Medical nutrition therapy in adults with diabetes

Firoozeh Hosseini-Esfahani

Nutrition and Endocrine Research Center

Research Institute for Endocrine Sciences

Shahid Beheshti University of Medical Sciences

1402/10/13

Overview

➢ Eating patterns, food groups and nutrients in prevention or management of diabetes

➢ Definition of diabetes and prediabetes

➢ Medical nutrition therapy (MNT)

    Energy

    Macronutrients

➢ Recommendations

➢ Conclusion

Eating patterns for prevention or management of Diabetes (1)

Dietary pattern	Main components	Diabetes prevention (Prediabetes)	Diabetes management
Mediterranean style	Emphasizes plant-based foods; fish and other seafood; olive oil; dairy products (mainly yogurt and cheese) in low to moderate amounts; typically fewer than 4 eggs/week; red meat in low frequency and amounts; concentrated sugars or honey rarely.	lower risk of type 2 diabetes	• A1C reduction • Weight loss • Lowered TG • Reduced risk of major CVD events
Vegetarian or vegan	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.	Reduced risk of diabetes	• A1C reduction • Weight loss • Lowered LDL-C and non–HDL-C

Evert AB, et al. Diabetes Care 2019;42:731–754

Eating patterns for prevention or management of Diabetes (2)

Dietary pattern	Main components	Diabetes prevention	Diabetes management
DASH	Emphasizes vegetables, fruits, and low-fat dairy products; whole intact grains, poultry, fish, and nuts; reduced in saturated fat, red meat, sweets, and sugar-containing beverages. May also be reduced in sodium.	lower risk of diabetes	• Weight loss • Lowered blood pressure
Low-fat	Emphasizes vegetables, fruits, starches, lean protein sources, and low-fat dairy products. Defined as total fat intake ≤30% of total calories and saturated fat intake ≤10%		• Weight loss
Very low-fat	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.		• Weight loss • Lowered blood pressure

Eating patterns for prevention or management of Diabetes (3)

Dietary pattern	Main components	Diabetes prevention	Diabetes management
Low-carbohydrate	Emphasizes vegetables low in carbohydrate; fat from animal foods, oils, butter, and avocado; protein in the form of meat, poultry, fish, shellfish, eggs, cheese, nuts, and seeds. Avoids starchy and sugary foods defined as reducing carbohydrates to **26–45%** of total calories. further limits carbohydrate-containing foods, more than half of calories from fat.		• A1C reduction • Weight loss • Lowered blood pressure • Increased HDL-C and lowered triglycerides
Very low-carbohydrate (VLC)	Often has a goal of 20–50 g of non fiber carbohydrate per day to induce nutritional ketosis. reducing carbohydrate to **<26%** of total calories.		• A1C reduction • Weight loss • Lowered blood pressure • Increased HDL-C • Lowered triglycerides

Evert AB, et al. Diabetes Care 2019;42:731–754

Dietary factors for the prevention of diabetes

Nutrients	Number of cohorts	Relative risk (95% CI)
Haeme-iron[21]	4	
Glycaemic index[19]	13	
Glycaemic load[19]	17	
DHA/EPA[17]	16	
Vegetable fibre[18]	7	
Fruit fibre[18]	8	
Alpha-linolenic acid[17]	7	
Magnesium[20]	13	
Cereal fibre[18]	8	
Vitamin D[22]	21	

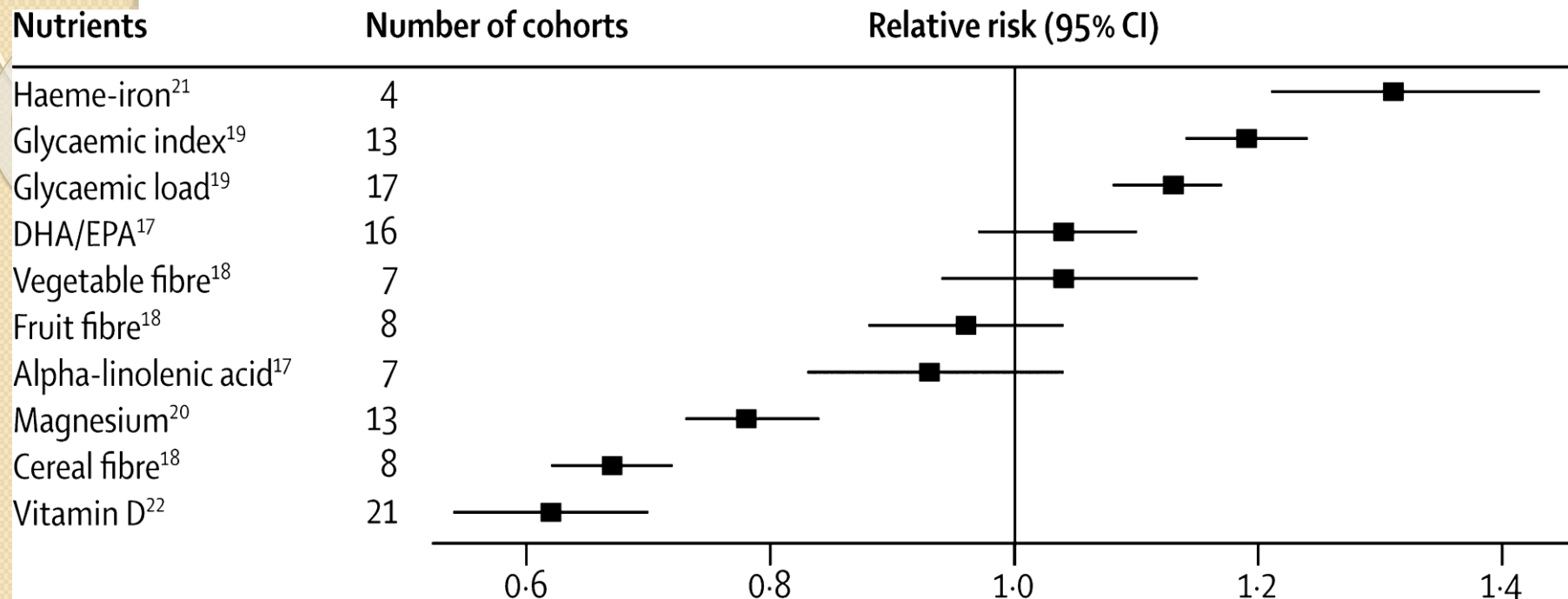Relative risk axis: 0·6 0·8 1·0 1·2 1·4

Figure. Summary of meta-analyses of prospective cohort studies of nutrient intake and glycaemic variables and type 2 diabetes

DHA=docosahexaenoic acid. EPA=eicosapentaenoic acid.

Relative risks are a comparison of extreme categories, **except for DHA/EPA (per 250 mg per day increase)** and **alpha-linolenic acid (per 0·5 g per day).** All nutrients and glycaemic variables were assessed from dietary intake, except vitamin D for which blood 25-hydroxyvitamin D was used.

Sylvia Hley et al. Lancet 2014; 383: 1999–2007.

# Individual foods and food groups for the prevention of diabetes
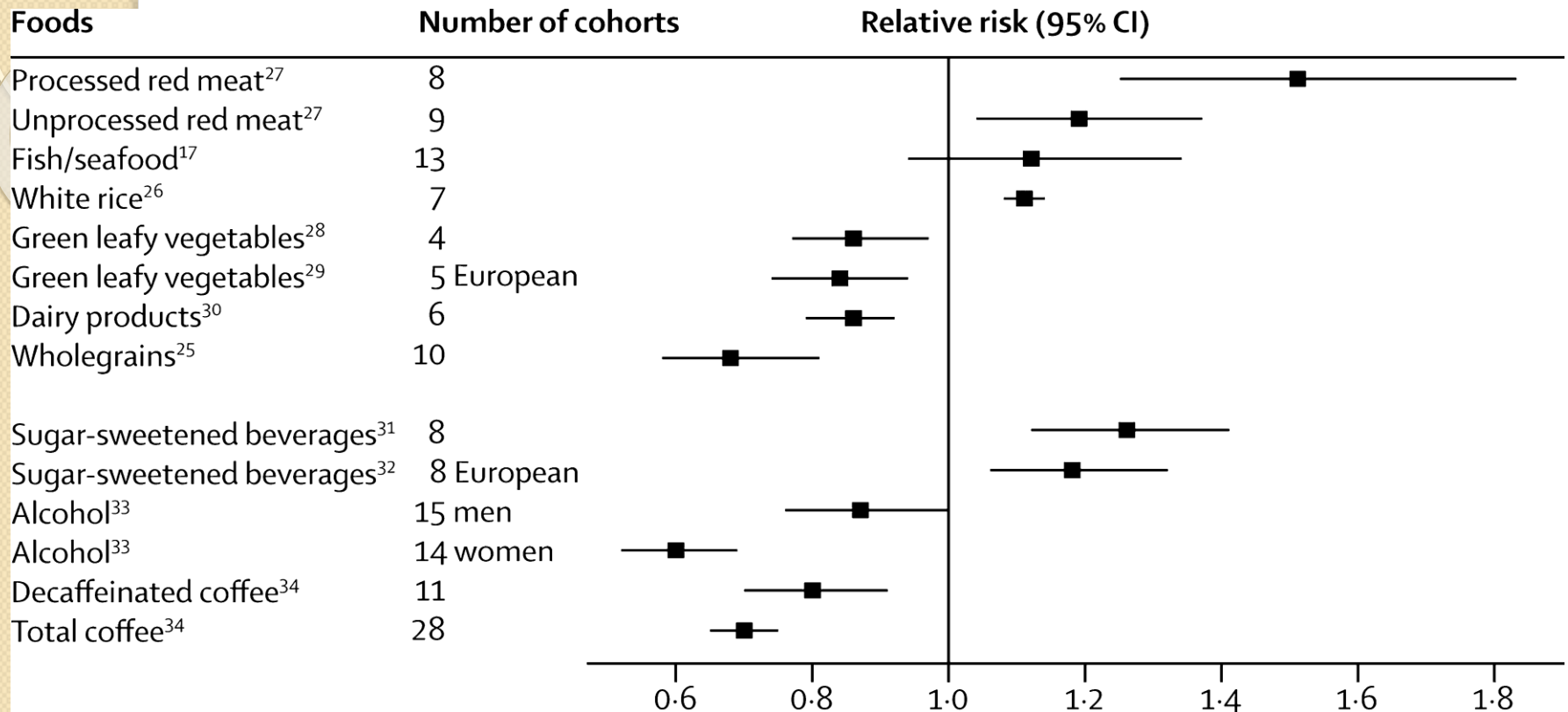
Figure. Summary of meta-analyses of prospective cohort studies on food and beverage intake and type 2 diabetes

Relative risks **are a comparison of extreme categories**, except **for processed meat (per 50 g per day increase)**, **unprocessed red meat and fish or seafood (per 100 g per day**), **white rice (per each serving per day)**, **whole grains (per three servings per day), sugar-sweetened beverages in European cohorts (per 336 g per day),** and **alcohol (22 g per day for men or 24 g per day for women with abstainers).**

Sylvia Hley et al. Lancet 2014; 383: 1999–2007.

Food groups and risk of type 2 diabetes

8
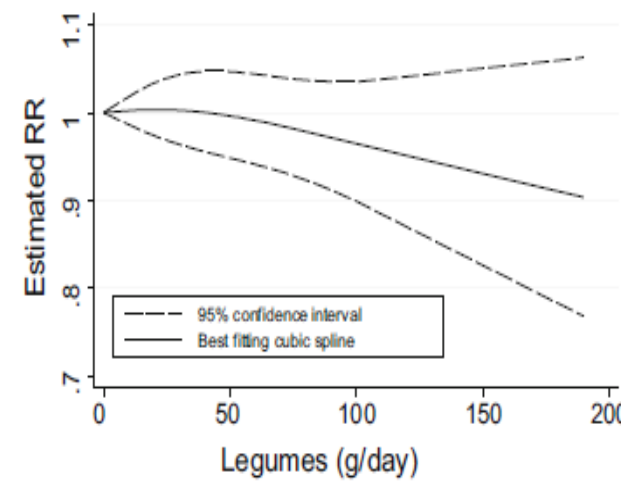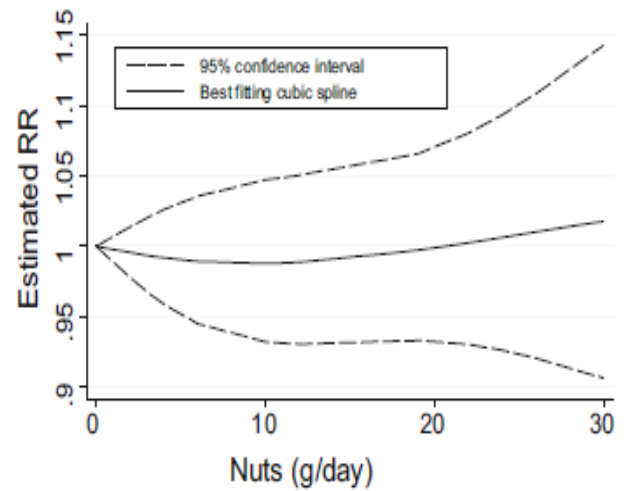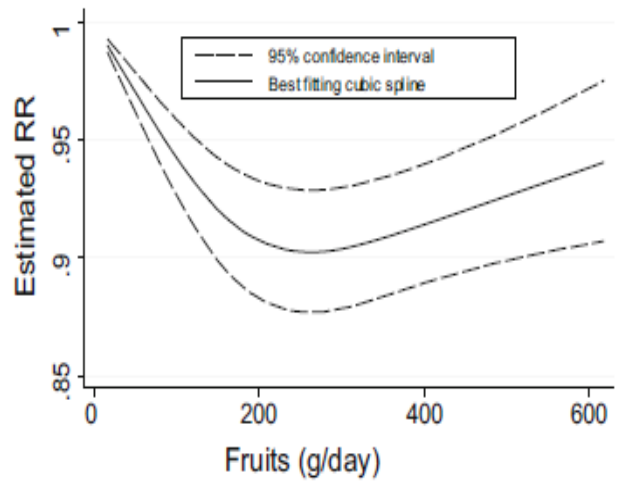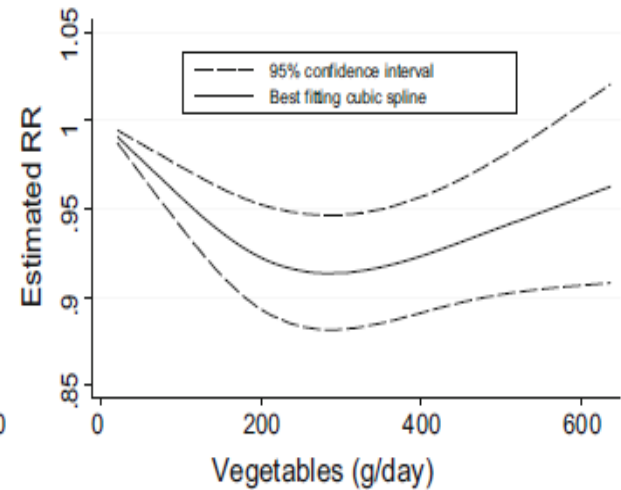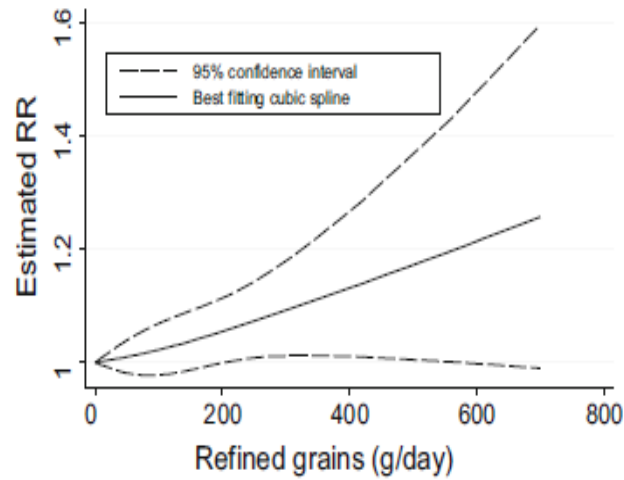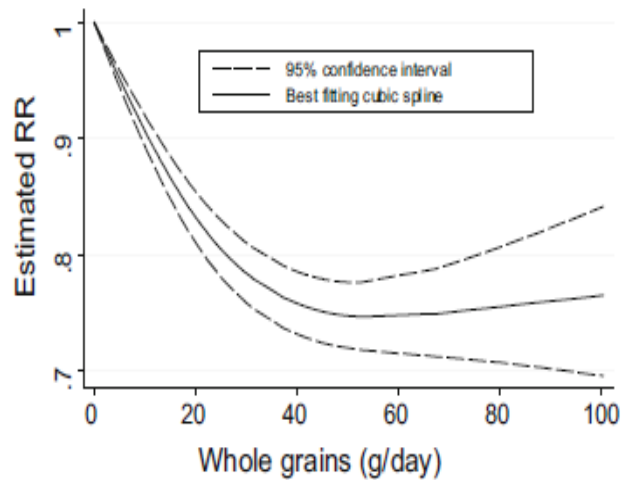
Food groups and risk of type 2 diabetes
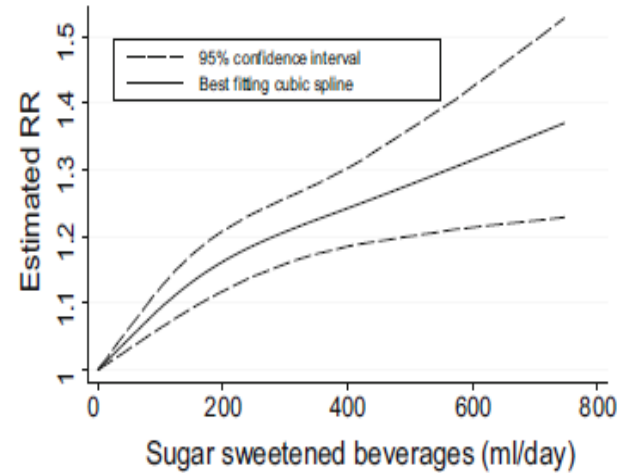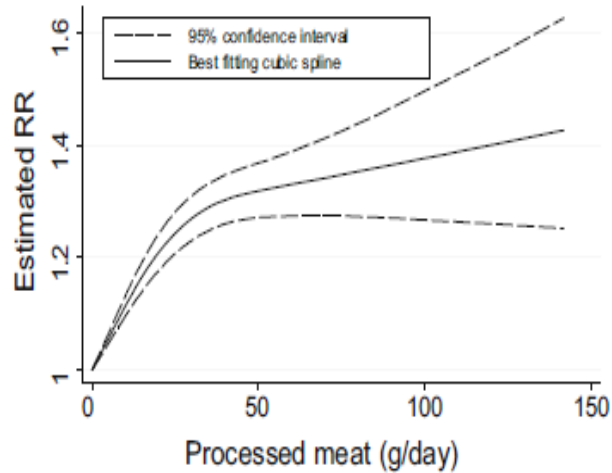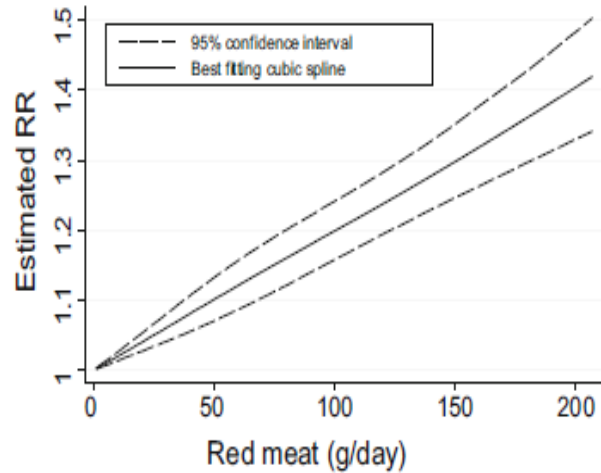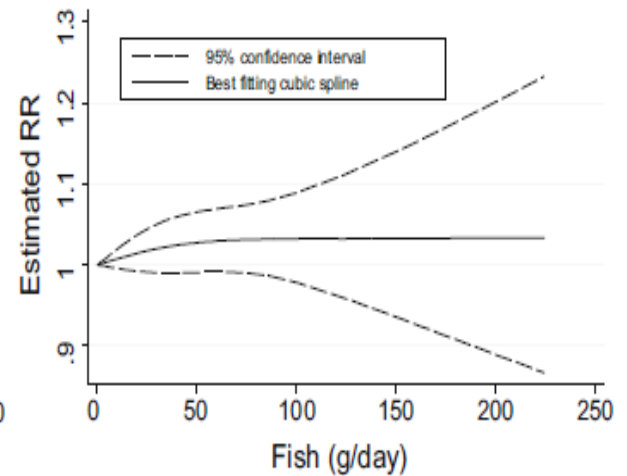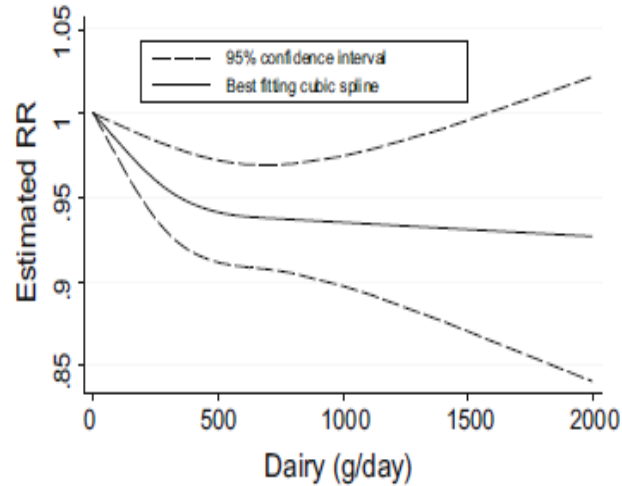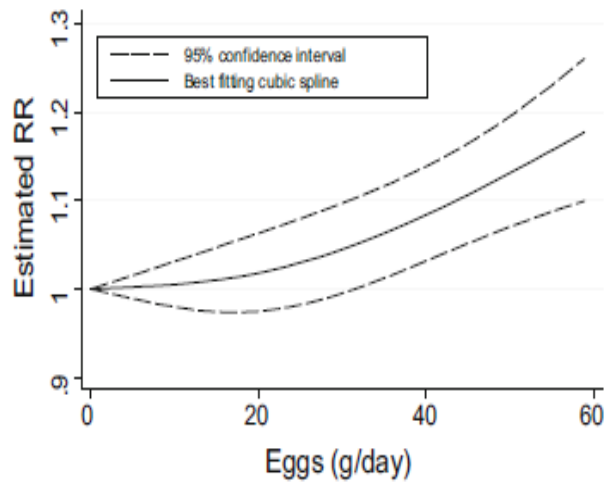
Figure 1. Risk of type 2 diabetes in individuals with highest vs. lowest categories of dietary parameters: Tehran Lipid and Glucose Study. *Presented as HRs (95%CIs). HRs, hazard ratios; ORs, odds ratios; CIs, confidence intervals.
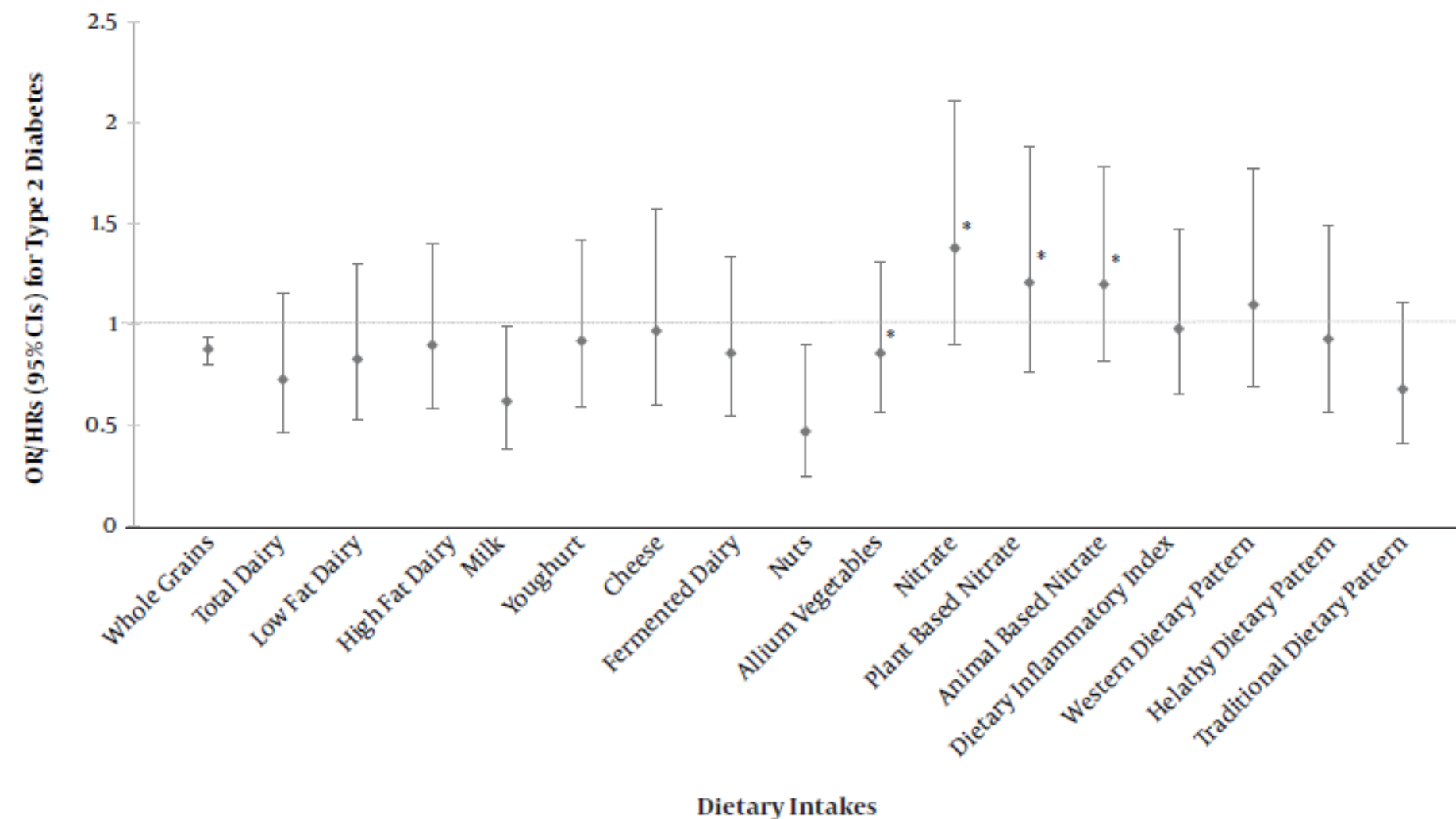
Type 2 Diabetes-Definition

- Fasting blood glucose ≥126 mg/dL

    - Fasting is defined as no caloric intake for at least 8 h

- 2-h plasma glucose (2-h PG) ≥200 mg/dL

- A1C ≥6.5%

- In a patient with classic symptoms of hyperglycemia or

  hyperglycemic crisis, Random blood glucose ≥200 mg/dL

Nuha A, et al. Diabetes Care Volume 46, Supplement 1, January 2023

Criteria for the Screening and Diagnosis of Diabetes

	Prediabetes	Diabetes
A1C	5.7– 6.4%*	≥6.5%†
FPG	100 –125 mg/dL (5.6 – 6.9 mmol/L)*	≥126 mg/dL (7.0 mmol/L)†
OGTT	140 –199 mg/dL (7.8 –11.0 mmol/L)*	≥200 mg/dL (11.1 mmol/L)†
RPG	—	≥200 mg/dL (11.1 mmol/L)‡

*For all three tests, risk is continuous, extending below the lower limit of the range and becoming disproportionately greater at the higher end of the range.

†In the absence of unequivocal hyperglycemia, results should be confirmed by repeat testing. ‡Only diagnostic in a patient with classic symptoms of hyperglycemia or hyperglycemic crisis. RPG, random plasma glucose.

Criteria for Testing for Diabetes or Pre-diabetes in Asymptomatic Adults (1)

1. Testing should be considered in all adults who are overweight (BMI≥25 kg/m2) and have additional risk factors:

- Physical inactivity

- First-degree relative with diabetes

- High-risk race/ethnicity (e.g., African American, Latino, Native American, Asian American, Pacific Islander)

- Women who delivered a baby weighing >9 lb or were diagnosed with GDM

Nuha A, et al. Diabetes Care Volume 46, Supplement 1, January 2023

Criteria for Testing for Diabetes or Pre-diabetes in Asymptomatic Adults (2)

- Hypertension (≥140/90 mmHg or on therapy for hypertension)

- HDL-C level <35 mg/dL and/or a triglyceride level >250 mg/dL

- Women with polycystic ovarian syndrome

- A1C ≥5.7%, IGT, or IFG on previous testing

- Other clinical conditions associated with insulin resistance (e.g., severe obesity, acanthosis nigricans)

- History of CVD

ARE YOU AT RISK FOR
TYPE 2 DIABETES?

American Diabetes Association®

Diabetes Risk Test

1 How old are you?

Less than 40 years (0 points)
40—49 years (1 point)
50—59 years (2 points)
60 years or older (3 points)

Write your score in the box.

2 Are you a man or a woman?

Man (1 point)   Woman (0 points)

3 If you are a woman, have you ever been diagnosed with gestational diabetes?

Yes (1 point)   No (0 points)

4 Do you have a mother, father, sister, or brother with diabetes?

Yes (1 point)   No (0 points)

5 Have you ever been diagnosed with high blood pressure?

Yes (1 point)   No (0 points)

6 Are you physically active?

Yes (0 points)   No (1 point)

7 What is your weight status?
(see chart at right)

Add up your score.

Height	Weight (lbs.)		
4' 10"	119-142	143-190	191+
4' 11"	124-147	148-197	198+
5' 0"	128-152	153-203	204+
5' 1"	132-157	158-210	211+
5' 2"	136-163	164-217	218+
5' 3"	141-168	169-224	225+
5' 4"	145-173	174-231	232+
5' 5"	150-179	180-239	240+
5' 6"	155-185	186-246	247+
5' 7"	159-190	191-254	255+
5' 8"	164-196	197-261	262+
5' 9"	169-202	203-269	270+
5' 10"	174-208	209-277	278+
5' 11"	179-214	215-285	286+
6' 0"	184-220	221-293	294+
6' 1"	189-226	227-301	302+
6' 2"	194-232	233-310	311+
6' 3"	200-239	240-318	319+
6' 4"	205-245	246-327	328+
	(1 Point)	(2 Points)	(3 Points)
	You weigh less than the amount in the left column (0 points)		

If you scored 5 or higher:

You are at increased risk for having type 2 diabetes. However, only your doctor can tell for sure if you do have type 2 diabetes or prediabetes (a condition that precedes type 2 diabetes in which blood glucose levels are higher than normal). Talk to your doctor to see if additional testing is needed.

Type 2 diabetes is more common in African Americans, Hispanics/Latinos, American Indians, and Asian Americans and Pacific Islanders.

Higher body weights increase diabetes risk for everyone. Asian Americans are at increased diabetes risk at lower body weights than the rest of the general public (about 15 pounds lower).

For more information, visit us at diabetes.org or call 1-800-DIABETES (1-800-342-2383)

Adapted from Bang et al., Ann Intern Med 151:775-783, 2009.
Original algorithm was validated without gestational diabetes as part of the model.

Lower Your Risk

The good news is that you can manage your risk for type 2 diabetes. Small steps make a big difference and can help you live a longer, healthier life.

If you are at high risk, your first step is to see your doctor to see if additional testing is needed.

Visit diabetes.org or call 1-800-DIABETES (1-800-342-2383) for information, tips on getting started, and ideas for simple, small steps you can take to help lower your risk.

Visit us on Facebook
Facebook.com/AmericanDiabetesAssociation

Figure 2.1—ADA risk test (diabetes.org/socrisktest).

Individual Nutrition Assessment

➢ Medical History

➢ Physical examination

    ➢ (BMI, Waist circumference/ Waist-to-hip ratio,…)

➢ Laboratory evaluation

    ➢ (chemistry panel, lipid panel, A1c, microalbumin-to-creatinine ratio)

➢ Diet History

➢ Life style, physical Activity

➢ Readiness to change

American Diabetes Association, Diabetes Care 2018 Jan; 41(Supplement 1): S38-S50.

Glycemic recommendations for many non-pregnant adults with diabetes

	ADA
HbA1c (%)	<7
Fasting (preprandial) plasma glucose	80-130 mg/dL
Peak postprandial capillary plasma glucose	<180 mg/dL

- Nuha A. Diabetes Care 2023;46(Suppl. 1):S97–S110

Recommendations for glycemic, blood pressure, and lipid control for most adults with diabetes

➤ Treat cholesterol profiles to targets

   ✓ Total cholesterol   <200

   ✓ Triglycerides   <150

   ✓ HDL   >40 men, >50 women

   ✓ LDL   <100, <70 high risk

   Statin therapy for those with history of MI or age over 40 plus other risk factors

➤ Treat blood pressure to target <130/<80

For most non-pregnant adults

Nuha A., et al. Diabetes Care 2023;46(Suppl. 1):S68–S96
Nuha A., et al. Diabetes Care 2023;46(Suppl. 1):S158–S190

Medical nutrition therapy (MNT)

➢ Nutrition therapy

➢ Exercise

➢ Self-monitoring of blood glucose (SMBG)

➢ Education

➢ Ongoing follow-up

Nuha A., et al. Diabetes Care 2023;46(Suppl. 1):S68–S96

Components of MNT in diabetes

✓ No "one-size-fits-all" eating approach

✓ Behavior modification alone may not be adequate to maintain euglycemia over time.

✓ Chosen eating pattern should improve glucose, BP, and lipid

✓ **Individualized** nutrition therapy, ideally provided by registered dietitian (level of evidence: **A**)

  ◦ Based on personal and cultural preferences

  ◦ Emphasizing a **variety** of nutrient-dense foods in appropriate portion sizes rather than focusing on individual macronutrients, micronutrients, or single foods

  ◦ Achieve and maintain body weight goals

  ◦ Delay or prevent the complications of diabetes

Nuha A., et al. Diabetes Care 2023;46(Suppl. 1):S68–S96

Energy balance in MNT (1)

➤ **Overweight/obese adults with type 2 diabetes**

✓ For weight loss: reduce energy intake while maintaining healthful eating pattern **(A)**

✓ Reduced calorie intake interventions show reductions in A1C of 0.3% to 2.0% in adults with type 2 diabetes

✓ Weight loss can be attained with lifestyle programs that achieve a 500–750 kcal/day energy deficit or provide 1200–1500 kcal/day for women and 1500–1800 kcal/day for men

➤ **Modest weight loss may improve glycemia, BP, lipids (Particularly early in disease process)**

Nuha A., et al. Diabetes Care 2023;46(Suppl. 1):S68–S96
Nuha A. Diabetes Care 2023;46(Suppl. 1):S128–S139

Energy Balance in MNT (2)

Recommended for modest weight loss

✓Intensive lifestyle interventions:

✓nutrition therapy counseling, physical activity, behavior change

✓Ongoing support

Nutritionally balanced, **calorie-reduced diet** should be followed to achieve and maintain a lower, healthier body weight

For Patients with BMI ≥25 kg/m^2…

Weight loss of **5-15%** of initial body weight

⬇

Improved insulin sensitivity, glycemic control, blood pressure control, lipid levels

Nuha A., et al. Diabetes Care 2023;46(Suppl. 1):S68–S96

Macronutrients in MNT

➢ No ideal percentage of calories from carbohydrate, protein, or fat for individuals with diabetes **(E)**

➢ Macronutrient distribution to be based on individualized assessment of

  ✓ Current eating patterns
  ✓ Preferences
  ✓ Metabolic goals
  ✓ Tradition, culture, religion, economics

● Emphasis should be on healthful eating patterns containing nutrient-dense foods, with less focus on specific nutrients **(B)**

● Reducing overall carbohydrate intake for individuals with diabetes **(B)**

Nuha A., et al. Diabetes Care 2023;46(Suppl. 1):S68–S96

Recommendations for MNT in patients with diabetes

	BDA	ADA	EASD	CDA	NCEP
Carbohydrate	50–55	Use of individualized assessment because evidence suggests no one ideal distribution for all people	45–60	45–60	50–60
GI(%)	–	Not recommended for general use	Recommended	Recommended	–
Fiber	30 g/d	14 g per 1000 kcal or 25 g per day for women and 38 g per day for men	Increase with low-GI foods	25–50 g per day or 15–25 g per 1000 kcal	20-30g/d
Protein(%)	10–15	15-20	10-20	15-20	15
Fat(%)	30–35	25-35	<35	20-35	25-35

GI= glycemic index, **ADA** :American Diabetes Association, **BDA** :British Diabetic Association, **CDA** :Canadian Diabetes Association, **EASD** :European Association for the Study of Diabetes, **NCEP** :National Cholesterol Education Program

Am J Clin Nutr 2013;97:505–16.
Sylvia Hley et al. Lancet 2014; 383: 1999–2007.
Canadian Diabetes Association Clinical Practice Guidelines Expert Committee. Can J Diabetes, 37 (2013), pp. S45-S55

ESC guideline: life style modification in diabetes

Physical activity	▪ Moderate to vigorous ≥150 min/week ▪ Aerobic exercise and resistance training are recommended in the prevention of T2DM and control of DM, but best when combined
Weight	➢ Aim for weight stabilization in the overweight or obese DM patients ➢ and weight reduction in subjects with IGT

Dietary habits
  Fat intake (% of dietary energy)
    Total
    Saturated
    Monounsaturated fatty acids
	
	<35%
	<10%
	>10%

Fiber	>40 g/day (or 20 g/1000 Kcal/day)
Vitamin or micronutrient supplementation	to reduce the risk of T2DM or CVD in DM is not recommended

ESC: European heart society

Carbohydrate (CHO) in MNT (1)

➤ Develop collaborative goals with patient

✓ Ideal CHO amount not established.

➤ **Amount of CHO and available insulin (B)**

➤ Important factors influencing postprandial glycemic response; considering while developing eating plan

➤ **Monitor CHO intake** to achieve glycemic control

➤ CHO intake from non-starchy vegetables, fruits, whole grains, legumes, dairy **(B)**

➤ Avoid other CHO sources, esp. those with added fats, sugar, sodium **(A)**

➤ Substitute **low glycaemic load foods for higher glycaemic load** foods may be beneficial

Sylvia Hley et al. Lancet 2014; 383: 1999–2007.
American Diabetes Association. Clin Diabetes. 2016 Jan;34(1):3-21
Alison B Evert et al. Diabetes Care 2014 Jan; 37(Supplement 1): S120-S143

Carbohydrate in MNT (2)

Quick Check for a Healthy Meal

1/2 PLATE
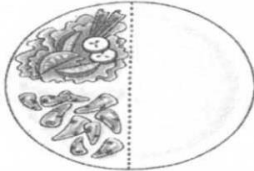
1. VEGETABLES
e.g. salad, carrots, green beans

1/4 PLATE
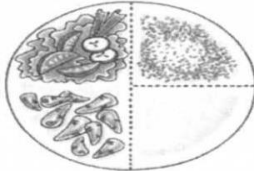
2. GRAIN PRODUCTS
e.g. pasta, potatoes, or rice

1/4 PLATE
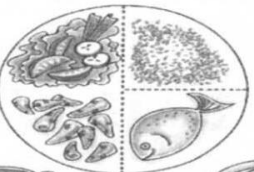
3. MEAT & ALTERNATIVES
e.g. lean meat, fish, poultry, cheese, or legumes

On the side...

4. FRUIT

5. LOW FAT MILK, OR YOGURT

6. GRAINS LIKE BREAD, ROLLS, OR CRISPBREAD

- Carbohydrates (by limiting them to what fits in one-quarter of the plate)

- An emphasis on low-carbohydrate (or non-starchy) vegetables

Carbohydrate Counting (B)

Works as follows:

✓ A dietitian determines a person's dietary needs

✓ The individual is given a **daily CHO allowance**

✓ Divided into a pattern of **meals & snacks** according to individual preferences

✓ The carbohydrate allowance can be expressed in grams or as the number of carbohydrate portions allowed per meals

Sylvia Hley et al. Lancet 2014; 383: 1999–2007.
Alison B Evert et al. Diabetes Care 2019;42:731–754
American Diabetes Association, Clin Diabetes. 2018 Jan;36(1):14-37

Carbohydrate (4) The Exchange Lists

Groups/ Lists	Carbohydrate	Protein	Fat	Calories
Carbohydrate Group				
Starch	**15**	3	1 or less	80
Fruit	**15**	____	____	60
Milk				
Skim	**12**	8	0-3	90
Low-fat	**12**	8	5	120
Whole	**12**	8	8	150
Other carbohydrates	**15**	varies	varies	varies
Vegetables	**5**	2	____	25
Meat and Substitute Group				
Very lean	____	7	0-1	35
Lean	____	7	3	55
Medium-fat	____	7	5	75
High-fat	____	7	8	100
Fat Group	____	____	5	45

Carbohydrate (5)

Foods that Contain Carbohydrates
Bread, cereals, pasta, and grains
Rice, beans, and starchy vegetables: potatoes, corn, peas
Fruit and fruit juices
Milk and yogurt
Sugars foods: regular soda, fruit drinks, jelly beans
Sweets: cake, cookies, chocolate candy

One Carbohydrate Choice
15 grams of carbohydrate
1 slice of bread
½ cup pasta
1 small potato
½ cup legumes
½ cup cereal
1 fruit
1 cup yogurt
1 cup milk

Carbohydrate (cont')

Example

- Energy requirement: **2000** kcal/d

- Carbohydrate requirement: 1100 kcal/d (55%) → **275** g/d

- Carbohydrate counts: 275 ÷ 15 = **18**

Starch	9
Fruit	4
Low fat milk	2
Other carbohydrates	1
Vegetables	6

Carbohydrate (cont')

Insulin

	Breakfast	S1	Lunch	S2	Dinner	S3
%	15	12.5	22.5	12.5	22.5	15
Count	3	2	4	2	4	3

Oral agents

	Breakfast	S1	Lunch	S2	Dinner	S3
%	15	12.5	25	12.5	25	10
Count	3	2	4.5	2	4.5	2

TABLE 30-6 Action Times of Human Insulin Preparations

Type of Insulin	Onset of Action	Peak Action	Usual Effective Duration	Monitor Effect In
Rapid-Acting				
Insulin lispro (Humalog)	<0.25-0.5 hr	0.5-2.5 hr	3-6.5 hr	1-2 hr
Insulin aspart (NovoLog)	<0.25 hr	0.5-1.0 hr	3-5 hr	1-2 hr
Insulin glulisine (Apidra)	<0.25 hr	1-1.5 hr	3-5 hr	1-2 hr
Short-Acting				
Regular (Humulin R and Novolin R)	0.5-1 hr	2-3 hr	3-6 hr	4 hr (next meal)
Intermediate-Acting				
NPH	2-4 hr	4-10 hr	10-16 hr	8-12 hr
Long-Acting				
Insulin glargine (Lantus)	2-4 hr	Peakless	20-24 hr	10-12 hr
Insulin determir (Levemir)	0.8-2 hr (dose dependent)	Peakless	12-24 hr (dose dependent)	10-12 hr
Mixtures				
70/30 (70% NPH, 30% regular)	0.5-1 hr	Dual	10-16 hr	
Humalog Mix 75/25 (75% neutral protamine lispro [NPL], 25% lispro)	<0.25 hr	Dual	10-16 hr	
Humalog Mix 50/50 (50% protamine lispro, 50% lispro)	<0.25 hr	Dual	10-16 hr	
NovoLog Mix 70/30 (70% neutral protamine aspart [NPA], 30% aspart)	<0.25 hr	Dual	15-18 hr	

Adapted from Kaufman FR editor: *Medical management of type 1 diabetes,* ed 6, Alexandria, Va, 2012, American Diabetes Association.

Carbohydrate in MNT (6)

Quality of carbohydrate

- Glycemic index and glycemic load

  ◦ Substitute foods with lower glycemic load for those with higher load

  ◦ Modest improvement in glycemic control

- Dietary fiber and whole grains:

- Fiber: 25 g/day women; 38 g/day men (14 g fiber/1,000 kcal/day)

- ≥50% of all grains should be whole grains

Sylvia Hley et al. Lancet 2014; 383: 1999–2007.
Alison B Evert et al. Diabetes Care 2014 Jan; 37(Supplement 1): S120-S143
American Diabetes Association, Clin Diabetes. 2018 Jan;36(1):14-37

Carbohydrate in MNT (7)

Sucrose, fructose, caloric sweeteners

- While substituting sucrose-containing foods for iso-caloric amounts of other carbohydrates may have similar blood glucose effects.

- Consumption should be minimized to avoid displacing nutrient-dense food choices.

- **Free fructose** (naturally occurring in foods such as fruit)

  ◦ Potentially better glycemic control vs sucrose or starch

  ◦ Unlikely to impact TG if consumption is not excessive (>12% energy)

Sylvia Hley et al. Lancet 2014; 383: 1999–2007.
Alison B Evert et al. Diabetes Care 2014 Jan; 37(Supplement 1): S120-S143
American Diabetes Association, Clin Diabetes. 2018 Jan;36(1):14-37

Carbohydrate in MNT (8)

Sucrose, fructose, calorie sweeteners

- Limit/avoid sugar-sweetened beverages

  ◦ Reduce risk for weight gain, worsening of cardio-metabolic profile **(A)**

- Non nutritive and hypo-caloric sweeteners

  ◦ Replacing added sugars with sugar substitutes could **decrease daily intake of carbohydrates** and calories.

  ◦ These dietary changes could beneficially affect glycemic, weight, and cardio-metabolic control.

  ➤ Using sugar substitutes does not make an unhealthy choice healthy; rather, it makes such a choice **less unhealthy**. **(B)**

Sylvia Hley et al. Lancet 2014; 383: 1999–2007.
Alison B Evert et al. Diabetes Care 2014 Jan; 37(Supplement 1): S120-S143
American Diabetes Association, Clin Diabetes. 2018 Jan;36(1):14-37

Alcohol **in MNT**

Drinking alcohol is forbidden in Islam

- Adults with diabetes who drink alcohol should do so in moderation (no more than one drink per day for adult women and no more than two drinks per day for adult men).

- Educating people with diabetes about the signs, symptoms, and self-management of delayed hypoglycemia after drinking alcohol, especially when using insulin or insulin secretagogues, is recommended.

  ◦ This effect may be a result of inhibition of gluconeogenesis, reduced hypoglycemia awareness due to the cerebral effects of alcohol, and/or impaired counter-regulatory responses to hypoglycemia

- The importance of glucose monitoring after drinking alcoholic beverages to reduce hypoglycemia risk should be emphasized

Nuha A., et al. Diabetes Care 2023;46(Suppl. 1):S68–S96

Protein in MNT

Diabetes without diabetic kidney disease	• **No ideal intake** to improve glycemic control or CVD risk • **Individualize goals**
Diabetes and macro- or microalbuminuria	Reduction below usual intake not recommended For people with non-dialysis-dependent DKD, dietary protein intake should be approximately 0.8 g/kg body weight per day. For patients on dialysis, higher levels of dietary protein intake should be considered.
Type 2 diabetes	Ingested protein appears to increase insulin response without increasing plasma glucose concentrations Do not use CHO sources high in protein to treat or prevent hypoglycemia

Nuha A., et al. Diabetes Care 2023;46(Suppl. 1):S68–S96
Standards of Medical Care in Diabetes—2016. Diabetes Care 2016;39(Suppl. 1):S1–S112
American Diabetes Association, Clin Diabetes. 2018 Jan;36(1):14-37

Fat in MNT (1)

Total fat	• **No ideal intake**; individualize goals •Fat quality more important than quantity
Monounsaturated fatty acid	•Mediterranean-style, MUFA-rich eating pattern recommended as alternative to low-fat, high CHO in patients with type 2 diabetes may improve glycemic control, CVD risk factors **(B)**
Polyunsaturated fatty acid	Limited evidence on effect in people with type 2 diabetes

Nuha A., et al. Diabetes Care 2023;46(Suppl. 1):S68–S96
Standards of Medical Care in Diabetes—2016. Diabetes Care 2016;39(Suppl. 1):S1–S112
American Diabetes Association, Clin Diabetes. 2018 Jan;36(1):14-37

Fat in MNT (2)

Dietary intake of fats	
Saturated fat	<10% of calories
Cholesterol	<300 mg dietary cholesterol/day
Trans fat	Limit as much as possible

Nuha A., et al. Diabetes Care 2023;46(Suppl. 1):S68–S96
Standards of Medical Care in Diabetes—2016. Diabetes Care 2016;39(Suppl. 1):S1–S112
American Diabetes Association, Clin Diabetes. 2018 Jan;36(1):14-37

Fat in MNT (3)

Dietary omega-3 fatty acids

- Omega-3 (EPA, DHA) supplements not recommended for diabetes prevention or treatment **(A)**

- Increase intake of foods with EPA, DHA, ALA

  Benefits on lipoproteins, CVD prevention, health outcomes **(B)**

- Eat fish (particularly fatty fish) ≥2 times/week

Nuha A., et al. Diabetes Care 2023;46(Suppl. 1):S68–S96
Standards of Medical Care in Diabetes—2016. Diabetes Care 2016;39(Suppl. 1):S1–S112
American Diabetes Association, Clin Diabetes. 2018 Jan;36(1):14-37

Micronutrients, herbal, and supplements in MNT

Vitamin or mineral supplementation: No benefit in patients without underlying deficiencies	
Antioxidants (vitamins E, C; carotene)	Not advised due to lack of evidence of efficacy and concern for long-term safety
Micronutrients (chromium, magnesium, vitamin D)	Insufficient evidence to recommend routine use to improve glycemic control in patients with diabetes (C)

Nuha A., et al. Diabetes Care 2023;46(Suppl. 1):S68–S96
Standards of Medical Care in Diabetes—2016. Diabetes Care 2016;39(Suppl. 1):S1–S112
American Diabetes Association, Clin Diabetes. 2018 Jan;36(1):14-37

SODIUM in MNT

➢ Reduce to <2300 mg/day **(B)**

➢ Patients with diabetes and hypertension

  ✓ Further reduction in sodium intake should be individualized.

  ✓ Sodium intake recommendations should take into account palatability, availability, affordability, and the difficulty of achieving low-sodium recommendations in a nutritionally adequate diet

Nuha A., et al. Diabetes Care 2023;46(Suppl. 1):S68–S96
Standards of Medical Care in Diabetes—2019. Diabetes Care 2019;42(Suppl. 1):S46–S60
American Diabetes Association, Clin Diabetes. 2018 Jan;36(1):14-37

NUTRITION MANAGEMENT PRIORITIES:

ALL PATIENS

- Recommend portion control for weight loss maintenance

- Know what foods contain CHOs

  ◦ Starchy veggies, whole grains, fruit, milk/milk products, veggies, sugar

- Choose nutrient-dense, high fiber foods over processed foods

- Avoid sugar-sweetened beverages

- CHO counting: usually no need to subtract fiber, sugar alcohols from total

Nuha A., et al. Diabetes Care 2023;46(Suppl. 1):S68–S96

Standards of Medical Care in Diabetes—2016. Diabetes Care 2016;39(Suppl. 1):S1–S112

American Diabetes Association, Clin Diabetes. 2018 Jan;36(1):14-37

NUTRITION MANAGEMENT PRIORITIES:
ALL PATIENS

➢ High *trans*, saturated fat foods replaced with foods high in unsaturated fats

➢ Choose lean protein and meat alternatives

➢ Vitamin and mineral supplements, herbal products, cinnamon not recommended to manage diabetes

➢ Limit sodium intake to 2300 mg/day

Sylvia Hley et al. Lancet 2014; 383: 1999–2007.
Standards of Medical Care in Diabetes—2016. Diabetes Care 2016;39(Suppl. 1):S1–S112
American Diabetes Association, Clin Diabetes. 2018 Jan;36(1):14-37

FOLLOW UP AND EVALUATION

➢ Monitor glucose (SMBG), A1c, weight, lipids, and blood pressure.

➢ Modify meal plan as needed to achieve metabolic goals.

➢ If metabolic targets are not met within 1–3 months, evaluate nutrition care plan, re-educate and review goals.

ADA. standards of Medical care in diabetes – 2014. Diabetes Care. 2014;37 (suppl 1): s14-s80.

CONCLUSION (1)

➢ Diabetes Self-Management Education

➢ Set individualized goals to meet patient needs

➢ Promote weight loss, if needed

➢ Self-monitored blood glucose (SMBG)

➢ Increase physical activity

➢ Incorporate other needed dietary modifications with meal plan

CONCLUSION (2)

➤ Meal plan – distribute food throughout the day to avoid large concentrations of calories or carbohydrates that cause postprandial glucose elevations.

➤ Individualize meals and snacks to include healthy food choices

➤ Dietary fiber intake to 14 g fiber/1,000 Kcal /day