needs based on personal and cultural preferences, health literacy, access to healthful food choices

Goals of nutrition therapy for type 1 diabetes

- Provide practical tools for day-to-day meal planning

Goals of nutrition therapy for type 1 diabetes

- ***Focus on matching insulin doses with meal composition through advanced carbohydrate counting***

14. Children and Adolescents: *Standards of Care in Diabetes— 2024*

Diabetes Care 2024;47(Suppl. 1):S258–S281 | <https://doi.org/10.2337/dc24-S014>

Nutrition Therapy

Recommendations

14.2 Individualized medical nutrition therapy is recommended for youth with type 1 diabetes as an essential component of the overall treatment plan. **A**

14.3 Monitoring carbohydrate intake, whether by carbohydrate counting or experience-based estimation, is a key component to optimizing glycemic management. **B**

14.4 Comprehensive nutrition education at diagnosis, with annual updates, by an experienced registered dietitian nutritionist, is recommended to assess caloric and nutrition intake in relation

to weight status and cardiovascular disease risk factors and to inform macronutrient choices. **E**



Nutrition therapy

- Refer for *individualized medical nutrition therapy (MNT)* provided by a registered dietitian (RD) knowledgeable and skilled in providing diabetes-specific nutritional advice
 - MNT delivered by a RD ----
 - associated with a reduction HbA_{1c} of **1.0-1.9% (11-21 mmol/mol)**
 - for sub-optimally managed type 1 diabetes/integrated into an overall management program
- **No one eating pattern recommended** for people with type 1 diabetes
 - The nutrition approach should be individualized based on personal preferences, socioeconomic status, cultural backgrounds and comorbidities.
 - Carbohydrate counting
 - Insulin-to-carbohydrate ratios to adjust mealtime dosing for improved glycaemic outcomes

- **+/-10 g** στην ποσότητα των υδατανθράκων δεν φαίνεται να επηρεάζει τον γευματικό έλεγχο

Smart CE, et al. Children and adolescents on intensive insulin therapy maintain postprandial glycaemic control without precise carbohydrate counting. *Diabet Med* 2009; 26: 279-285

- Αντίθετα, **+/-20 g** στην ποσότητα των υδατανθράκων επιφέρει μεταγευματικά υπερ- ή υπογλυκό
- Smart CE, et al. In children using intensive insulin therapy, a 20-g variation in carbohydrate amount significantly impacts on postprandial glycaemia. *Diabet Med* 2012 Jul;29(7):e21-4

Διαιτητικές συστάσεις για τα άτομα με ΣΔ μετά το 2014

- Τα στοιχεία πλέον δείχνουν ότι **δεν υπάρχει ιδανικό ποσοστό των θερμίδων** από υδατάνθρακες, πρωτεΐνες και λίπος για όλα τα άτομα με διαβήτη
- Η **κατανομή των μακροθρεπτικών συστατικών** πρέπει να καθορίζεται με βάση την **εξατομικευμένη αξιολόγηση** των διατροφικών συνηθειών, των προτιμήσεων, του είδους της αγωγής και των μεταβολικών στόχων.

A guide to the distribution of macronutrients

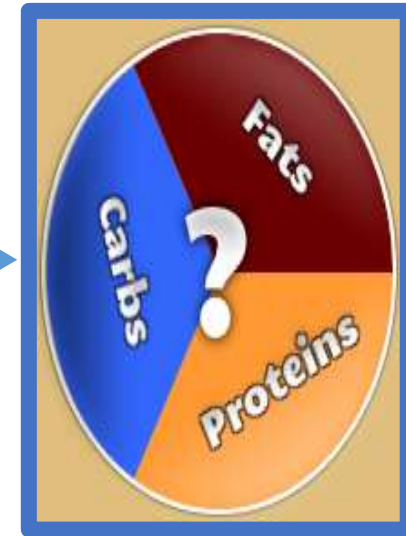
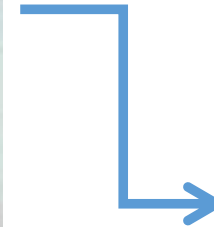
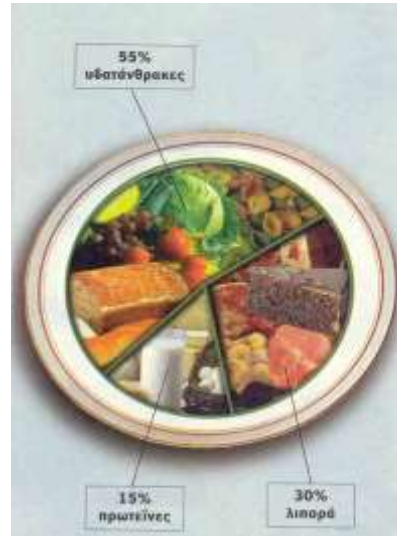
Carbohydrate 45% to 55% energy

Moderate sucrose intake (up to 10% total energy)

Fat 30% to 35% energy

<10% saturated fat + trans fatty acids

Protein 15% to 20% energy



Διατροφικά Πρότυπα για το ΣΔ

Type of eating pattern	Description	Potential benefits reported*
USDA Dietary Guidelines For Americans (DGA) (8)	Emphasizes a variety of vegetables from all of the subgroups; fruits, especially whole fruits; grains, at least half of which are whole intact grains; lower-fat dairy; a variety of protein foods; and oils. This eating pattern limits saturated fats and trans fats, added sugars, and sodium.	DGA added to the table for reference; not reviewed as part of this Consensus Report
Mediterranean-style (69,76,85–91)	Emphasizes plant-based food (vegetables, beans, nuts and seeds, fruits, and whole intact grains); fish and other seafood; olive oil as the principal source of dietary fat; dairy products (mainly yogurt and cheese) in low to moderate amounts; typically fewer than 4 eggs/week; red meat in low frequency and amounts; wine in low to moderate amounts; and concentrated sugars or honey rarely.	<ul style="list-style-type: none"> • Reduced risk of diabetes • A1C reduction • Lowered triglycerides • Reduced risk of major cardiovascular events
Vegetarian or vegan (77–80,92–99)	The two most common approaches found in the literature comprise a plant-based vegetarian eating devoid of all flesh foods but including egg (ovo) and/or dairy (lacto) products, or vegan eating devoid of all flesh foods and animal-derived products.	<ul style="list-style-type: none"> • Reduced risk of diabetes • A1C reduction • Weight loss • Lowered LDL-C and non-HDL-C
Low-fat (26,45,80,83,100–106)	Emphasizes vegetables, fruits, starches (e.g., breads/crackers, pasta, whole intact grains, starchy vegetables), lean protein sources (including beans), and low-fat dairy products. In this review, defined as total fat intake \approx 30% of total calories and saturated fat intake \approx 10%.	<ul style="list-style-type: none"> • Reduced risk of diabetes • Weight loss
Very low-fat (107–109)	Emphasizes fiber-rich vegetables, beans, fruits, whole intact grains, nonfat dairy, fish, and egg whites and comprises 70–77% carbohydrate (including 30–60 g fiber), 10% fat, 13–20% protein.	<ul style="list-style-type: none"> • Weight loss • Lowered blood pressure
Low-carbohydrate (110–112)	Emphasizes vegetables low in carbohydrate (such as salad greens, broccoli, cauliflower, cucumber, cabbage, and others); fat from animal foods, oils, butter, and avocado; and protein in the form of meat, poultry, fish, shellfish, eggs, cheese, nuts, and seeds. Some plans include fruit (e.g., berries) and a greater array of nonstarchy vegetables. Avoids starchy and sugary foods such as pasta, rice, potatoes, bread, and sweets. There is no consistent definition of “low” carbohydrate. In this review, a low-carbohydrate eating pattern is defined as reducing carbohydrates to 26–45% of total calories.	<ul style="list-style-type: none"> • A1C reduction • Weight loss • Lowered blood pressure • Increased HDL-C and lowered triglycerides
Very low-carbohydrate (VLC) (110–112)	Similar to low-carbohydrate pattern but further limits carbohydrate-containing foods, and meals typically derive more than half of calories from fat. Often has a goal of 20–50 g of nonfiber carbohydrate per day to induce nutritional ketosis. In this review a VLC eating pattern is defined as reducing carbohydrate to $<$ 26% of total calories.	<ul style="list-style-type: none"> • A1C reduction • Weight loss • Lowered blood pressure • Increased HDL-C and lowered triglycerides
Dietary Approaches to Stop Hypertension (DASH) (81,118,119)	Emphasizes vegetables, fruits, and low-fat dairy products; includes whole intact grains, poultry, fish, and nuts; reduced in saturated fat, red meat, sweets, and sugar-containing beverages. May also be reduced in sodium.	<ul style="list-style-type: none"> • Reduced risk of diabetes • Weight loss • Lowered blood pressure
Paleo (120–122)	Emphasizes foods theoretically eaten regularly during early human evolution, such as lean meat, fish, shellfish, vegetables, eggs, nuts, and berries. Avoids grains, dairy, salt, refined fats, and sugar.	<ul style="list-style-type: none"> • Mixed results • Inconclusive evidence

*Source: RCTs, meta-analyses, observational studies, nonrandomized single-arm studies, cohort studies. USDA, U.S. Department of Agriculture.

Nutrition therapy

- Low-carbohydrate/very-low carbohydrate eating patterns
 - Have been found to reduce HbA_{1c} levels in the *short-term*
 - IF an individual wishes to utilize, it is important to incorporate **in conjunction with healthy eating guidelines.**

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Richard I. G. Holt^{1,2} • J. Hans DeVries^{3,4} • Amy Hess-Fischl⁵ • Irl B. Hirsch⁶ • M. Sue Kirkman⁷ • Tomasz Klupa⁸ • Barbara Ludwig⁹ • Kirsten Nørgaard^{10,11} • Jeremy Pettus¹² • Eric Renard^{13,14} • Jay S. Skyler¹⁵ • Frank J. Snoek¹⁶ • Ruth S. Weinstock¹⁷ • Anne L. Peters¹⁸

Postprandial Glucose Variability Following Typical Meals in Youth Living with Type 1 Diabetes

Susana R. Patton ^{1,*}, Simon Bergford ², Jennifer L. Sherr ³, Robin L. Gal ², Peter Calhoun ², Mark A. Clements ⁴, Michael C. Riddell ⁵ and Corby K. Martin ⁶

Table 2. Effect of macronutrients on postprandial glycemic variability.

	N	Mean ± SD	Adjusted Mean Difference (95% CI)	p-Value ^a
Glucose CV (%)				
Overall	1980	19 ± 10%	-	-
Carbohydrates				
<25 g	507	18 ± 9%	Reference	0.002
25 to <50 g	603	18 ± 9%	0.3% (-0.8%, 1.5%)	
50 to <75 g	458	20 ± 10%	1.9% (0.6%, 3.2%)	
≥75 g	412	21 ± 10%	3.0% (1.4%, 4.6%)	
Fat				
<10 g	695	19 ± 9%	Reference	0.006
10 to <30 g	815	19 ± 10%	-0.5% (-1.5%, 0.5%)	
≥30 g	470	19 ± 10%	-1.0% (-2.4%, 0.3%)	
Protein				
<0.25 g/kg	1000	19 ± 9%	Reference	0.19
0.25 to <0.50 g/kg	514	19 ± 9%	-0.7% (-1.8%, 0.4%)	
≥0.50 g/kg	466	19 ± 10%	-0.9% (-2.1%, 0.3%)	
Glucose SD (mg/dL)				
Overall	1980	30 ± 17	-	-
Carbohydrates				
<25 g	507	26 ± 15	Reference	<0.001
25 to <50 g	603	28 ± 15	1.6 (-0.4, 3.6)	
50 to <75 g	458	32 ± 18	5.1 (2.8, 7.4)	
≥75 g	412	33 ± 19	6.6 (3.8, 9.3)	
Fat				
<10 g	695	29 ± 17	Reference	<0.001
10 to <30 g	815	30 ± 17	-0.5 (-2.3, 1.3)	
≥30 g	470	30 ± 17	-2.7 (-5.0, -0.4)	
Protein				
<0.25 g/kg	1000	29 ± 16	Reference	0.05
0.25 to <0.50 g/kg	514	30 ± 17	-0.7 (-2.6, 1.2)	
≥0.50 g/kg	466	30 ± 18	-1.8 (-3.8, 0.3)	

^a p-value on the effect of nutritional content (carbohydrate, fat, or protein) on glucose CV and glucose SD based on a repeated measures linear regression model adjusting for HbA1c, outcome in 24 h prior to meal, glucose at the start of the meal, insulin on board, grams of fiber, and grams of carbohydrates with an exchangeable correlation structure.

Eligible youth were between 12 and 17 years old; diagnosed with T1D for at least three months; following an intensive insulin regimen for at least one month; and reporting a Physical Activity Questionnaire for Children and Adolescents (PAQ) survey score of at least 1.5, indicating a moderate or high level of physical activity.

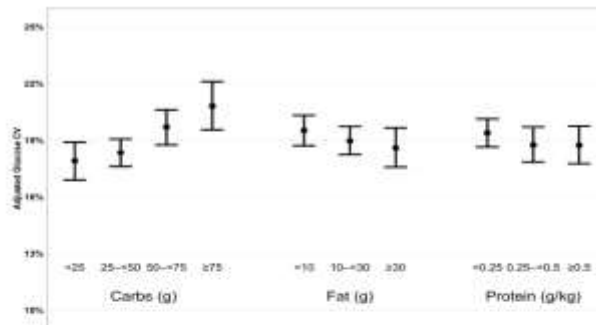


Figure 1. Plot of adjusted glucose CV by macronutrient group. Each plot has adjusted glucose CV and 95% confidence interval on the y-axis and macronutrient group on the x-axis.

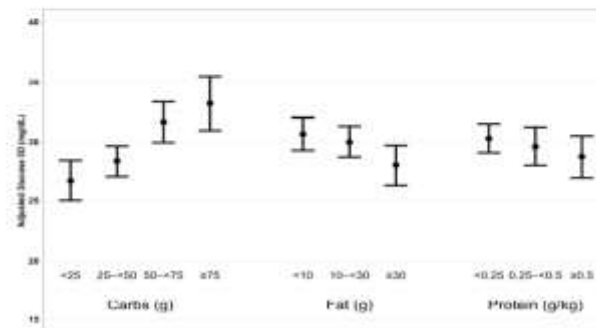


Figure 2. Plot of adjusted glucose SD by macronutrient group. Each plot has adjusted glucose SD and 95% confidence interval on the y-axis and macronutrient on the x-axis.

Overall, our results suggest **greater glycemic variability following meals higher in carbohydrate content, while we observed lower variability following meals in fat or protein.**

Notably, in our sub-analyses, insulin modality, exercise in the postprandial period, and exercise intensity did not appear to influence the relationship between mealtime macronutrients and postprandial glycemic variability.

Ο κανόνας των 500

Ο κανόνας των 500

- Ινσουλίνη: Αναλογία υδατανθράκων = 450 ή $500 \div$ συνολική ημερήσια δόση ινσουλίνης (TDD)

παράδειγμα

- TDD = 36 μονάδες
- τα επίπεδα γλυκόζης είναι μέσα στους επιθυμητούς στόχους
- Ινσουλίνη: Αναλογία υδατανθράκων = $500 \div 36 = 13.8$ (περίπου 14)
➔ αναλογία = **1:14**

Συντελεστής ινσουλινο-ευαισθησίας (ISF)

Μέθοδος με το συντελεστή ινσουλινο-ευαισθησίας (ISF)¹

- $ISF = 1500 \text{ or } 1800 \div TDD$
- Ινσουλίνη:Αναλογία υδατανθράκων = $ISF \times 0.33$

παράδειγμα

- $TDD = 25 \text{ units}$
- $ISF = 1800 \div 25 = 72 \text{ mg/dl}$
- Ινσουλίνη:Αναλογία υδατανθράκων = $72 \times 0.33 = 23.8$ (round up to 24)
Ratio = 1:24

Υπολογισμός γευματικής ινσουλίνης

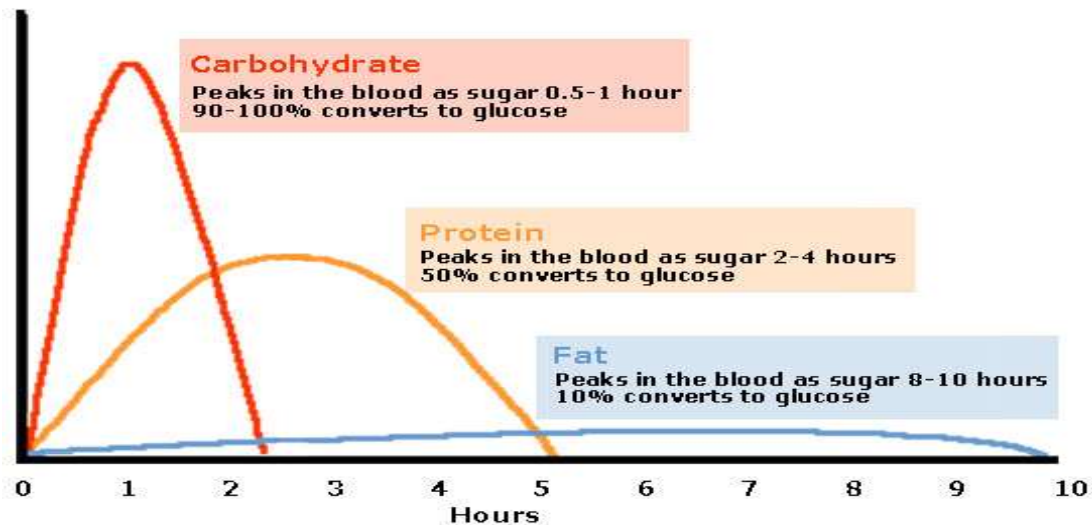
Topic	Recommendation
Effectiveness of nutrition therapy	<p>5.9 An individualized medical nutrition therapy program as needed to achieve treatment goals, provided by a registered dietitian nutritionist (RD/RDN), preferably one who has comprehensive knowledge and experience in diabetes care, is recommended for all people with type 1 or type 2 diabetes, prediabetes, and gestational diabetes mellitus. A</p> <p>5.10 Because diabetes medical nutrition therapy can result in cost savings B and improved outcomes (e.g., A1C reduction, reduced weight, decrease in cholesterol) A, medical nutrition therapy should be adequately reimbursed by insurance and other payers. E</p>
Energy balance	5.11 For all patients with overweight or obesity, behavioral modification to achieve and maintain a minimum weight loss of 5% is recommended. A
Eating patterns and macronutrient distribution	<p>5.12 There is no ideal macronutrient pattern for people with diabetes; meal plans should be individualized while keeping total calorie and metabolic goals in mind. E</p> <p>5.13 A variety of eating patterns can be considered for the management of type 2 diabetes and to prevent diabetes in individuals with prediabetes. B</p> <p>5.14 Reducing overall carbohydrate intake for individuals with diabetes has demonstrated the most evidence for improving glycemia and may be applied in a variety of eating patterns that meet individual needs and preferences. B</p>
Carbohydrates	<p>5.15 Carbohydrate intake should emphasize nutrient-dense carbohydrate sources that are high in fiber (at least 14 g fiber per 1,000 kcal) and minimally processed. Eating plans should emphasize nonstarchy vegetables, fruits, and whole grains, as well as dairy products, with minimal added sugars. B</p> <p>5.16 People with diabetes and those at risk are advised to replace sugar-sweetened beverages (including fruit juices) with water as much as possible in order to control glycemia and weight and reduce their risk for cardiovascular disease and fatty liver B and should minimize the consumption of foods with added sugar that have the capacity to displace healthier, more nutrient-dense food choices. A</p> <p>5.17 When using a flexible insulin therapy program, education on the glycemic impact of carbohydrate A, fat, and protein B should be tailored to an individual's needs and preferences and used to optimize mealtime insulin dosing.</p> <p>5.18 When using fixed insulin doses, individuals should be provided education about consistent pattern of carbohydrate intake with respect to time and amount, while considering the insulin action time, as it can result in improved glycemia and reduce the risk for hypoglycemia. B</p>

Στα άτομα με ΣΔ και εντατικοποιημένο σχήμα ινσουλινοθεραπείας αλλά και στη θεραπεία με αντλία είναι απαραίτητη η εκπαίδευση στη μέτρηση των υδατανθράκων

(A) τον υπολογισμό της προγευματικής δόσης ινσουλίνης

(B) αλλά και στον υπολογισμό των πρωτεϊνών και λιπιδίων

- Σημαντικότερη παράμετρος είναι **η συνολική ενεργειακή πρόσληψη** και όχι η πηγή της ενέργειας.
- Οι υδατάνθρακες είναι το κύριο θρεπτικό συστατικό που επηρεάζει την μεταγευματική γλυκόζη του αίματος.
- Ωστόσο, επειδή **και τα τρία θρεπτικά συστατικά** απαιτούν ινσουλίνη για τον μεταβολισμό τους και επηρεάζουν την επιτυχία των στόχων, θα πρέπει να λαμβάνονται υπόψη μέσα στο πλαίσιο της ισορροπημένης διατροφής.



Standards of Medical Care in Diabetes—2017:

Summary of Revisions

Diabetes Care 2017;40(Suppl. 1):S4–S5 | DOI: 10.2337/dc17-S003

Το 2017, για πρώτη φορά, στις επίσημες συστάσεις τις αμερικανικής διαβητολογικής εταιρείας, αναφέρεται πως στα άτομα με ΣΔ, που ακολουθούν εντατικοποιημένο σχήμα ινσουλινοθεραπείας, είναι απαραίτητη η εκπαίδευση στην μέτρηση των υδατανθράκων και σε μερικές περιπτώσεις και ο υπολογισμός των πρωτεϊνών και του λίπους (ADA,2017:40 (Suppl 1)

The recommendation for nutrition therapy in people prescribed flexible insulin therapy was updated to include fat and protein counting in addition to carbohydrate counting for some patients to reflect evidence that these dietary factors influence insulin dosing and blood glucose levels.

Για πρώτη φορά αναφέρεται και ο Υπολογισμός ΚΑΙ λίπους-πρωτεΐνης

**The management of type 1 diabetes in adults. A consensus report
by the American Diabetes Association (ADA) and the European
Association for the Study of Diabetes (EASD)**

Richard I. G. Holt^{1,2} • J. Hans DeVries^{3,4} • Amy Hess-Fischl⁵ • Irl B. Hirsch⁶ • M. Sue Kirkman⁷ • Tomasz Klupa⁸ •
Barbara Ludwig⁹ • Kirsten Nørgaard^{10,11} • Jeremy Pettus¹² • Eric Renard^{13,14} • Jay S. Skyler¹⁵ • Frank J. Snoek¹⁶ •
Ruth S. Weinstock¹⁷ • Anne L. Peters¹⁸

- High fat and/or high protein, may contribute to delayed hyperglycemia and the need for insulin dose adjustments.
 - Highly variable between individuals
 - Postprandial glucose measurements for up to three or more hours may be needed to determine initial dose adjustments



Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report

<https://doi.org/10.2337/dci19-0014>

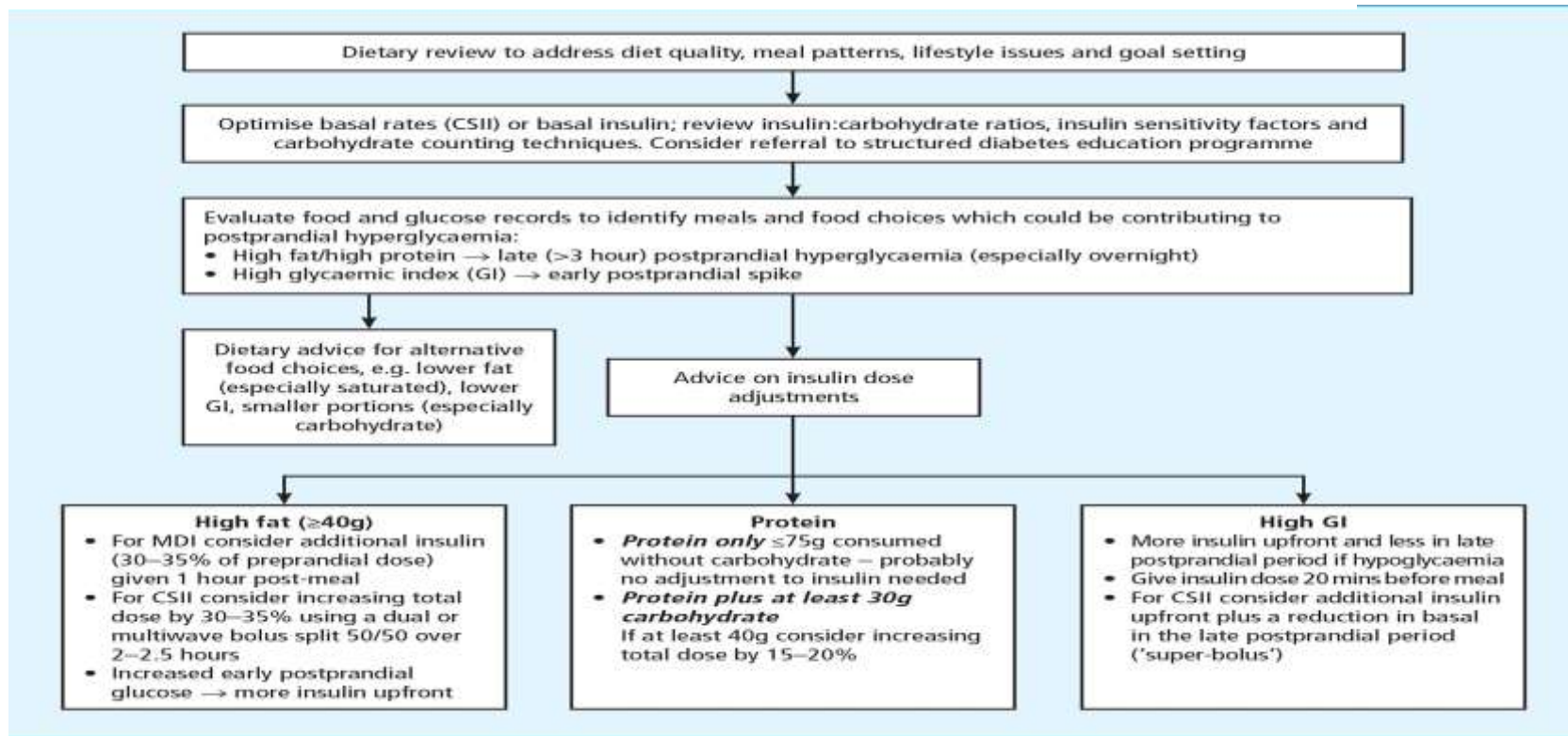
- When consuming a mixed meal that contains carbohydrate and is high in fat and/or protein, insulin dosing should not be based solely on carbohydrate counting. A cautious approach to increasing mealtime insulin doses is suggested; continuous glucose monitoring (CGM) or self-monitoring of blood glucose (SMBG) should guide decision-making for administration of additional insulin.

5. Facilitating Behavior Change and Well-being to Improve Health Outcomes: *Standards of Medical Care in Diabetes—2022*

Diabetes Care 2022;45(Suppl. 1):S60–S82 | <https://doi.org/10.2337/dc22-5005>

- 5.17 When using a flexible insulin therapy program, education on the glycemic impact of carbohydrate **A**, fat, and protein **B** should be tailored to an individual's needs and preferences and used to optimize mealtime insulin dosing.

Fat and protein counting in type 1 diabetes



Insulin strategies for dietary fat and protein in type 1 diabetes: A systematic review

Tenele A. Smith^{1,2} | Alexandra A. Marlow^{1,2} | Bruce R. King^{1,2,3} | Carmel E. Smart^{1,2,3}




Novelty statement

- Type 1 diabetes guidelines recommend that fat and protein be considered in the meal insulin strategy yet, the optimal adjustments remain unknown.
- For carbohydrate meals containing >30 g of fat or >15 g fat with >25 g protein, findings support an insulin dose increase of 30% of the insulin-to-carbohydrate ratio.
- In pump therapy, findings demonstrated a glycaemic benefit of insulin delivery in combination over standard and extended boluses, with $\geq 60\%$ of the insulin calculated for carbohydrate given 15 min before eating.
- In multiple daily injections, the effectiveness of a split insulin strategy in improving postprandial glycaemia is unclear.

Conclusions: Findings highlight the glycaemic benefit of an additional 24%–75% ICR for fat and fat and protein meals. For these meals, there is supportive evidence for insulin delivery in a combination bolus with a minimum upfront dose of 60% ICR, 15 min before the meal.

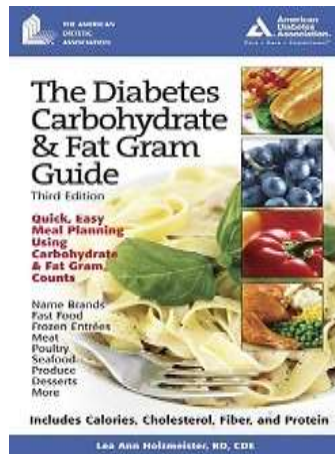
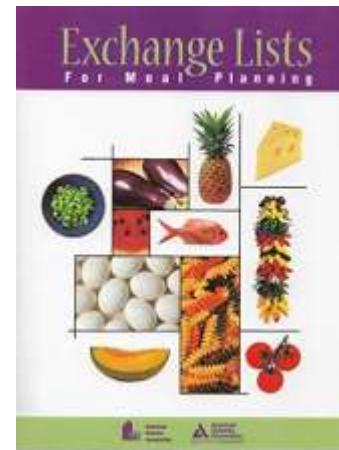
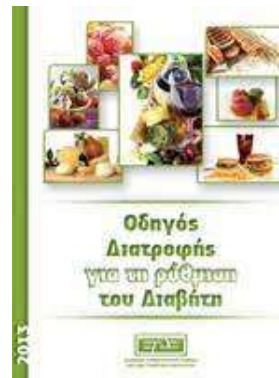
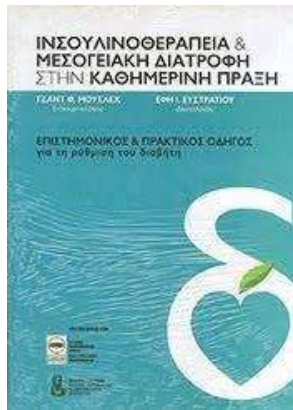
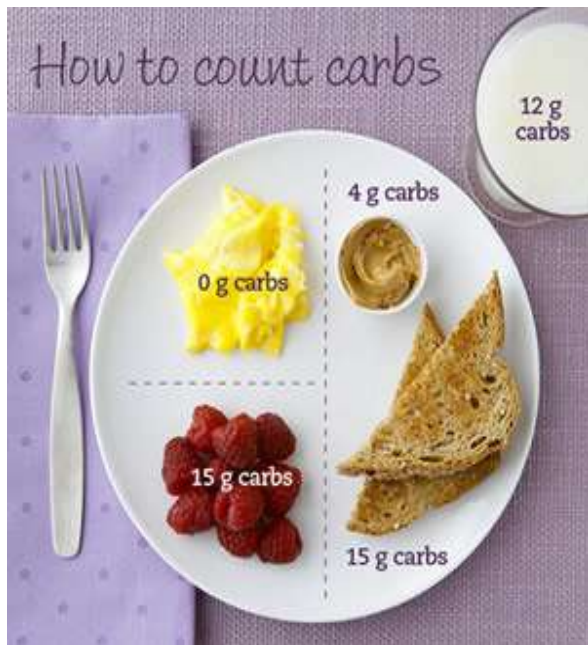
Factor Associated with Adherence to the Protein and Fat Counting Strategy by Adults with Type 1 Diabetes Mellitus

Gabriela Correia Uliana ^{1,†}, Juliana Carvalho da Costa ^{1,†}, Ayla Rocha Quaresma ^{2,†}, Arthur Andrade da Fonseca ², Kaory Brito Ohaze ², Layla Sandia Cezário Alves ² and Daniela Lopes Gomes ^{1,2,*} 

Cross-sectional study was conducted from November 2021 to June 2022 through an online questionnaire.




- The majority of respondents knew what protein and lipid counting was but did not know how to perform it, highlighting the need to invest in diabetes education.
- Factors associated with greater adherence to protein and lipid counting included:
 1. receiving guidance from a nutritionist,
 2. having a family income greater than three minimum wages,
 3. having a higher education level, and
 4. having free time during meal preparation.
- Furthermore, this study demonstrated that adhering to protein and lipid counting was associated with adequate HbA1c control.
- These results emphasize the importance of **considering protein and lipid counting as a strategy to optimize glycemic control.**

Χρήση ισοδυνάμων τροφής



Ισοδύναμα τροφίμων

Groups/Lists	CHO	Protein	Fat	Calories
ΑΜΥΛΟΥΧΑ-ΟΜΑΔΑ ΨΩΜΙΟΥ	15	3	≤1	80
ΦΡΟΥΤΑ	15	0	0	60
ΓΑΛΑ ΚΑΙ ΠΡΟΙΟΝΤΑ ΤΟΥ	12	8	0-3	90
ΑΠΑΧΟ	12	8	5	120
ΗΜΙΠΑΧΟ	12	8	8	150
ΠΛΗΡΕΣ				
ΑΛΛΟΙ ΥΔΑΤΑΝΘΡΑΚΕΣ	12	varies	varies	varies
ΛΑΧΑΝΙΚΑ	5	2	0	25
ΚΡΕΑΣ ΚΑΙ ΥΠΟΚΑΤΑΣΤΑΤΑ				
πολύ άπαχο	0	7	0-1	35
άπαχο	0	7	3	55
μετρίου λίπους	0	7	5	75
υψηλού λίπους	0	7	8	100
ΟΜΑΔΑ ΛΙΠΟΥΣ	0	0	5	45

<p>Ανανάς 3/4 φλιτζ</p> 	<p>αχλάδι 1 μικρό 110 γρ</p> 	<p>βερίκοκα 4 ολόκληρα 150 γρ</p> 	<p>γκρέιπ φρούτ ½ μεγάλο 330 γρ</p> 	<p>δαμάσκηνα 2 μέτρια 140 γρ</p> 
<p>καρπούζι 1 φέτα 380 γρ</p> 	<p>κεράσια 12 μεγάλα 85 γρ</p> 	<p>μανταρίνι 2 μικρά 220 γρ</p> 	<p>μήλο 1 μικρό 120 γρ</p> 	<p>μπανάνα ½ μεγάλη ή 1 μικρή 120 γρ</p> 
<p>νεκταρίνι 1 μέτριο 140 γρ</p> 	<p>πεπόνι 3/4 φλιτζ. 280 γρ</p> 	<p>πορτοκάλι 1 μικρό 180 γρ</p> 	<p>ροδάκινο 1 μέτριο 110 γρ</p> 	<p>σταφύλια 17 ρόγες μικρές 85 γρ</p> 
<p>φράουλες 10 μικρές ή 1 φλιτζ</p> 	<p>Χυμός μήλου ½ φλιτζ</p> 	<p>Χυμός πορτοκαλιού ½ φλιτζ.</p> 	<p>Σταφίδες 1κουτ σούπας</p> 	<p>Ξερά βερίκοκα 8 κομμάτια</p> 

<p>½ φλιτζάνι ντομάτα</p> 	<p>1 φλιτζάνι μανιτάρια</p> 	<p>1 φλιτζάνι μαρούλι</p> 	<p>½ φλιτζάνι μπρόκολο</p> 	<p>1 φλιτζάνι καρότα</p> 
<p>½ φλιτζάνι κουνουπίδι</p> 	<p>½ φλιτζάνι κολοκυθάκια</p> 	<p>½ φλιτζάνι πατζάρια</p> 	<p>½ φλιτζάνι μπάμιες</p> 	<p>½ φλιτζάνι μελιτζάνα</p> 
<p>½ φλιτζάνιο ραπανάκια</p> 	<p>½ φλιτζάνι πράσα</p> 	<p>1 φλιτζάνι λάχανο</p> 	<p>½ φλιτζάνι σπαράγγια</p> 	<p>½ φλιτζάνι σπανάκι</p> 

<p>κουλούρι Θεσ/νίκης 1/2</p> 	<p>κριτσίνια 2</p> 	<p>1/2 φλιτζ. Κουκιιά</p> 	<p>μπισκότα τύπου cream crackers 2</p> 	<p>φρυγανιές (μικρές) 2 τεμάχια</p> 
<p>ψωμί σίκαλης 1 φέτα (30 γρ)</p> 	<p>ψωμάκια τύπου χάμπουργκερ 1/2 (30 γρ.)</p> 	<p>Αλεύρι 3 κ.σ.</p> 	<p>βρώμη 1/2 φλιτζ.,</p> 	<p>Κορν Φλέικς 1/2 φλιτζ</p> 
<p>μακαρόνια- κριθάρaki-χυλοπίπτες 1/3 φλιτζ.(μαγειρ.)</p> 	<p>μούσλι 1/4 φλιτζ</p> 	<p>ρύζι (μαγειρεμένο) άσπρο ή καστανό 1/3 φλιτζ.</p> 	<p>Μπάρα Δημητριακών 1 τεμάχιο (απλή)</p> 	<p>ρεβίθια, φασόλια, Φακές 1/2 φλιτζ.</p> 
<p>Αρακάς (μαγειρεμένος) 1/2 φλιτζ</p> 	<p>καλαμπόκι βραστό 1/2 φλιτζ</p> 	<p>κάστανα 4 μεγάλα</p> 	<p>πατάτες ψητές 1 μικρή μεγέθους αβγού (85 γρ)</p> 	<p>Μπισκότα digestive χωρίς ζάχαρη 2</p> 
<p>πατάτες πουρέ 1/2 φλιτζ</p> 	<p>φασολάκια (πράσινα με καρπό μαγειρεμένα) 1/2 φλιτζ</p> 	<p>Σούπα ντομάτα με ρύζι 1 φλιτζάνι</p> 	<p>Βάφλα 85 γρ</p> 	<p>Αραβική πίτα 1/2</p> 
<p>Πίτα για σουβλάκι 1/2</p> 	<p>Κρέπα 1/2</p> 	<p>Μπισκότα πτιμπερ 2</p> 	<p>Σούπα κοτόπουλο ή φαρόσουπα με ρύζι 1 φλιτζάνι</p> 	<p>Παξιμαδάκια κρίσιπς 2 τεμάχια</p> 

ΙΣΟΔΥΝΑΜΑ ΥΔΑΤΑΝΘΡΑΚΩΝ ΣΕ ΕΝΤΑΤΙΚΟΠΟΙΗΜΕΝΟ ΣΧΗΜΑ ΙΝΣΟΥΛΙΝΗΣ

ΔΕΝ ΠΡΕΠΕΙ ΝΑ ΞΕΧΝΑΜΕ ΠΟΤΕ: 1 ισοδύναμο υδατάνθρακα = 15 γρ υδατανθράκων

	<u>ΠΟΣΟΤΗΤΑ/ΜΕΡΙΔΑ</u>	<u>ΥΔΑΤΑΝΘΡΑΚΕΣ (γρ)</u>
<u>ΟΜΑΔΑ ΔΗΜΗΤΡΙΑΚΩΝ- ΑΜΥΛΟΥΧΩΝ ΛΑΧΑΝΙΚΩΝ</u>		
Ψωμί λευκό	30 γρ	15 (1 ισοδύναμο)
Ψωμί ολικής αλέσεως	30 γρ	15 (1 ισοδύναμο)
Ψωμί του τοστ	1 φέτα	15 (1 ισοδύναμο)
Ψωμί τύπου χάμπουργκερ	½ (30γρ)	15 (1 ισοδύναμο)
Φρυγανιές λευκές	2 τεμ.	15 (1 ισοδύναμο)
Φρυγανιές ολικής αλέσεως	2 τεμ	15 (1 ισοδύναμο)
Κουλούρι Θεσ/νίκης	½ τεμ	15 (1 ισοδύναμο)
Κράκερς (cream crackers)	2 τεμ	15 (1 ισοδύναμο)
Πίτα	½ τεμ	15 (1 ισοδύναμο)
Παξιμάδια	2 μικρά	15 (1 ισοδύναμο)
Αλεύρι	3 κ.σ	15 (1 ισοδύναμο)
Δημητριακά άσπρα	½ φλυτζ.	15 (1 ισοδύναμο)
Ρύζι μαγειρευμένο	50 γρ	15 (1 ισοδύναμο)
Όσπρια μαγειρευμένα (στραγγισμένα)	90 γρ	15 (1 ισοδύναμο)
Ζυμαρικά μαγειρευμένα	50 γρ	15 (1 ισοδύναμο)
Πατάτες	75 γρ	15 (1 ισοδύναμο)
Αρακάς μαγειρευμένος	80 γρ	15 (1 ισοδύναμο)
Καλαμπόκι βραστό	65γρ	15 (1 ισοδύναμο)
Κάστανα	4 μεγάλα, 6 μικρά	15 (1 ισοδύναμο)

Μέθοδοι υπολογισμού ΥΔ: διαφορές

ΦΑΓΗΤΟ

GRAMM VS

ΙΣΟΔΥΝΑΜΑ

1 φλ πουρέ πατάτας

36

2

8 κομμάτια σπαράγγια

8

0

1 μικρό ψωμάκι (30 γρ)

19

1

90 γρ κοτόπουλου

0

0

1 μικρό αχλάδι 210 γρ

21

1

2 κουτ σουπας μαργαρίνη

0

0

81 gm

60 gm

Insulin dose using 1:15 (1:C ratio)

5.4 u

4.0 u

Πρακτικοί τρόποι υπολογισμού



Nutrition Facts

Serving Size 2 crackers (14 g)
Servings Per Container About 21

Amount Per Serving

Calories 60 Calories from Fat 15

% Daily Value*

Total Fat 1.5g 2%

Saturated Fat 0g 0%

Trans Fat 0g

Cholesterol 0mg 0%

Sodium 70mg 3%

Total Carbohydrate 10g 3%

Dietary Fiber Less than 1g 3%

Sugars 0g

Protein 2g

Vitamin A 0% • Vitamin C 0%

Calcium 0% • Iron 2%

* Percent Daily Values are based on a diet of 2,000 calories. Your daily values may be higher or lower depending on your calorie needs:

	Calories: 2,000	2,500
Total Fat	Less than 65g	80g
Sat Fat	Less than 20g	25g
Cholesterol	Less than 300mg	300mg
Sodium	Less than 2400mg	2400mg
Total Carbohydrate	300g	375g
Dietary Fiber	25g	30g

Πρέπει να διαβάσουμε τις διατροφικές ΕΤΙΚΕΤΕΣ Γιαούρτια με φρούτα

Nutrition Facts	
Serving Size 1 container (226g)	
Amount Per Serving	
Calories 110	Calories from Fat 0
	% Daily Value*
Total Fat 0g	0 %
Saturated Fat 0g	0 %
Trans Fat 0g	
Cholesterol Less than 5mg	1 %
Sodium 160mg	7 %
Total Carbohydrate 15g	5 %
Dietary Fiber 0g	0 %
Sugars 10g	
Protein 13g	
Vitamin A 0 % • Vitamin C 4 %	
Calcium 45 % • Iron 0 %	

* Percent Daily Values are based on a 2000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

Nutrition Facts	
Serving Size 1 container (227g)	
Amount Per Serving	
Calories 240	Calories from Fat 25
	% Daily Value*
Total Fat 3g	4 %
Saturated Fat 1.5g	9 %
Trans Fat 0g	
Cholesterol 15mg	5 %
Sodium 140mg	6 %
Total Carbohydrate 46g	15 %
Dietary Fiber less than 1g	3 %
Sugars 44g	
Protein 9g	
Vitamin A 2 % • Vitamin C 4 %	
Calcium 35 % • Iron 0 %	

* Percent Daily Value is based on a 2000 calorie diet. Your Daily Values may be higher or lower based on your calorie needs.

Υπολογίζουμε το μέγεθος της μερίδας



Fist = 8 fluid oz or 1 cup



Palm = 3 oz.



Thumb = 1 oz.



Handful = 1/2 cup



Thumb tip = 1 tsp.

Μέγεθος ισοδυνάμου

1 Cup =  Baseball

3/4 Cup =  Tennis Ball

1/2 Cup =  Computer Mouse


1/4 Cup =  Egg
















3 Oz. =  Deck of Cards

2 Teaspoons =  Ping-Pong Ball

How Much Do YOU Eat?

Use these everyday items to estimate the amount you eat.



 <p>1/2 cup of fruit juice = size of a baseball</p>	 <p>1 small apple = 1 cup = size of a baseball</p>	 <p>1/2 cup of sliced fruit = size of a baseball</p>	<p>Amounts of foods that count as:</p> <p>2 cups Fruit Group</p>
 <p>1/2 cup of carrots or other vegetables = size of a small computer mouse</p>	 <p>10 medium fries counts as 1/2 cup = size of a deck of cards</p>	 <p>1 cup of raw vegetables = size of a baseball</p>	<p>2 1/2 cups Vegetable Group</p>
 <p>1 cup of milk = size of a milk carton</p>	 <p>1 cup of yogurt = size of a baseball</p>	 <p>1 1/2 oz. of low-fat natural cheese* = size of 2 pieces of bread</p>	<p>3 cups or equivalent Milk Group</p>
 <p>2-3 oz. of meat, poultry or fish = size of a deck of cards</p>	 <p>1 tablespoon of peanut butter counts as 1 oz. = size of a small whole butter</p>	 <p>1/2 cup of beans counts as 2 oz. = size of a baseball</p>	<p>5 1/2 ounces or equivalent Meat & Beans Group</p>
 <p>1/2 cup of cooked pasta = 1 oz. = size of a small computer mouse</p>	 <p>1 cup of dry cereal = 1 oz. = size of a baseball</p>	 <p>1 slice of bread counts as 1 oz. = size of a CD</p>	<p>6 ounces or equivalent Grains Group</p>

Μέγεθος ισοδυναμίου



Μέγεθος ισοδυνάμων

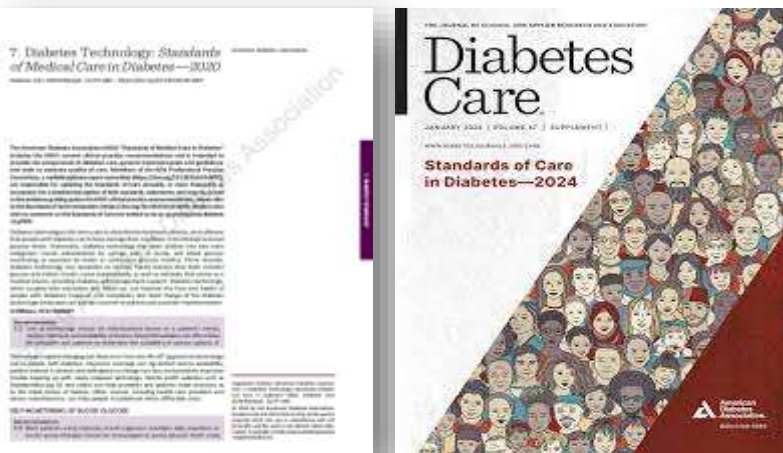
Δημητριακά πρωινού = 1 γροθιά



7. Diabetes Technology: *Standards of Care in Diabetes—2024*

Diabetes Care 2024;47(Suppl. 1):S126–S144 | <https://doi.org/10.2337/dc24-S007>

Από το 2020 προστέθηκε κεφάλαιο για
Τεχνολογία



Recommendation

7.1 Use of technology should be individualized based on a patient's needs, desires, skill level, and availability of devices. **E**

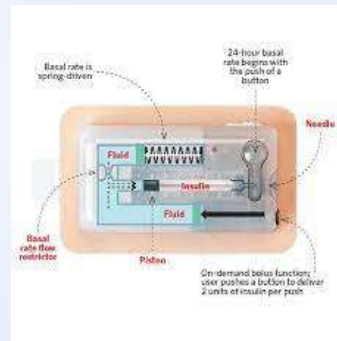
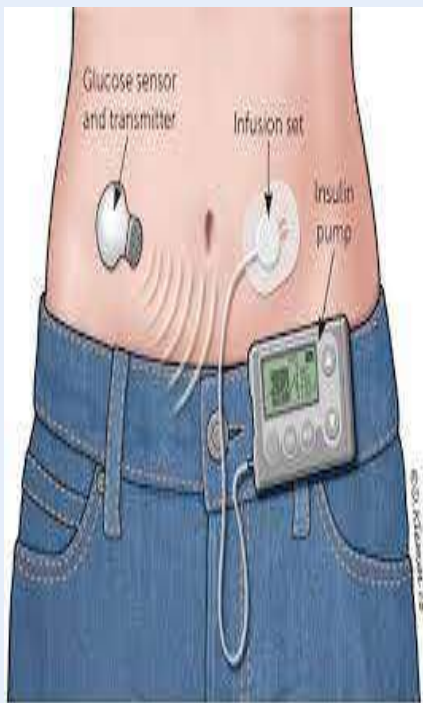
Technology is rapidly changing, but there is no “one-size-fits-all” approach to technology use in people with diabetes. Insurance coverage can lag behind device availability, patient interest in devices and willingness to change can vary, and providers may have trouble keeping up with newly released technology. Not-for-profit websites can help providers and patients make decisions as to the initial choice of devices. Other sources, including health care providers and device manufacturers, can help people troubleshoot when difficulties arise.

Table 7.3—Continuous glucose monitoring (CGM) devices

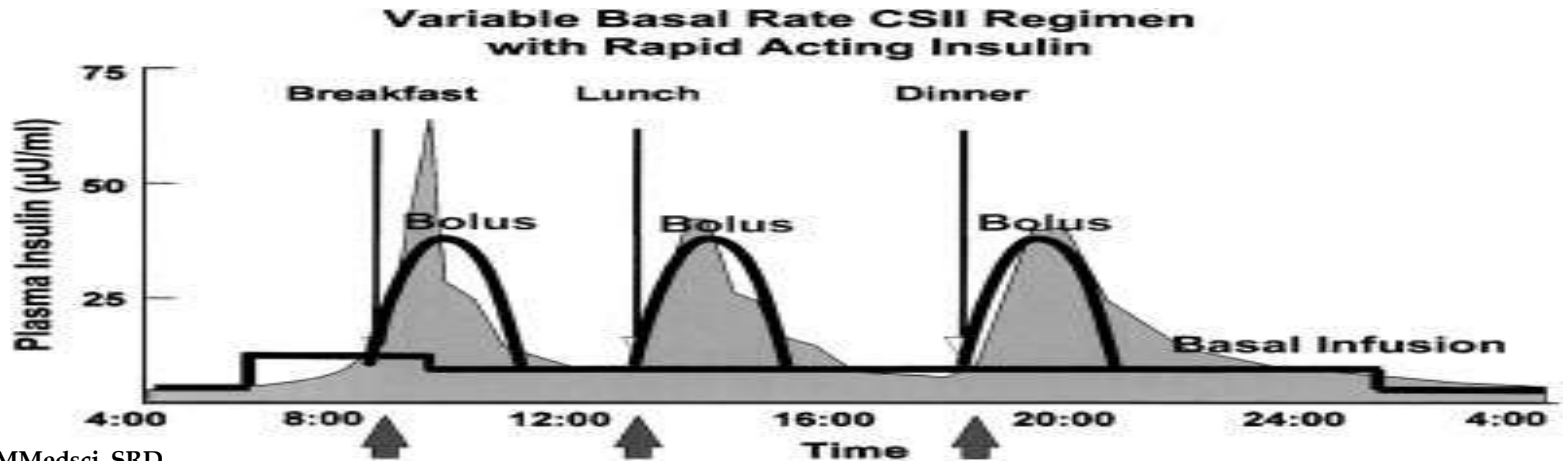
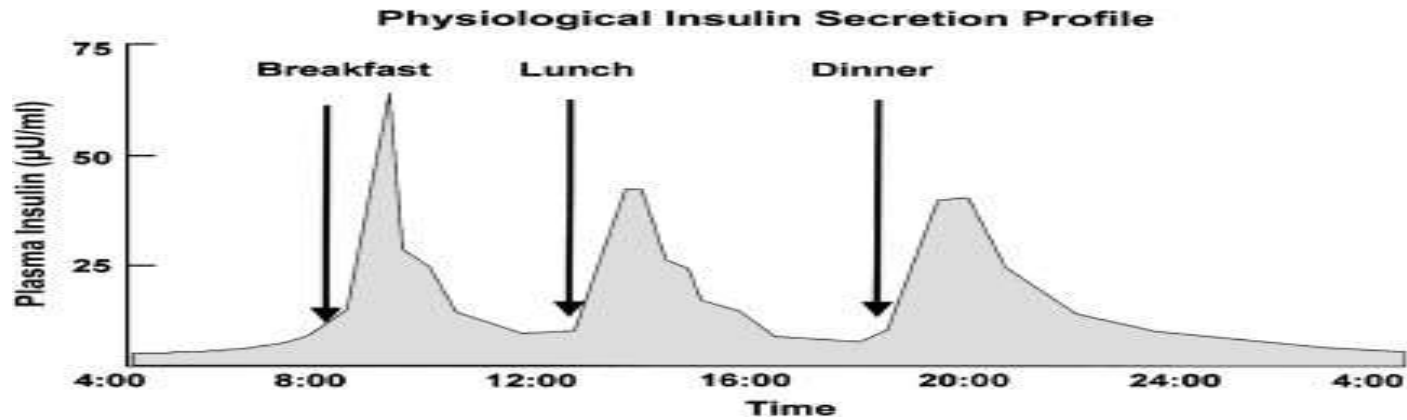
Type of CGM	Description
Real-time CGM (rtCGM)	CGM systems that measure and display glucose levels continuously
Intermittently scanned CGM (isCGM)	CGM systems that measure glucose levels continuously but only display glucose values when swiped by a reader or a smartphone
Professional CGM	CGM devices that are placed on the patient in the provider's office (or with remote instruction) and worn for a discrete period of time (generally 7–14 days). Data may be blinded or visible to the person wearing the device. The data are used to assess glycemic patterns and trends. These devices are not fully owned by the patient—they are a clinic-based device, as opposed to the patient-owned rtCGM/isCGM devices.

ONE SIZE
DOES NOT
FIT ALL

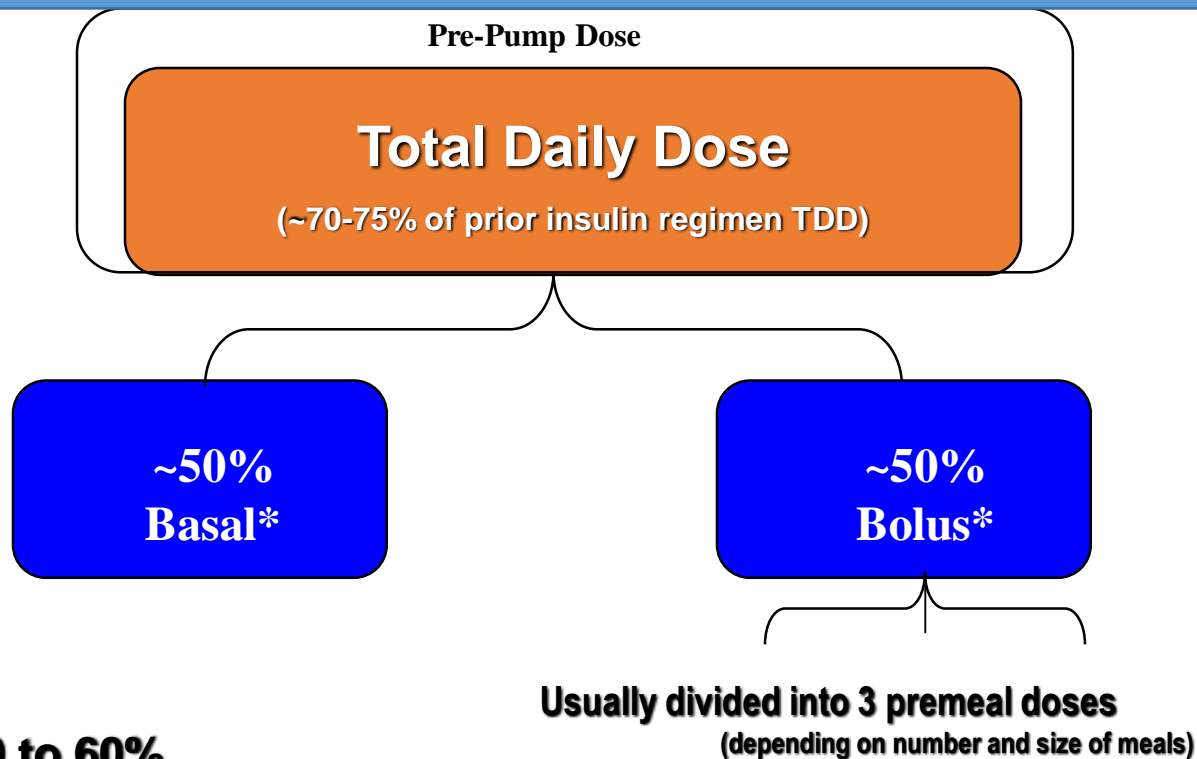
Αντλία ινσουλίνης CSII



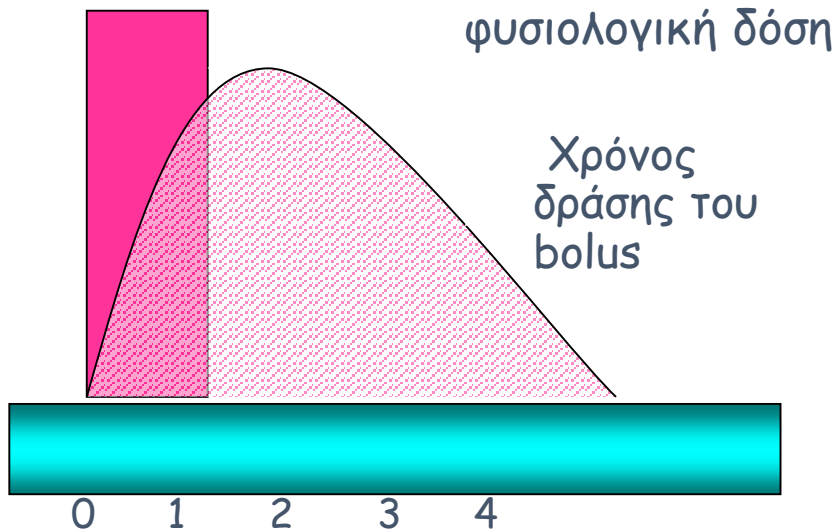
Αντλία: μια καλή προσομοίωση



Καθορίζοντας βασικό ρυθμό και bolus



***Range: 40 to 60%**



Υπάρχουν

3

τρόποι δράσεις:



(1) Φυσιολογική δόση εφόδου



Φυσιολογικό bolus

Θέλουμε να καλύψουμε ένα 200 g
γιαούρτι
Και 1 μήλο
ΜΟΝΟ ΥΔΑΤΑΝΘΡΑΚΕΣ

Ινσουλίνη

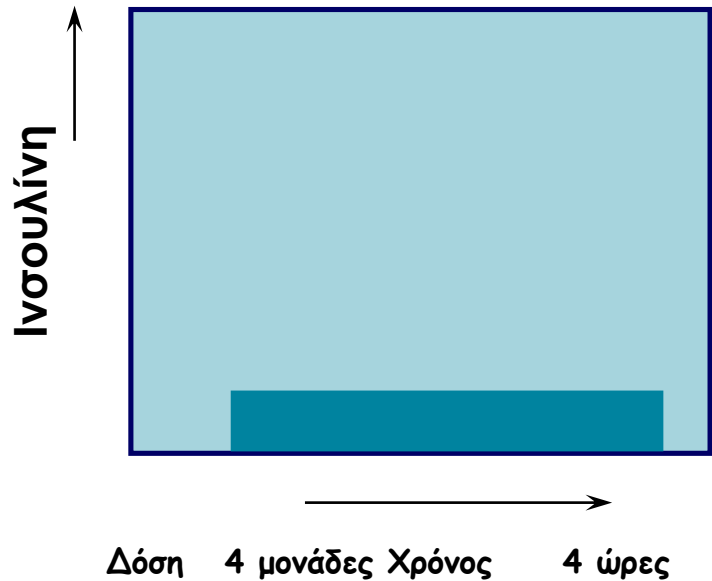


2-4 Μονάδες



(2) Τετραγωνικό κύμα δόσης εφόδου

Square bolus=παρατεταμένη δόση

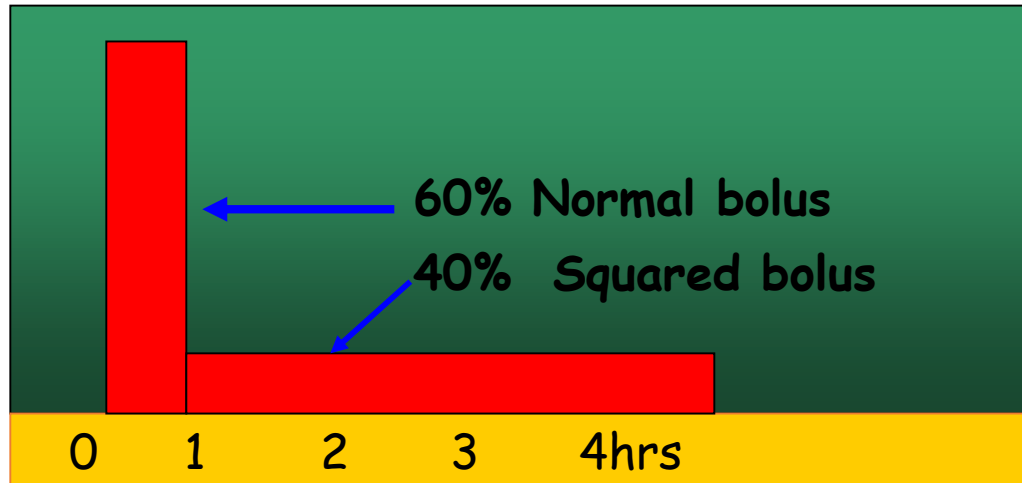


Όταν θέλουμε να καλύψουμε ένα παρατεταμένο δείπνο
που περιλαμβάνει
3-5 πιάτα,
Π.χ. σε Ιταλικό,
ή Μεξικάνικο
(με διάρκεια από 30 min μέχρι
και 8 ώρες)
Ή για να καλύψουμε φαγητά με
πολύ χαμηλό ΓΔ π.χ. κόκκινες
φακές
Ή τροφές πολύ υψηλές σε
πρωτεΐνη



Διφασικό bolus

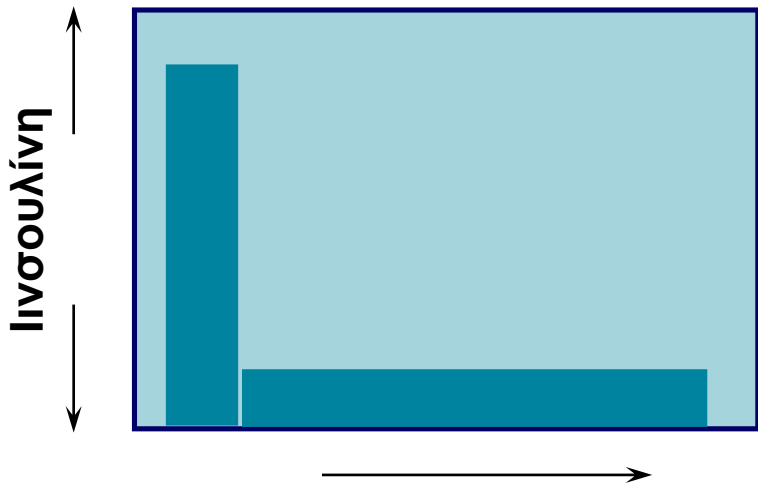
- Η δόση μοιράζεται σε δύο φάσεις
- Με διάρκεια μέχρι και 8 ώρες
- Μπορούμε να το ακυρώσουμε





(3) Διφασική δόση εφόδου

Dual bolus=συνδυαστική δόση



Χρόνος

Δόση 4 Μονάδες: 2 μονάδες αρχικά, 2 σε 4 ώρες

Για να καλύψουμε ένα γεύμα με κρέας-άμυλο, αλλά και παρουσία λίπους

Ή

για να καλύψουμε ένα

γεύμα σε ταχυφαγείο
(Fast food)

Ή

Παθολογικές καταστάσεις π.χ.
γαστροπάρεση

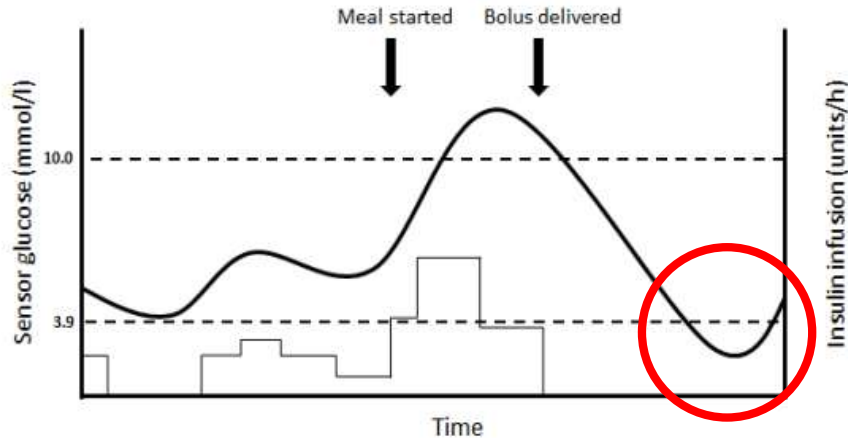


ΧΡΗΣΙΜΗ Η ΒΟΗΘΕΙΑ ΑΠΟ ΕΞΕΙΔΙΚΕΥΜΕΝΟ ΔΙΑΙΤΟΛΟΓΟ ΓΙΑ ΤΗΝ ΘΕΡΑΠΕΙΑ ΜΕ ΑΝΤΛΙΑ

- Διατροφική εκπαίδευση
- Εκπαίδευση στην καταμέτρηση υδατανθράκων
- Επιλογή κατάλληλου μοτίβου γλυκαιμίας
- Τροποποίηση διατροφικής συμπεριφοράς
- Εντοπισμός λανθασμένων πρακτικών στη διαχείριση του ΣΔ
- Ανάδειξη αλλαγών στη θεραπεία

Insulin Bolus Timing

- Η δήλωση ΥΔΚ πριν το γεύμα είναι ιδιαίτερα σημαντική, καθώς το κλειστό σύστημα θα αυξήσει αυτόματα την παροχή ινσουλίνης μετά από μια αρχική άνοδο των επιπέδων γλυκόζης, οπότε μία δήλωση ΥΔΚ είτε κατά τη διάρκεια είτε μετά την κατανάλωση του γεύματος θα μπορούσε να οδηγήσει σε υπογλυκαιμία.



Δήλωση ΥΔΚ και έναρξη γεύματος

- Τα κλειστά συστήματα απαιτούν τη δήλωση ΥΔΚ 10-20 λεπτά πριν την έναρξη του γεύματος, για τη βελτιστοποίηση της δράσης της ινσουλίνης και της απορρόφησης υδατανθράκων.....

εκτός αν....

- ...προηγήθηκε ή υπάρχει υπογλυκαιμία
- ...το γεύμα είναι υψηλής πρωτεΐνης/λίπους
- ...το άτομο έχει γαστροπάρεση
- ...ακολουθεί επιπρόσθετη θεραπεία

Dietary determinants of postprandial blood glucose control in adults with type 1 diabetes on a hybrid closed-loop system

Claudia Vetrani¹ • Ilaria Calabrese¹ • Luisa Cavagnuolo¹ • Daniela Pacella² • Elsa Napolano¹ • Silvia Di Rienzo¹ • Gabriele Riccardi¹ • Angela A. Rivellese¹ • Giovanni Annuzzi¹ • Lutgarda Bozzetto¹

Adults with type 1 diabetes treated with a hybrid closed loop system



7-day food record

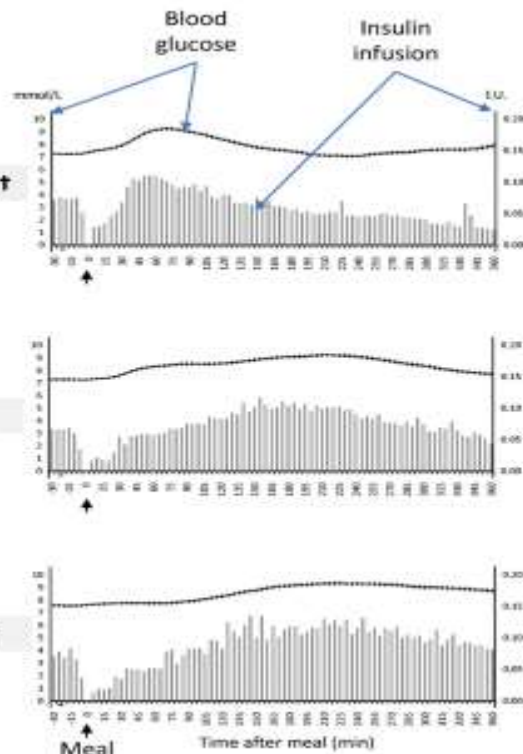


N=1264 meals

Breakfast

Lunch

Dinner



Meal components associated with postprandial time in range (3.9–10 mmol/l)

Positive predictors
None

Negative predictors
Energy, total protein, MUFA, cholesterol, glycaemic load, carbohydrates, simple sugars

No significant predictors

Positive predictors
Plant proteins

Negative predictors
Glycaemic load, simple sugars, carbohydrates

A Nutritional Approach to Optimizing Pump Therapy in Type 1 Diabetes Mellitus

Evdoxia Gitsi ¹, Sarantis Livadas ², Nicholas Angelopoulos ³, Rodis D. Paparodis ⁴, Marina Raftopoulou ¹ and Georgia Argyrakopoulou ^{1,*}

Table 1. Nutritional recommendations for patients with T1DM on pump therapy.

Study (Year)	Population	Meals	Recommendation
Gingras et al. (2018) [24] Wolpert et al. (2013) [23] Bell et al. (2016) [22] Smith et al. (2021) [16] Lopez et al. (2017) [20] Al Balwi et al. (2022) [21]	Individuals with T1DM in CLS Individuals with T1DM in CLS Individuals with T1DM in OLS Children and adolescents with T1DM on CSII Children and adolescents with T1DM on CSII Individuals with T1DM	HFHP	Increase TID by 25–60% for high-fat (>40 g) and/or high-protein (>25 g) meals. Initiate with a 10–20% ICR increase, gradually raise by 10% if hyperglycemia persists. For HFHP meals, favor a combination bolus, delivering 30–70% of TID before meals and the remainder over 2–3 h based on individual requirements. High-GI foods alongside a HFHP meal might suggest the need for an elevated upfront dose.
ISPAD (2022) [13]	Children and adolescents with T1DM	Mixed meals	Utilize CGMs for achieving personalized management of mixed meals effectively.
O’Connell et al. (2008) [31]	Young individuals (8–18 y.o.) with T1DM on CSII	Low-GI meals	Consider the use of a combination bolus (50:50 over 2 h).
Lopez et al. (2014) [32]	Children and adults with T1DM on CSII	Moderate-GI meals	Consider implementing an extended/wave bolus initiated 20–30 min prior to eating.
Lupoli et al. (2019) [30]	Individuals with T1DM		Consider administering insulin 15 min prior to eating.
Bell et al. (2015) [17]	Individuals with T1DM	High-GI meals	An alternative strategy for high-GI meals includes a Super Bolus (~50% increase in the initial insulin bolus, followed by reduction in basal rate for the subsequent 2 h).
Bozzetto et al. (2019) [35]	Individuals with T1DM		Consider including a source of MUFAs alongside a high-GI meal for lowering the glycemic response.
ADA (2014) [29]	Individuals with T1DM	CHO rich meals	Aim to swap high-glycemic options with lower glycemic alternatives. In particular, promote the consumption of whole, less refined foods (i.e., legumes, whole grains, fruits, vegetables). Discourage the intake of processed products (i.e., sugary drinks, fast food, refined grains).
Faber et al. (2018) [37]	Young patients (7–17 y.o.) with T1DM		Consider intake of protein and/or fat 15 min prior to a CHO-rich meal for lowering the glycemic response.

Review

A Nutritional Approach to Optimizing Pump Therapy in Type 1 Diabetes Mellitus

Nutrients **2023**, *15*, 4897. <https://doi.org/10.3390/nu15234897>



Evdoxia Gitsi ¹, Sarantis Livadas ², Nicholas Angelopoulos ³ , Rodis D. Paparodis ⁴ , Marina Raftopoulou ¹ and Georgia Argyrakopoulou ^{1,*}

Table 2. Nutritional recommendations for patients with T1DM on pump therapy during fasting.

Study (Year)	Population	Topic	Recommendation
Reiter et al. (2007) [43]	Individuals with T1DM on MDI and CSII	Before fasting	Consider a 25% reduction in the last pre-meal insulin bolus. Tailor modifications to the individual, with a reduction range of 25% to 75%. The latter may be more appropriate for extended fasting periods lasting 25 h.
Karamat et al. (2010) [39]	Individuals with DM (type 1 and 2)		Incorporate sources of complex CHO into the meals.

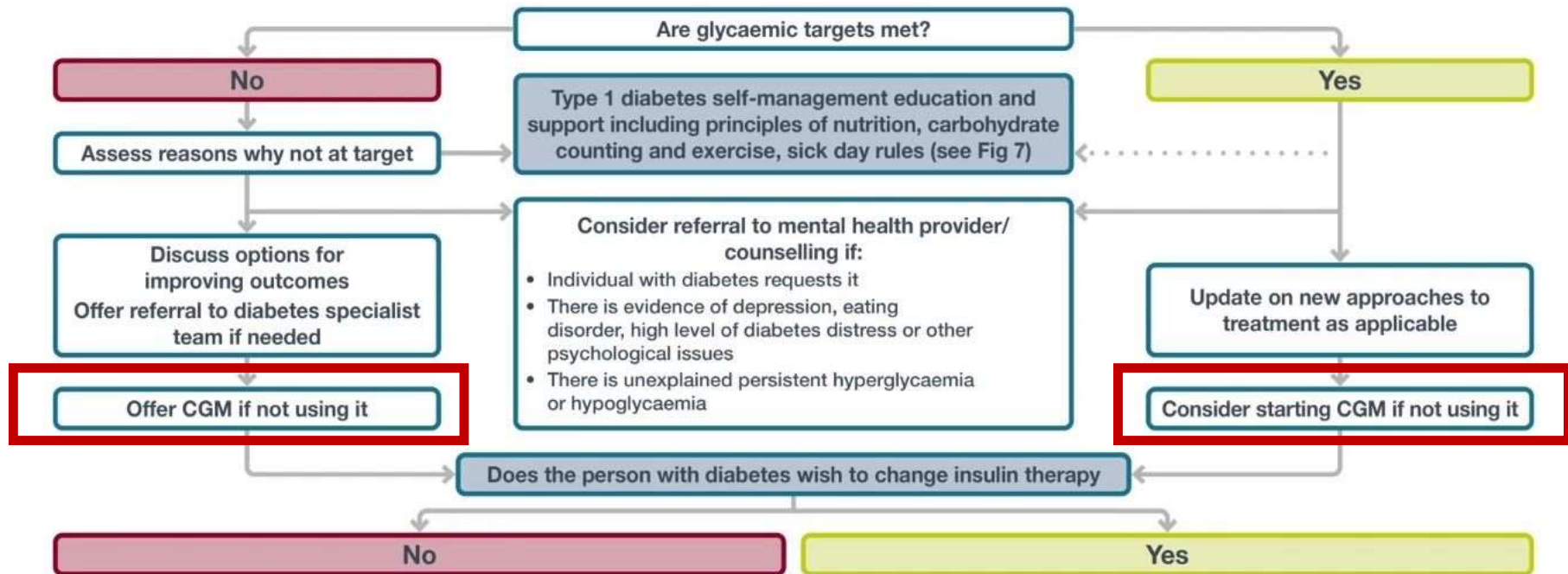
Table 2. *Cont.*

Study (Year)	Population	Topic	Recommendation
IDF–DaR (2022) [48]	Individuals with T1DM	During fasting	Consider a 20–40% reduction in the basal insulin rate during the final 4–5 h before fasting break.
IDF–DaR (2022) [48]	Individuals with T1DM	After fasting	Consider a 10–30% increase in the basal insulin rate for the initial hours after the fasting break.
Reiter et al. (2007) [43]	Individuals with T1DM on MDI and CSII		Consider a reduction in the ICR for the initial post-fasting meal due to increased insulin sensitivity.
Karamat et al. (2010) [39]	Individuals with DM (type 1 and 2)		Consider options from low to higher GI. Encourage the restriction of sources high in both fat and sugar.



Συσκευή συνεχούς καταγραφής και Διατροφή

General principles for management of glycaemia in existing type 1 diabetes in an adult





International Consensus on Use of Continuous Glucose Monitoring

Diabetes Care 2017;40:1631–1640 | <https://doi.org/10.2337/dc17-1600>

Το CGM πρέπει να λαμβάνεται υπόψιν σε συνδυασμό με τη HbA_{1c}

•για την αξιολόγηση του γλυκαιμικού ελέγχου και ρύθμιση της θεραπείας σε όλους τους διαβητικούς ασθενείς T1D και T2D, σε εντατικοποιημένα σχήματα ινσουλινοθεραπείας

•που δεν επιτυγχάνουν τους γλυκαιμικούς τους στόχους, ιδιαιτέρως

•αν οι ασθενείς υποφέρουν από προβληματικές υπογλυκαιμίες.

“Όλοι οι ασθενείς πρέπει να λαμβάνουν εκπαίδευση στον τρόπο με τον οποίο θα πρέπει να ερμηνεύουν και να αντιδρούν στις μετρήσεις γλυκόζης τους ανεξάρτητα από τη μέθοδο λήψης αυτών.”



9. Ο έλεγχος της γλυκαιμικής εικόνας από το άτομο με ΣΔ. Αυτοέλεγχος- Συνεχής καταγραφή γλυκόζης

Η χρήση της ΣΚΓ ενδείκνυται σε:

- Εφήβους και παιδιά με ΣΔτ1 που ακολουθούν σχήμα πολλαπλών ενέσεων (εντατικοποιημένο σχήμα ινσουλινοθεραπείας) ή φέρουν αντλία ινσουλίνης ως επιπρόσθετο βοηθητικό εργαλείο στη ρύθμιση του γλυκαιμικού ελέγχου
- Άτομα με ΣΔ με συχνά επεισόδια υπογλυκαιμίας ή ανεπίγνωστη υπογλυκαιμία
- Σε παιδιά και εφήβους με ΣΔτ1, η ΣΚΓ μπορεί να συμβάλλει στην καλύτερη ρύθμιση της γλυκαιμίας είτε χρησιμοποιούν σύστημα πολλαπλών ενέσεων ινσουλίνης είτε χρησιμοποιούν αντλία ινσουλίνης

Νεότεροι δείκτες της HbA1c - rtCGM



AVERAGE,SD,CV%

TIME IN RANGE

AGP

“Ανά διαστήματα, μια νέα ιδέα, μέθοδος ή ένα νέο εργαλείο οδηγεί σε ένα σημείο καμπής στη διαχείριση του διαβήτη. Πιστεύουμε ότι σήμερα βρισκόμαστε σε ένα τέτοιο σημείο, το οποίο έχει προκύψει από την ανάπτυξη αξιόπιστων συσκευών συνεχούς καταγραφής γλυκόζης”

Diabetes Care. 2018;41(6):e92-e94.doi:10.2337/dci18-0010

Τα CGM είναι υποδόρια, ελάχιστα επεμβατικά, αμπερομετρικά / ενζυματικά (GOD) συστήματα , που βασίζονται σε βιοαισθητήρα και παρέχουν έμμεση αξιολόγηση της συγκέντρωσης της γλυκόζης στο πλάσμα, μέσω μέτρησης της συγκέντρωσης γλυκόζης στο εξωκυτταρικό διάμεσο υγρό.

Κατηγοριοποίηση **Interstitial Glucose Monitoring ISF CGM**

CGM

Continuous Glucose Monitoring

Αναφέρεται και ως rtCGM, “real-time CGM”

Τα δεδομένα παρέχονται συνεχώς και αυτόματα σε πραγματικό χρόνο



FGM

Intermittent Continuous Glucose Monitoring

Αναφέρεται και ως isCGM “intermittent scanning CGM”

Τα δεδομένα παρέχονται μόνο κατ’ επίκληση



Clinical Targets for Continuous Glucose Monitoring Data Interpretation: Recommendations From the International Consensus on Time in Range

<https://doi.org/10.2337/dci19-0028>

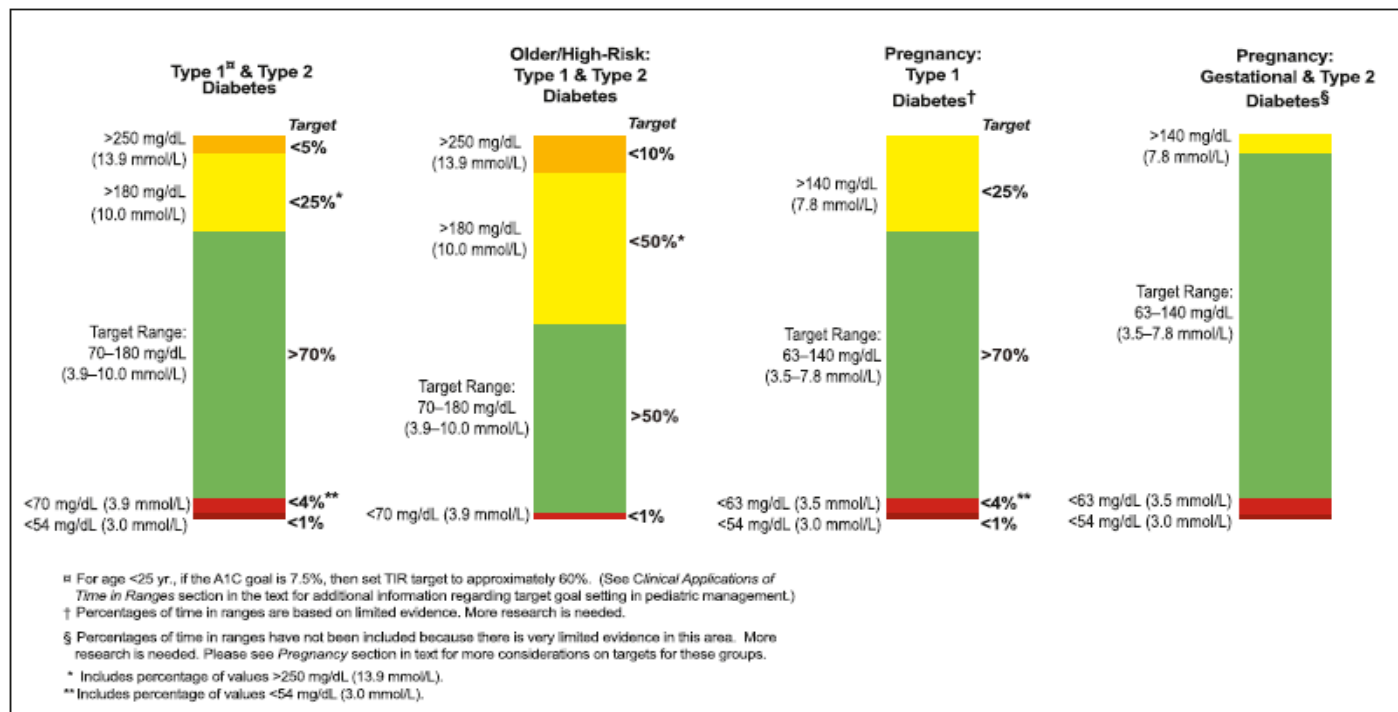


Figure 1—CGM-based targets for different diabetes populations.

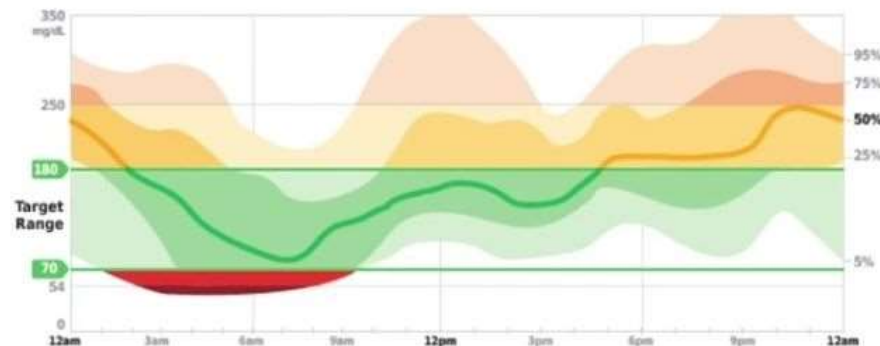
AGP Report

AGP Report: Continuous Glucose Monitoring



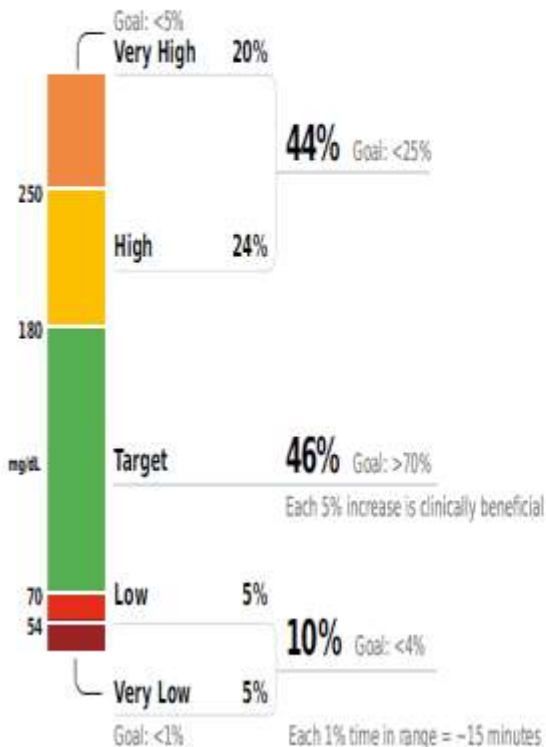
Ambulatory Glucose Profile (AGP)

AGP is a summary of glucose values from the report period, with median (50%) and other percentiles shown as if they occurred in a single day.



AGP Report: Continuous Glucose Monitoring

Time in Ranges Goals for Type 1 and Type 2 Diabetes



Test Patient DOB: Jan 1, 1970

14 Days: August 8-August 21, 2021

Time CGM Active: 100%

Glucose Metrics

Average Glucose **175 mg/dL**
 Goal: <154 mg/dL

Glucose Management Indicator (GMI) **7.5%**
 Goal: <7%

Glucose Variability **45.5%**
 Defined as percent coefficient of variation
 Goal: ≤36%

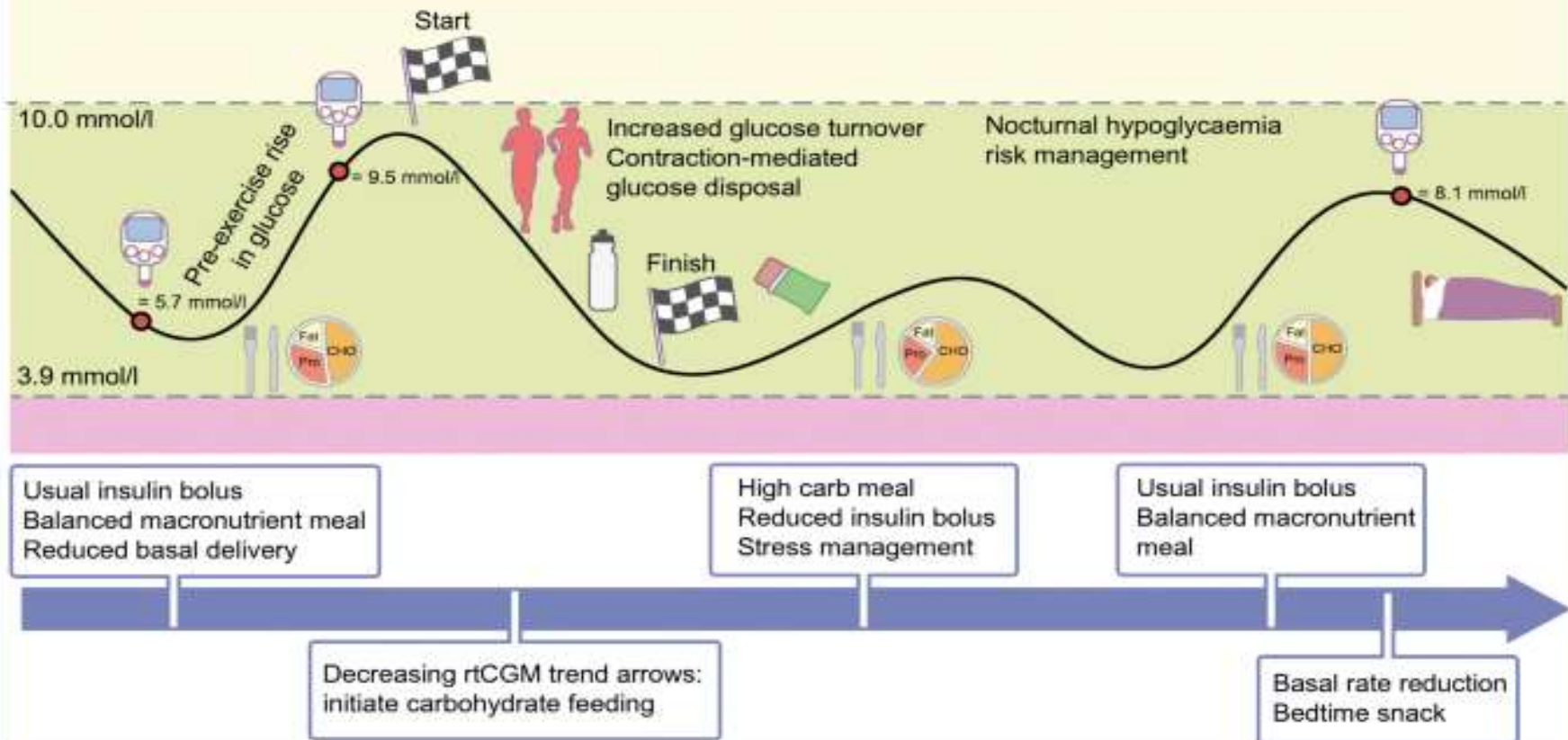
Standardised CGM metrics for clinical care

- Number of days CGM device is worn:
 - recommend 14 days
- Percentage of time CGM device is active:
 - recommend 70% of data from 14 days
- Mean glucose
- GMI
- Glycaemic variability (%CV)
- Time above range
 - Per cent of readings and time >13.9 mmol/l (>250 mg/dl); Level 2 hyperglycaemia
 - Per cent of readings and time >10.0 mmol/l (>180 mg/dl); Level 1 and Level 2 hyperglycaemia
- TIR
 - Per cent of readings and TIR 3.9–10.0 mmol/l (70–180 mg/dl)
- TBR
 - Per cent of readings and time <3.9 mmol/l (<70 mg/dl); Level 1 and Level 2 hypoglycaemia
 - Per cent of readings and time <3.0 mmol/l (<54 mg/dl); Level 2 hypoglycaemia

Ερμηνεία βέλους τάσης στη λήψη θεραπευτικής απόφασης σχετικά με τη διατροφή και την άσκηση

Πριν την άσκηση:

Προ άσκησης Γλυκόζη Αίματος	Συνήθης Δράση	Βέλος Τάσης	Ρυθμός & Κατεύθυνση Μεταβολής	Ιδανική Δράση
125 mg/dL	Λάβετε 10-15 γρ. Υδατανθράκων πριν την άσκηση	➔	Σταθερός	Λάβετε 10-15 γρ. Υδατανθράκων πριν την άσκηση
125 mg/dL	Λάβετε 10-15 γρ. Υδατανθράκων πριν την άσκηση	⬇️ ➡️	Μέτρια Πτώση	Λάβετε 20-30 γρ. Υδατανθράκων πριν την άσκηση
125 mg/dL	Λάβετε 10-15 γρ. Υδατανθράκων πριν την άσκηση	⬇️ ⬇️	Ραγδαία Πτώση	Λάβετε 30-40 γρ. Υδατανθράκων πριν την άσκηση & ξαναμετρήστε τη γλυκόζη αίματος πριν την άσκηση
125 mg/dL	Λάβετε 10-15 γρ. Υδατανθράκων πριν την άσκηση	⬆️ ⬆️	Μέτρια Άνοδος	OK για την άσκηση χωρίς απαραίτητο σνακ
125 mg/dL	Λάβετε 10-15 γρ. Υδατανθράκων πριν την άσκηση	⬆️ ⬆️	Ραγδαία Άνοδος	OK για την άσκηση. Ξαναμετρήστε τη γλυκόζη αίματος σε 15-20 λεπτά. Αν είναι αξιοσημείωτα αυξημένη, χορηγήστε γευματική ινσουλίνη



Four critical times for DSMES in type 1 diabetes



Figure Legend:

The four critical times when DSMES is particularly needed for people with diabetes (and their caregivers, when applicable). ICR, insulin:carbohydrate ratio; incl., including; ISF, insulin sensitivity factor.



YOU can control diabetes
with a healthy lifestyle,
proper nutrition
and support.



Σας ευχαριστώ