



دانشگاه علوم پزشکی اصفهان

مرکز تحقیقات غدد و متابولیسم



Standards of Care in Diabetes-2026 Medical Nutrition Therapy

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American
Diabetes
Association

Benefits of Healthy Eating for Adults

May help you **live longer**

Keeps **skin, teeth, and eyes** healthy

Supports **muscles**

Boosts **immunity**

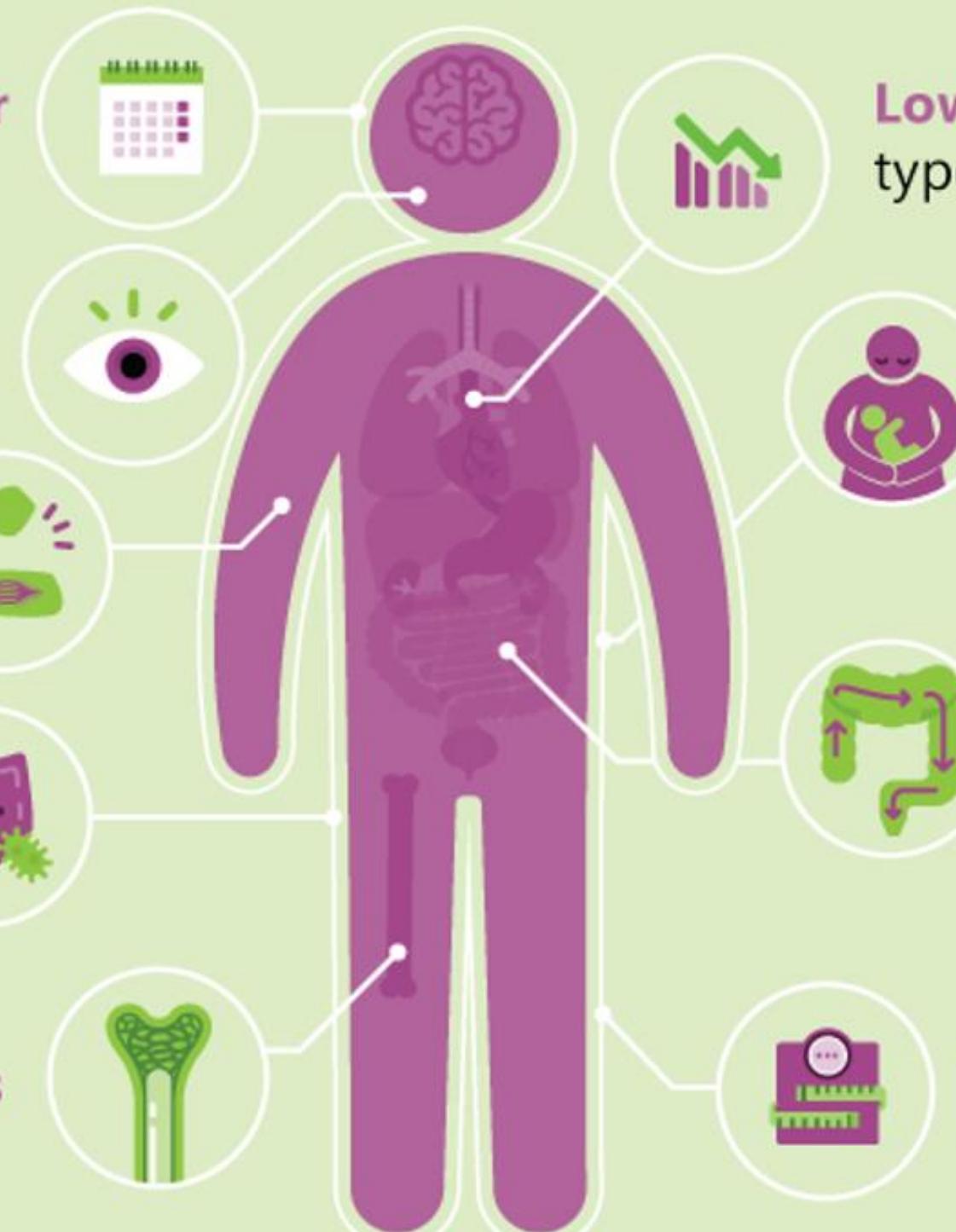
Strengthens **bones**

Lowers risk of heart disease, type 2 diabetes, and some cancers

Supports **healthy pregnancies and breastfeeding**

Helps the **digestive system** function

Helps achieve and maintain a **healthy weight**



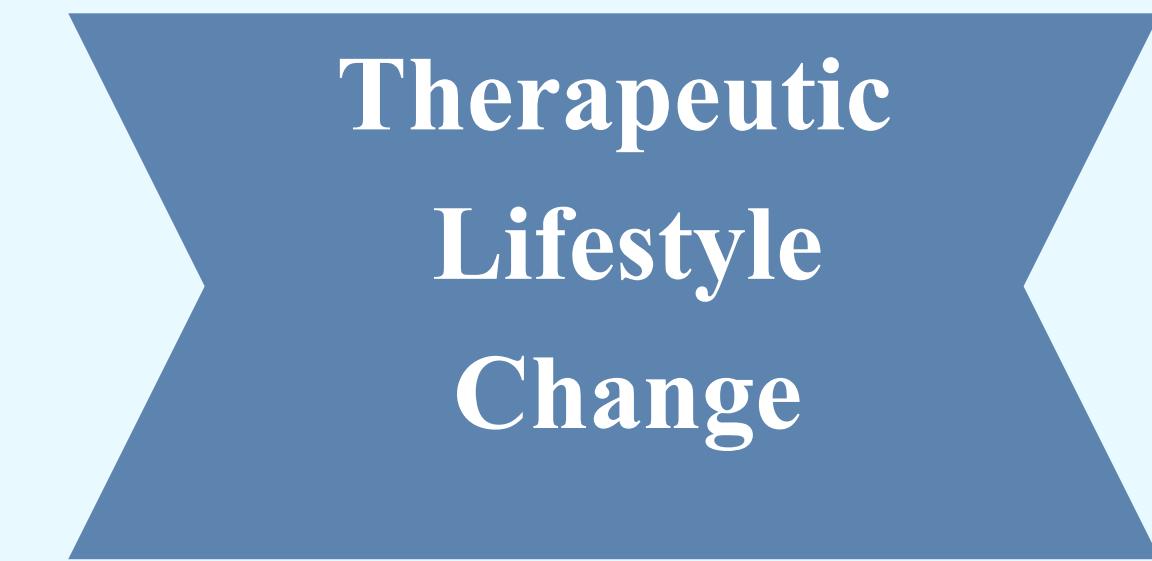


Bridging the Gap

What we know vs. what we do

Top 3 Behaviors Attributable to Chronic Disease:

1. Dietary pattern
2. Physical activity level
3. Tobacco use

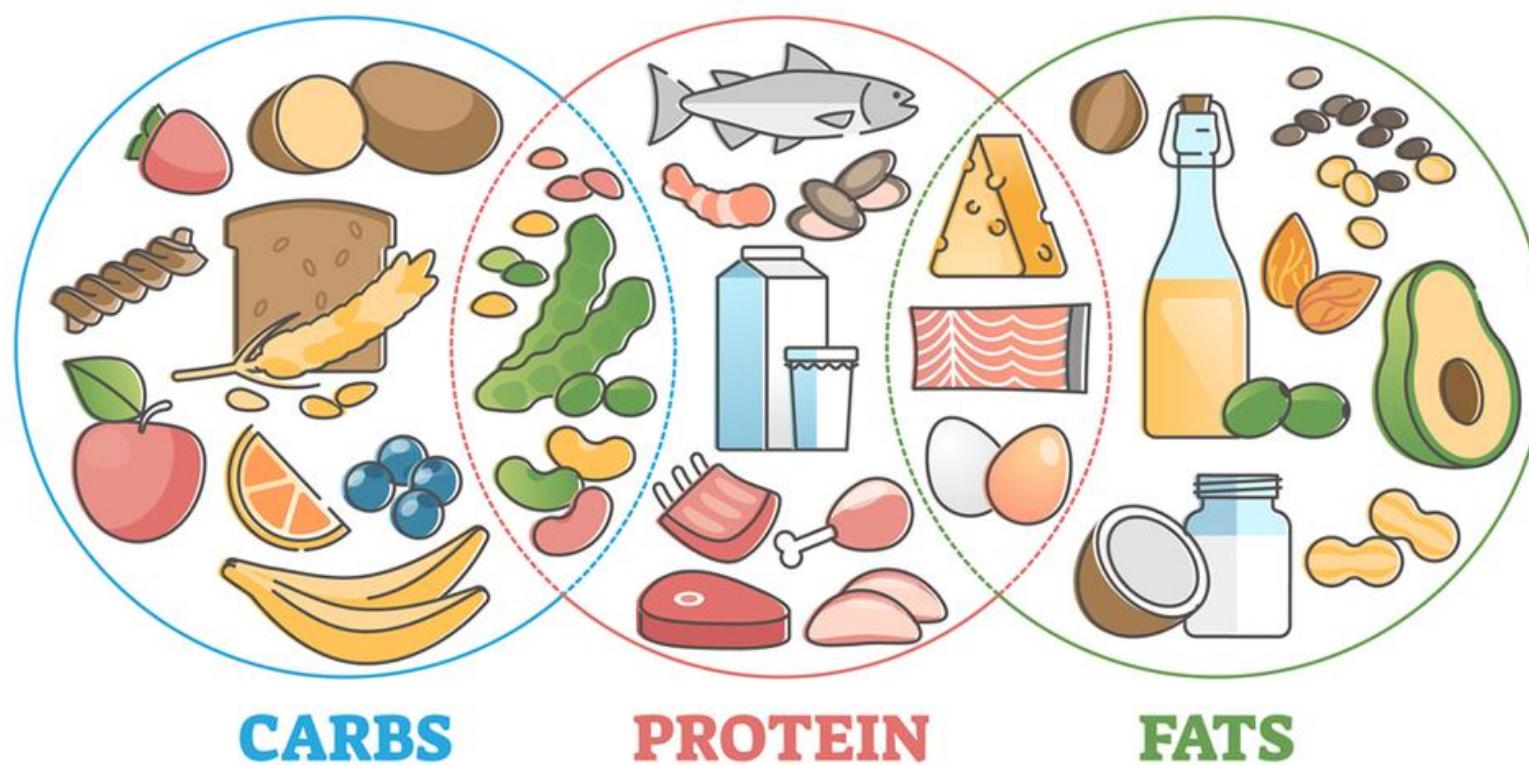


Therapeutic
Lifestyle
Change



Macronutrients

MACRONUTRIENTS



Carbohydrate, fat and protein
in foods provide energy for body
functions and physical activities.

Protein

Recommended amount:

0.8-1.5 gr/Kg of body weight per day

- During pregnancy, breastfeeding, and in children and the elderly, the **need for protein increases**.
- **Animal:** red meat, poultry, dairy products, and eggs
- **Plant:** grains, legumes, soy, and nuts





The nutritional value of animal protein is greater than that of plant protein, and it is better to consume protein sources in a mixed form

Protein Complementing



A diet consisting solely of a plant-based diet will not be able to produce enough protein for growth due to the limiting amino acid.

Cereals and legumes
Cereals and dairy
Pulses and seeds



Fat

Providing energy

Providing essential fatty acids

Providing fat-soluble vitamins

30-35% of energy intake in the diet
should come from fats.

Saturated fatty acids should be less
than **%10** of total calorie intake.



Trans fatty acids

High intake of trans fatty acids is linked to coronary heart disease, type 2 diabetes, various cancers, and allergies.



TRANS FAT

The main source of trans fatty acids is hydrogenated oils.



Fat

Emphasize healthy fats

Canola oil, olive oil, avocado, nuts, seeds, fatty fish



Reduce saturated and trans fats

Solid shortening, lard, fast food, processed foods

Carbohydrate

- Emphasis on **complex and fibrous carbohydrates**
Whole grains, legumes, vegetables, fruits with skin
- Reduce consumption of **simple and refined carbohydrates**
Sugar, all kinds of soft drinks and sweet drinks,
white bread, white rice



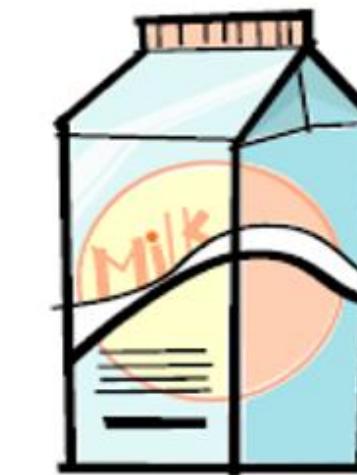
Carbohydrate

- The importance of controlling the **size of meals** containing carbohydrates.
- **Distribution** of carbohydrates in main meals and snacks



Carbohydrate

Food	Grams of Carbs/Serving
Starch/Bread	15 grams
Fruit	15 grams
Milk	12 grams
Vegetables	5 grams
Meat	0 grams
Fat	0 grams





General recommendation for macronutrient distribution

Fats:
20 to 35%

Proteins:
10 to 25%

At least 130 gr/day of carbohydrates is recommended for adults to meet the brain's glucose needs.

Fiber

- **Insoluble fiber**, such as cellulose found in plants, increases the frequency of bowel movements and increases stool volume, leading to a decrease in the time it takes for waste to pass through the digestive tract.
- **Soluble fiber** is able to form a gel, and leads to a slowdown and increase in the time it takes for micronutrients to pass through and be absorbed.



Fiber

Foods with **at least 3 g** of fiber per serving are generally considered higher fiber choices.

Adequate total fiber intake



38 gr/day for men



25 gr/day for women

14gr/1000Kcal



Glycemic Index vs. Glycemic Load

Glycemic index:

Numerical way of showing
how carbohydrates affect
blood sugar levels

Glycemic load:

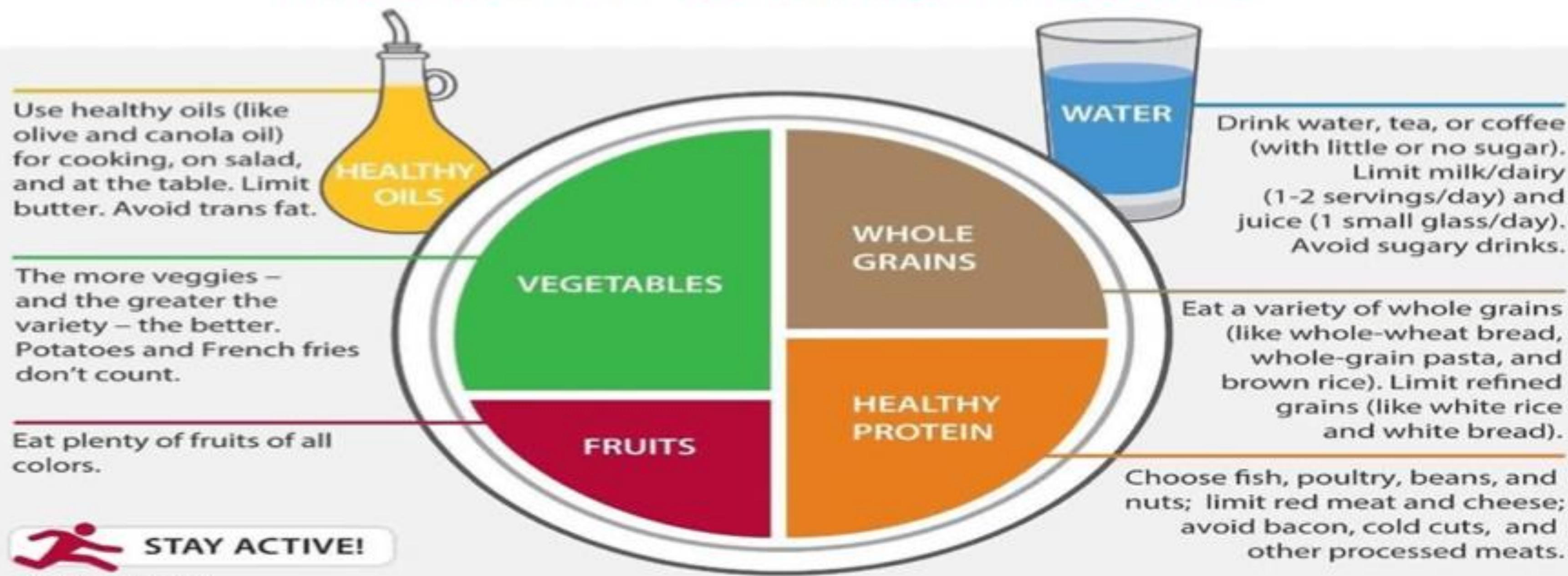
Uses GI and the amount of total
carbs per serving of a specific food to
estimate how quickly a food causes
blood sugar to rise and how much blood
sugar levels will rise in total after eating



Main Food groups

Food List	Carbohydrate (g)	Protein (g)	Fat (g)	Calories
Carbohydrates				
Carbohydrates: breads, cereals and grains, starchy vegetables, crackers and snacks, and beans, peas, and lentils	15	0–3	0–1	80
Fruits	15	—	—	60
Milk				
Fat-free, low-fat, 1%	12	8	0–3	100
Reduced fat, 2%	12	8	5	120
Whole	12	8	8	160
Sweets, desserts, and other carbohydrates	15	Varies	Varies	Varies
Nonstarchy vegetables	5	2	—	25
Meat and Meat Substitutes				
Lean	—	7	0–3	45
Medium-fat	—	7	4–7	75
High-fat	—	7	8+	100
Plant-based proteins	Varies	7	Varies	Varies
Fats	—	—	5	45
Alcohol	Varies	—	—	100

HEALTHY EATING PLATE



STAY ACTIVE!

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Nutrition Behaviors to Encourage



Water should be the primary beverage of choice.

For individuals who do not prefer plain water, no-calorie alternatives are the next best choice.

Options include adding lemon, lime, berries, or cucumber slices to water; sparkling no-calorie water or flavored no-calorie waters; no-calorie carbonated beverages.

Nutrition Recommendations

1. Provide individualized MNT
2. MNT should be cost-saving; improve cardiometabolic outcomes and reimbursed by insurance
3. Consider weight management
4. Emphasis on key nutrition principles



Nutrition Recommendations

5. Reducing carbohydrate intake: an effective way is limiting processed foods.



6. Assess intake of supplements and herbs

7. Limit sodium intake <2300 mg/day

8. Consider dietary patterns such as

Mediterranean diet





Weight Management

Diabetes prevention program

- More focus in weight loss = reduction in total fat and calorie intake
- There is no ideal percentage of calorie from macronutrients= macros distribution should be individualized based on current eating patterns, preferences, and metabolic goals

Weight Management

Diabetes prevention program

- At least 7% of weight, more feasible to achieve
- 7-10 % weight reduction= greater benefits
- The recommended pace of weight loss: 1-2 lb/week





Weight Management

Patient with diabetes and prediabetes

- Primary goal along with glycemic management
- At least 5%
- 7-10 % is recommended
- Benefits of weight loss are progressive and more intensive goals (15%) may be appropriate



Weight Management

Patient with diabetes and prediabetes

- Traditional interventions may not be effective in some Asian populations; should be tailored to their culture
- GLP1 RA, helps to loose more weight (10-15%), with higher risk of nausea and ketosis in T1DM
- Metabolic surgery > 20% weight loss



Weight Management

Metabolic dysfunction-associated steatotic liver disease (MASLD)

- Minimum weight loss goal: 5%
- Preferably $\geq 10\%$ weight loss is needed to improve liver histology

More individualized = greater benefit



Weight Management

Metabolic dysfunction-associated steatosis liver disease (MASLD)

- No difference in energy deficit between individuals with diabetes with obesity with or without MASLD
- Limit saturated fat, refined carbohydrates, and added sugar

Med-diet

Best evidence for improvement of MASLD

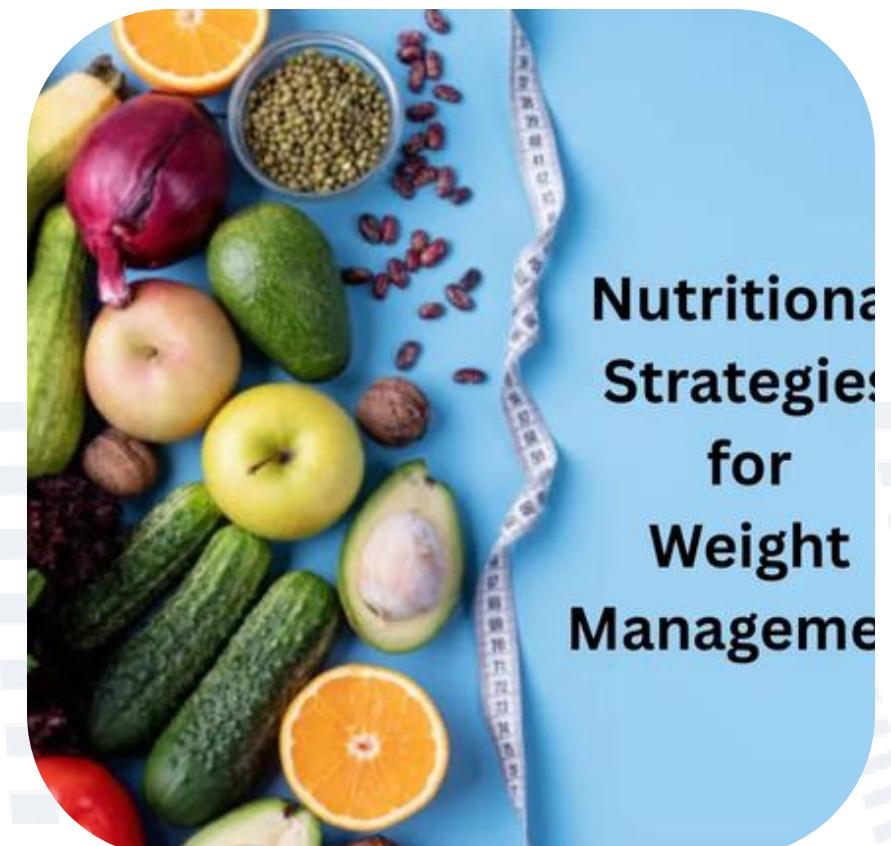
Assessment and monitoring persons with obesity

- Screen for overweight or obesity using BMI annually
- Additional assessment for adiposity
- During active management increase monitoring to at least every 3 months.



Assessment and monitoring persons with obesity

- BMI is not a perfect measure of adipose tissue mass and distribution; However, it remains an acceptable measure
- Do not forget about privacy
- Anthropometric measurement should be performed and reported nonjudgmentally



**Nutritional
Strategies
for
Weight
Management**

Assessment and monitoring persons with obesity

- Screening for history of dieting, past and current disordered eating pattern
- Past effort in weight loss and body weight history can be useful



Motivational interviewing technique

- First asking the individual if they want to discuss their weight
- Health care professionals should never assume a person with overweight or obesity wants to discuss weight at a medical appointment; especially when appointment is seemingly for an unrelated issue (i.e. back pain)





Strategies for weight management

Nutrition and eating pattern

Physical activity and exercise

Behavioral counseling

Pharmacotherapy

Medical devices

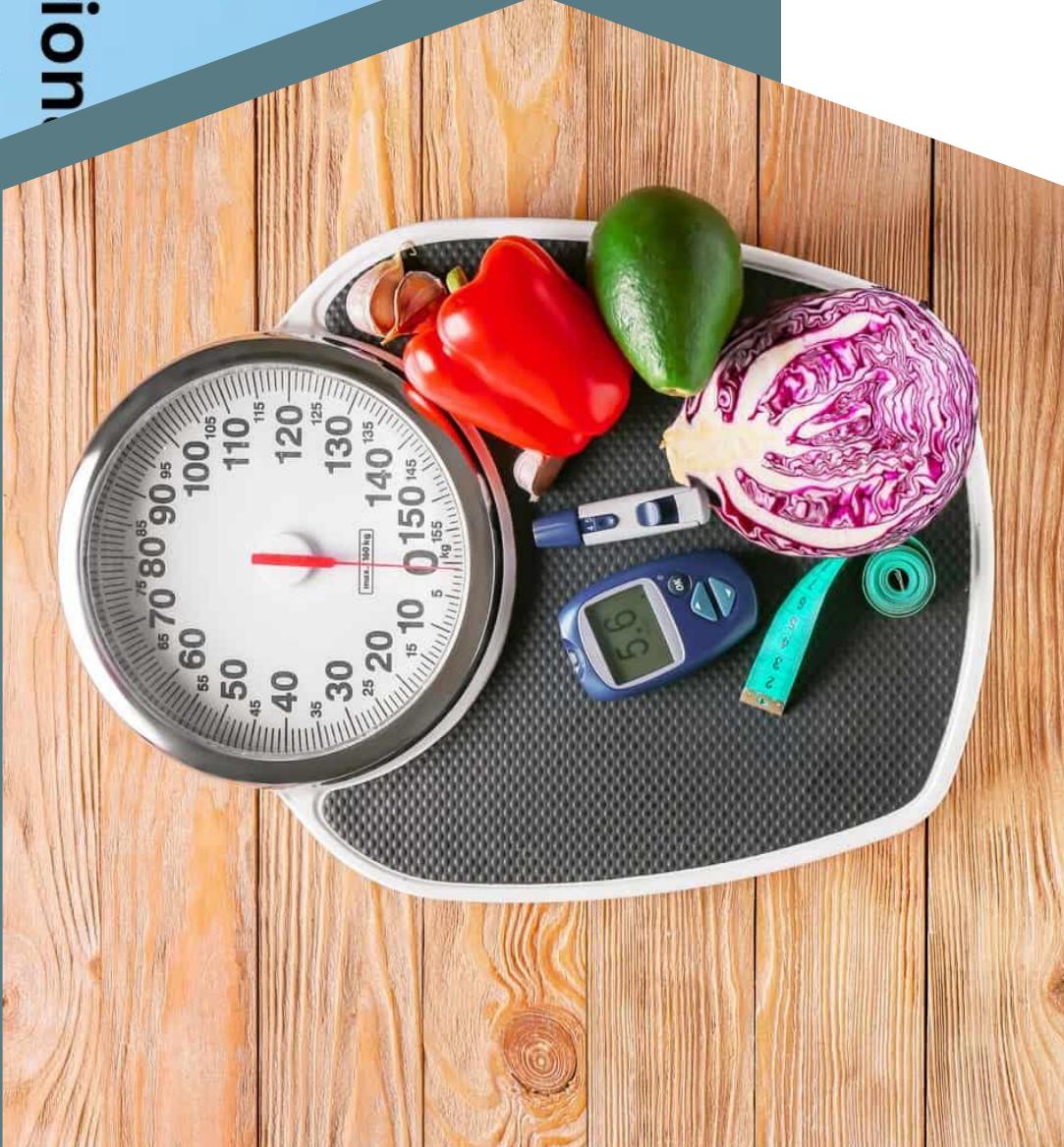
Metabolic surgery





Strategies for weight management

Therapeutic choices should be individualized based on person's medical history, life circumstance, and preferences.



Individualized Approach

There is no one-size fits
all eating pattern



Individualized Approach

- Usual eating style
- Cultural background
- Food preferences
- Social Determinant of Health
- Behavioral health status
- Physical activity
- Try maintain the pleasure of eating: reducing or limiting foods only when indicated by scientific evidence





Strategies for weight management

Nutrition Strategies for Weight Management



- High frequency of counseling ≥ 16 sessions in 6 month
- Effective long-term (more than 1 years) weight maintenance provides monthly contact and support + weekly self-monitoring of body weight



Strategies for weight management

Achieve 500-750 kcal/day energy deficit





Strategies for weight management

- Very low calorie meals (800-1000 kcal/day) should only be prescribed short-term (up to 3 months) and carefully with close monitoring

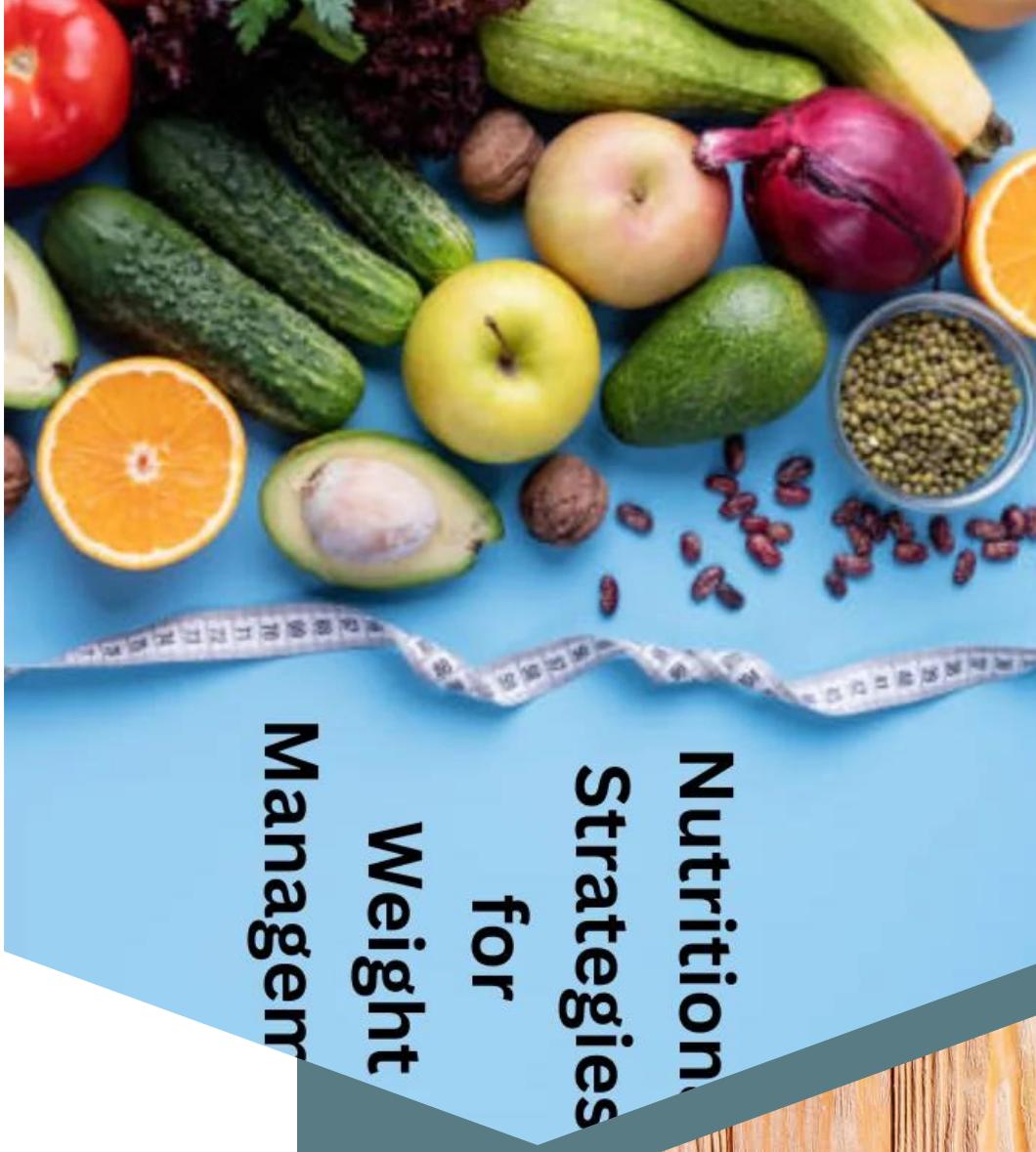
Complications:

electrolyte abnormalities, severe fatigue, cardiac arrhythmias

Selected individuals,

such as those requiring weight loss or glycemic management before surgery



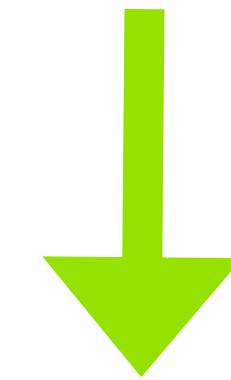


Nutrition
Strategies
for
Weight
Management



Strategies for weight management

Nutritional supplements not
recommended



they are not effective



Strategies for weight management

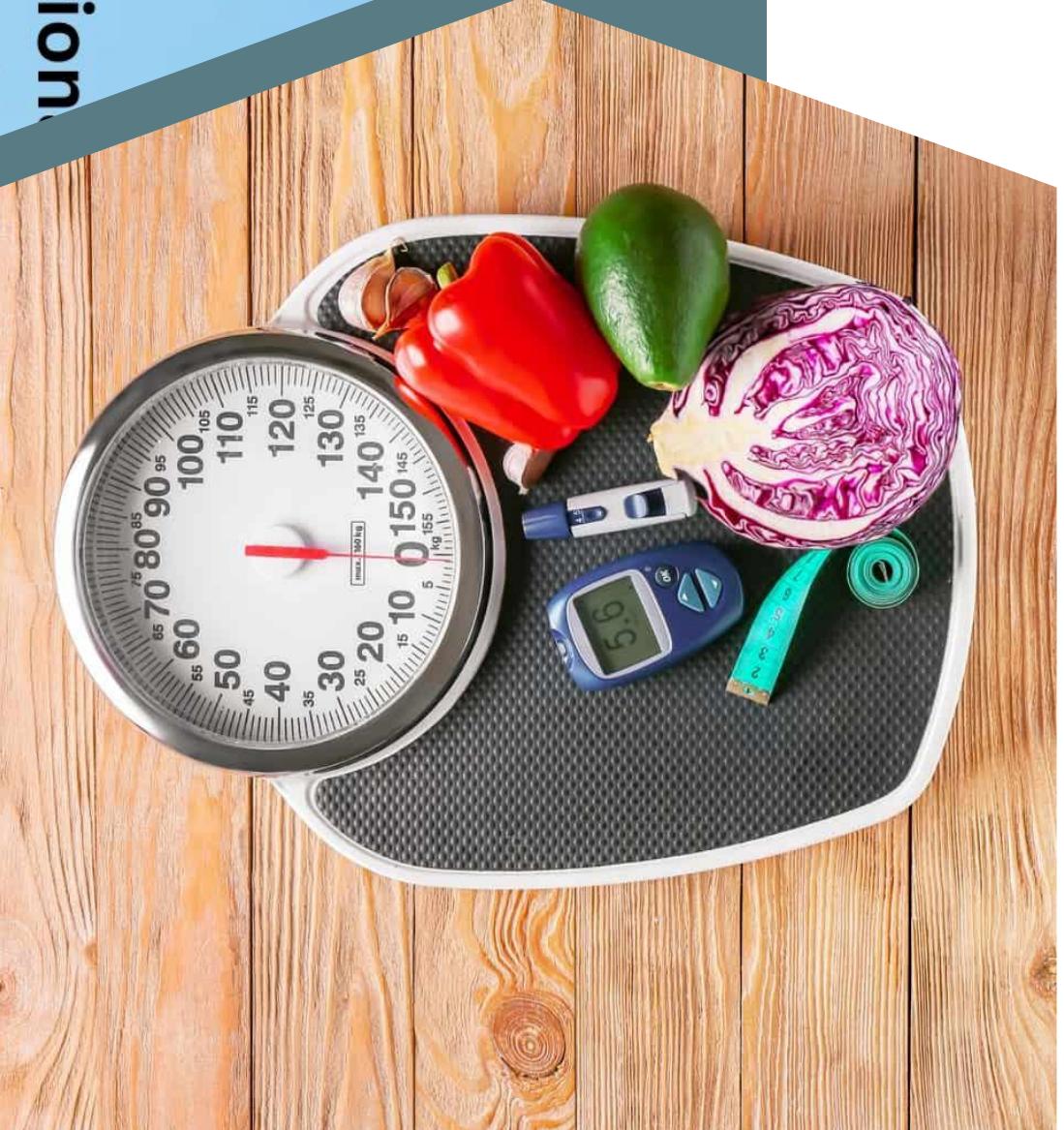
Different nutrition interventions can be applied, with energy deficit; No single way is best

Calorie restriction is necessary for glycemic and weight management, but rigid meal plans and strict tracking can be contraindicated



Strategies for weight management

Emphasis on food patterns instead of macro- and micronutrients; totality of the foods and beverage a person consume





Strategies for weight management

Appropriate dietary patterns for individuals with prediabetes or diabetes:

Mediterranean style

Plant-based diet (vegetarian, vegan)

DASH diet

Low carbohydrate diet

Diabetes plate

Mediterranean Diet



Key Benefits

- Heart Health
- Weight Management
- Improved Blood Sugar Control
- Reduced Inflammation
- Longevity



Mediterranean diet

- Strong evidence for improved glycemic control and cardiovascular outcomes
- Associated with reduced HbA1c and improved lipid profile
- Benefits observed even without weight loss
- Recommended especially for patients with high cardiovascular risk



Mediterranean diet

- Characterized by high consumption of fruits, vegetables, whole grains, and healthy fats, has been linked to numerous health benefit.
- The Mediterranean diet is associated with a **reduced risk** of developing type 2 diabetes, promoting beneficial effects on glycemic control and cardiovascular health.



Mediterranean diet

- The Mediterranean diet is linked to improvements in various cardiometabolic risk factors including blood glucose levels and HbA1c reductions.

Mediterranean Diet Pyramid

A contemporary approach to delicious, healthy eating

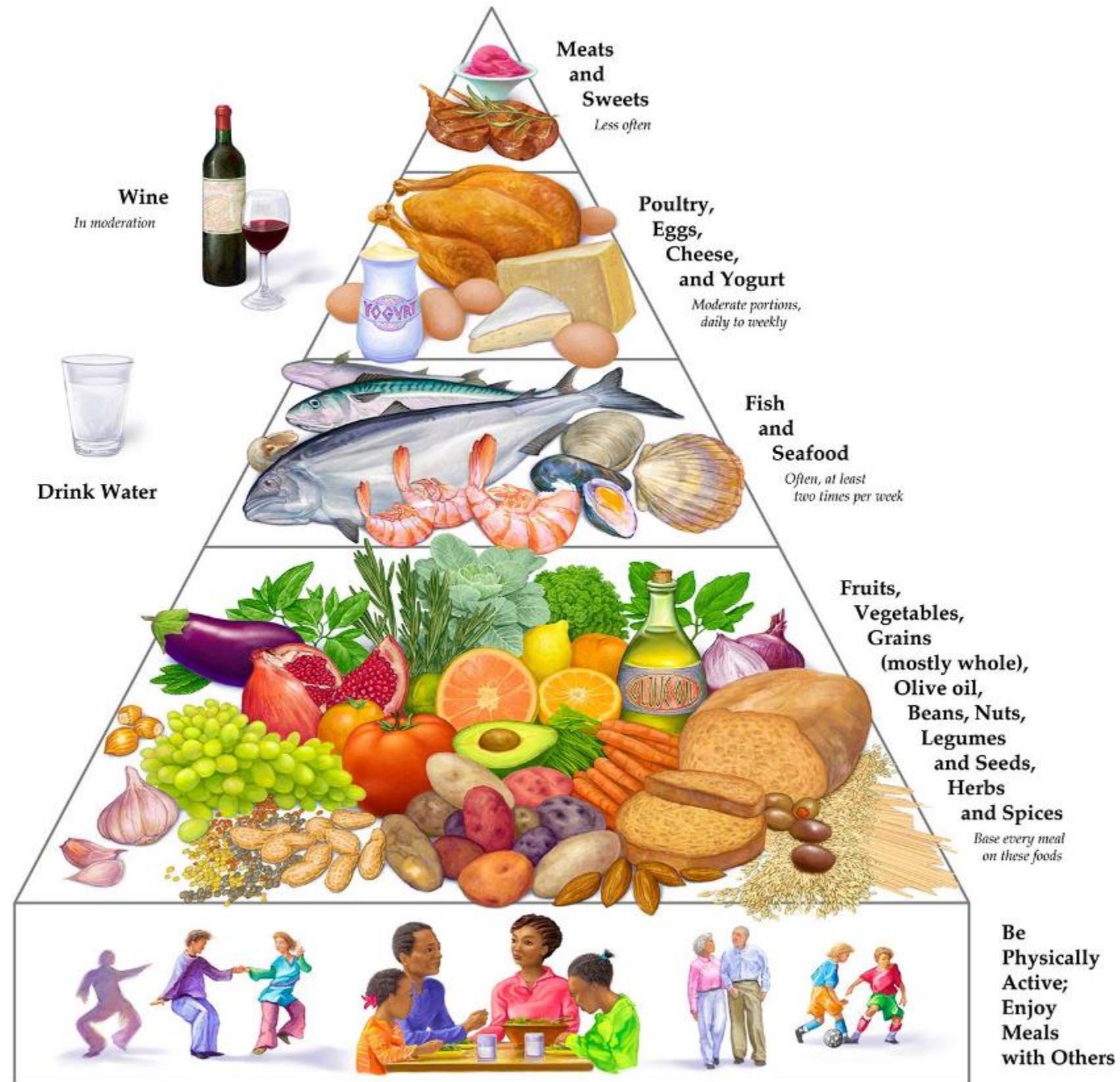


Illustration by George Middleton

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Dietary Approaches to Stop Hypertension

- The DASH diet, emphasizes high consumption of fruits, vegetables, and low-fat dairy while reducing saturated fats and sugars.
- It notably lowers blood pressure, enhances insulin sensitivity, and may reduce the risk of conditions like preeclampsia.



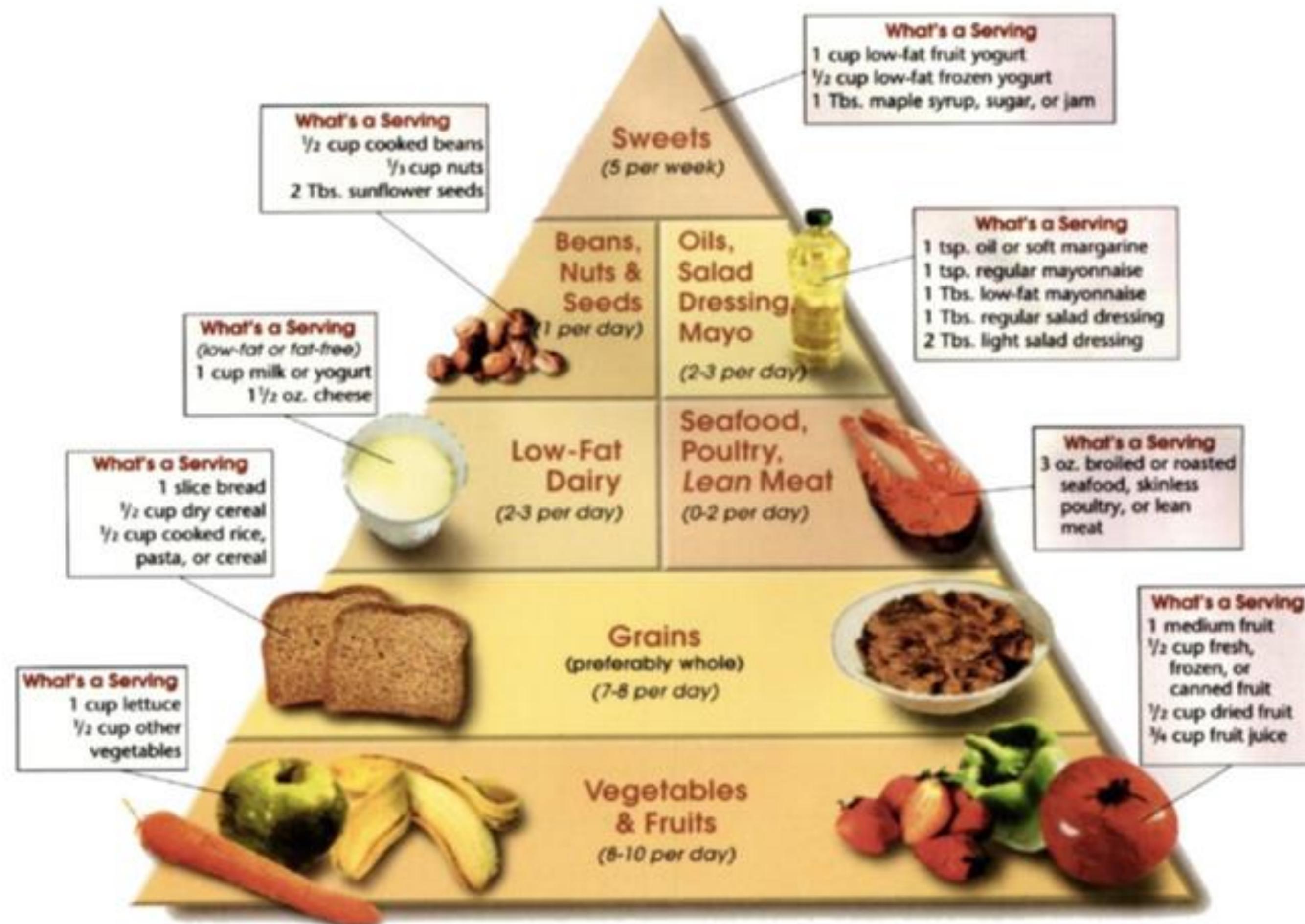
Dietary Approaches to Stop Hypertension

- Numerous studies have established that adherence to the DASH diet can improve glycemic control in individuals with type 2 diabetes .
- This dietary approach significantly reduces HbA1c levels and enhances insulin sensitivity, thus optimizing blood glucose homeostasis



Dietary Approaches to Stop Hypertension

- Particularly beneficial for diabetes with hypertension
- Improves blood pressure and cardiometabolic risk factors
- Emphasizes fruits, vegetables, whole grains, and low-fat dairy
- Not inherently low-carbohydrate but high in carbohydrate quality



Note: Choose lower-salt foods from all categories.

Comparing Med-diet and DASH

Main Differences

Aspect	Mediterranean Diet	DASH Diet
Primary Focus	Overall longevity, enjoyment, and lifestyle (includes social eating, exercise, moderate wine).	Specifically designed to lower blood pressure (high sodium restriction).
Fat Emphasis	High in healthy fats (extra-virgin olive oil, avocados, nuts); ~35-40% calories from fat.	Low-fat (focus on low-fat dairy); ~27% calories from fat.
Protein Sources	Fish/seafood prominent; moderate poultry, eggs, dairy; limited red meat.	More emphasis on low-fat dairy; lean meats, poultry, fish.
Structure	Flexible, no strict portions; pyramid-based with cultural foods.	Structured with daily/weekly servings (e.g., 4-5 fruits, limited sodium <2,300mg/day).

What is a Low Carb Diet?

Low carb means "low carbo" or lower intake of carbohydrates, where the focus is to cut out carbohydrates from your daily diet and meal consumption.

Will a Low Carb Diet Help You Lose Weight?



Cutting out carbohydrates will help you lose weight, especially when it comes to changing our bad habits of consuming ultra-processed carbohydrates such as bread, cakes, and pasta.

When you cut out these harmful foods, your body begins to deflate and help you with your weight goals with time.

Foods You Should Eat in a Low Carb Diet



The Low Carb Diet is to reduce and even cut into definitive carbohydrates from your diet. The low-carbohydrate main purpose is the loss of weight in a natural way, providing the detoxification of the body. Often this diet includes healthier foods on their menu, such as dairy, fruits, vegetables, and lean meats.

Foods You Should Avoid in a Low Carb Diet



Sugar: It is forbidden within the low-carb context. So, honey, coconut sugar, and processed should not be consumed.

Wheat Flour: No products using wheat flour should be consumed even if it is full.

The low-carbohydrate diet (LCD)



- May improve HbA1c and reduce medication needs in selected patients
- Short-term benefits more consistent than long-term outcomes
- Requires careful monitoring for hypoglycemia
- Not recommended for pregnancy, eating disorders, or advanced kidney disease



Low-Fat, High-Quality Eating Patterns

- Effectiveness depends on food quality rather than fat reduction alone
- Should emphasize whole grains, fiber, and minimally processed foods
- Low-fat diets high in refined carbohydrates are not recommended

Fasting



- Effectiveness depends on food quality rather than fat reduction alone
- Should emphasize whole grains, fiber, and minimally processed foods
- Low-fat diets high in refined carbohydrates are not recommended

Religious and intermittent fasting: differences and similarities

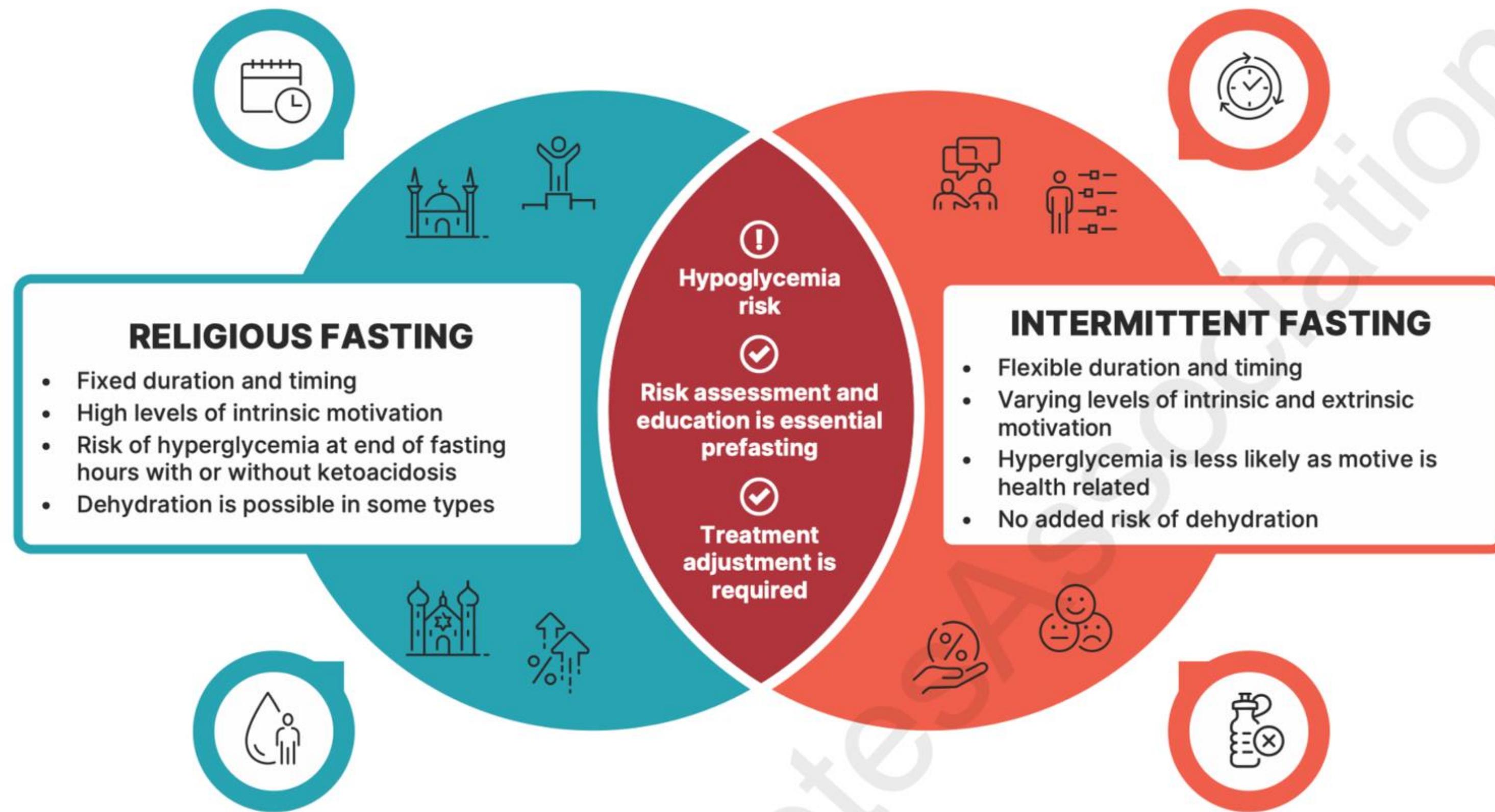
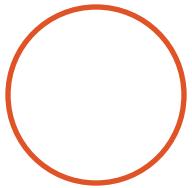


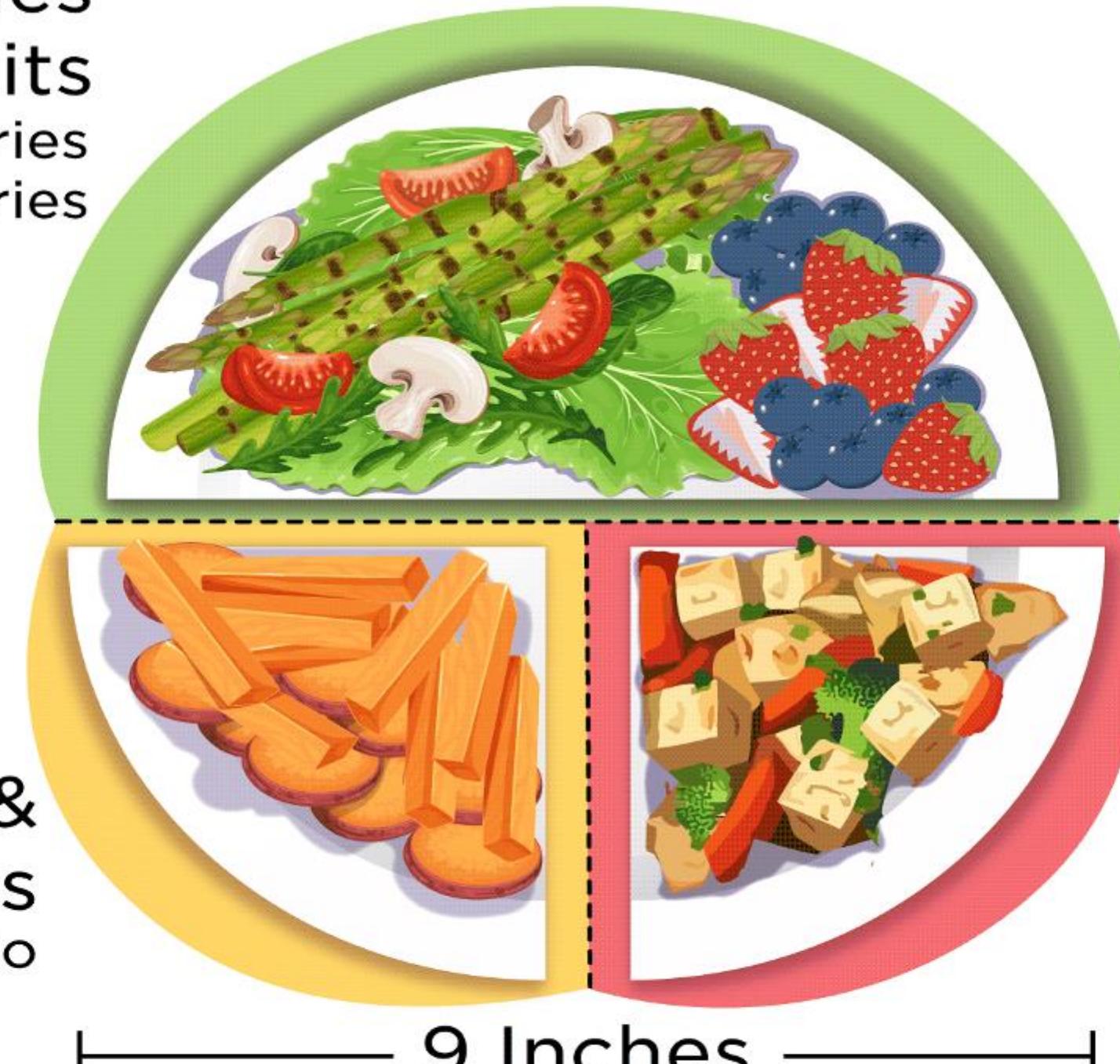
Figure 5.1—Differences and similarities between religious and intermittent fasting for people with diabetes.

A Healthy Plate



$\frac{1}{2}$ Vegetables
& fruits

Asparagus, strawberries
and blueberries



$\frac{1}{4}$ Grains &
starches
Sweet potato

$\frac{1}{4}$ Protein
Tofu

9 Inches

Use of Supplements

- Despite lack of evidence of benefit, consumers continue to take supplements.

- One general rule:

Without underlying deficiencies, there is no benefit from herbal or other (i.e., vitamins and mineral) supplementation for people with diabetes.



Use of Supplements: Vitamin D

- Supplementation to prevent diabetes (10-15% reduction in risk in specific populations such as older adults and lower baseline vitamin D)
- Risks: Hypercalcemia, Hypercalciuria, nephrolithiasis, kidney failure



Use of Supplements: Vitamin D

- Just ensure it meets the recommended daily allowance
- Optimal vitamin D level: 20-30 ng/mL generally thought to be sufficient,
- Those receiving antiresorptive therapy (including bisphosphonate) > 30 ng/mL is recommended



Use of Supplements: Calcium

- 1000-1200 mg/day through diet or supplement



Use of Supplements: Omega-3

- Supplementation is not recommended for prevention or treatment of cardiovascular event in people with diabetes; no evidence of benefit for glycemic control or cardiovascular events



Use of Supplements

- Routine supplementation with antioxidants (such as vitamin E and C) is not recommended: no evidence of efficacy, concern for long-term safety
- Harms of Beta-carotene supplementation outweigh the benefits for prevention of CVD and cancer



Use of Supplements

- Routine use of herbal supplements and micronutrients has no adequate evidence to improve glycemic control in people with T1&2D:

Cinnamon

Curcumin (turmeric)

Aloe vera

Chromium



Use of Supplements

Vitamin B12 levels should be monitored in those taking metformin, particularly in those with anemia and peripheral neuropathy



Use of Supplements

Multivitamin-mineral supplementation may be necessary in special populations:

Pregnancy or lactating,
older adults,
vegetarians or vegans,
following very low-calorie diets or
low-carb diets

Individual who consume <1200 kcal/day



Nutrition deficiencies due to obesity pharmacotherapy

GLP-1 RA

13% after 6 months

22% after 12 months

Most frequent: vitamin D deficiency



Nutrition deficiencies due to obesity pharmacotherapy

- Semaglutide:

Sever constipation, GI side effects
(reduce meal size, mindful eating,
stop eating once full, decrease
high fat or spicy foods)



Nutrition deficiencies due to obesity pharmacotherapy

- Dual GIP and GLP-1 RA : same as GLP-1 RA
- Orlistat:

Fat soluble vitamins



Nutrition deficiencies due to obesity pharmacotherapy

- SGLT2 inhibitors:
 - Very low carbohydrate diet or ketogenic diet should be avoided (potential risk of ketoacidosis)
 - Alcohol intake should be avoided
 - Adequate hydration is very important



Diabetes Related CKD



- Low protein Diet (in those with albuminuria or reduced eGFR)
- Below RDA (0.8 gr/kg) is not recommended due to alter glycemic measure, CVD risk, increase risk of malnutrition
- People with diabetes with or without CKD are advised to limit sodium to <2300 mg/day, processed foods are major contributors of sodium intake



Nonnutritive sweeteners (NNS)

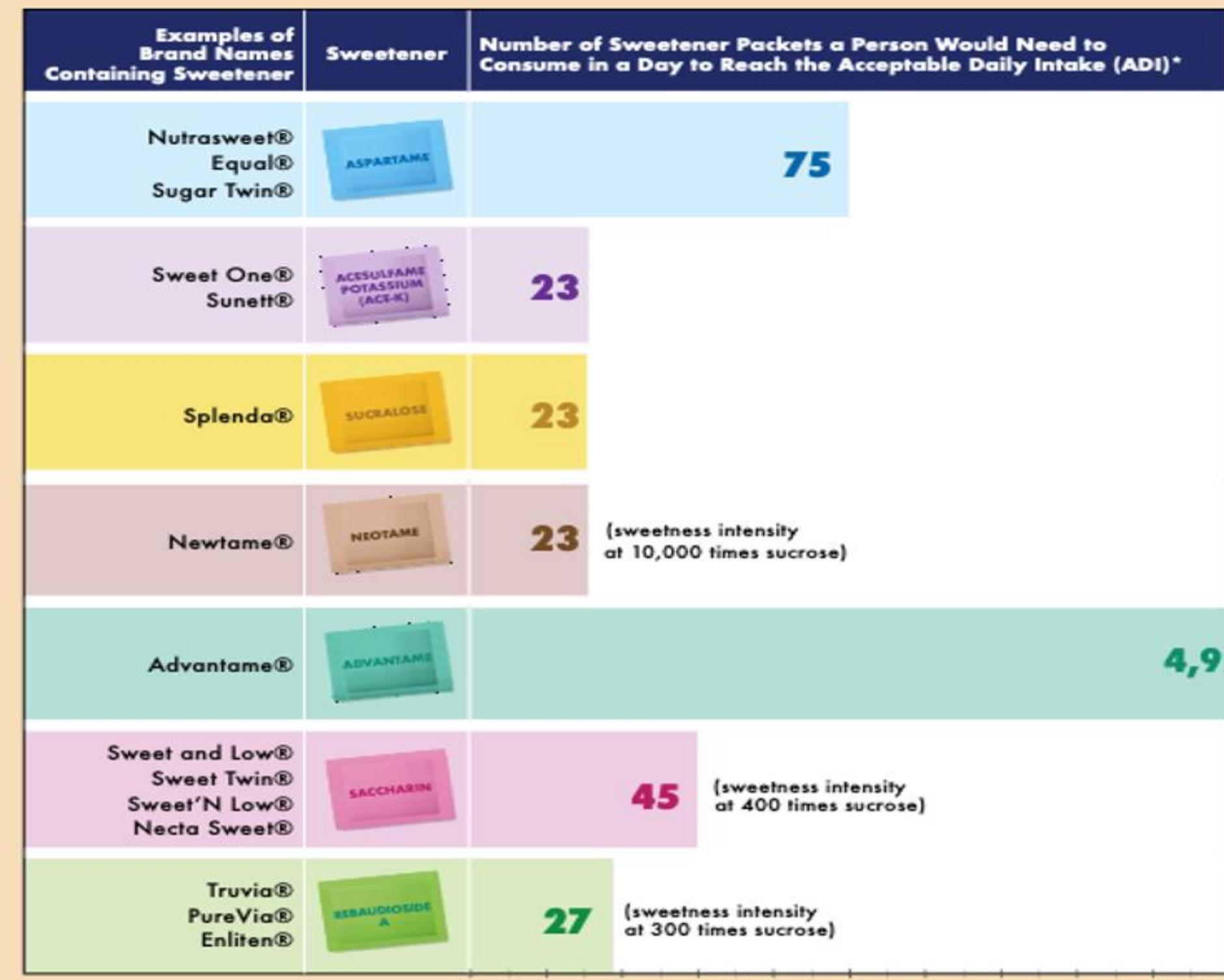
- Approved by FDA for all populations, including people with diabetes
- May be an acceptable substitute for nutritive sweeteners when consumed in moderation
- Do not appear to have significant effect on glycemic management



Safe Levels of Sweeteners

FDA

How many packets can a person consume and still be at the safe level for each sweetener based on its sweetness intensity?



Notes About the Chart:

The ADI in milligrams per kilogram body weight per day (mg/kg bw/d) for the sweeteners in the chart:

- Aspartame is 50 mg/kg bw/d
- Acesulfame potassium (Ace-K) is 15 mg/kg bw/d
- Sucralose is 5 mg/kg bw/d
- Neotame is 0.3 mg/kg bw/d
- Advantame is 32.8 mg/kg bw/d
- Saccharin is 15 mg/kg bw/d
- Rebaudioside A, a type of steviol glycoside, is 12 mg/kg bw/d

This is based on the ADI for steviol glycosides: 4 mg/kg bw/d, expressed as steviol equivalents, set by the Joint FAO/WHO Expert Committee on Food Additives, on which the FDA participates.

* Number of sweetener packets a 60 kg (132 pound) person would need to consume to reach the ADI. The FDA assumed a sweetener packet is as sweet as two teaspoons (approximately 8 grams) of sugar for these comparisons.

Thank for Your Attention!

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