

Diabetes

Applicable to: Nurses, Physicians and Other Health Professionals

Recommendations

Individuals with diabetes should follow *Eating Well with Canada's Food Guide* recommendations:

- Eat at least one dark green and one orange vegetable each day.
- Have vegetables and fruit more often than juice.
- Make at least half of grain product choices whole grain each day.
- Drink lower fat milk or fortified soy beverages.
- Have meat alternatives such as beans, lentils and tofu often.
- Eat at least two servings of fish each week.
- Achieve and maintain a healthy weight through healthy eating and moderate physical activity.
- Enjoy foods with little or no added fat, sugar or salt.
- Satisfy thirst with water.

Detailed information about *Eating Well with Canada's Food Guide* can be found at

www.healthcanada.gc.ca/foodguide

Additional recommendations for individuals with diabetes include:

- In people with type 2 diabetes, glycemic control is improved when meals are spaced regularly throughout the day. This encourages consistent carbohydrate intake and spacing over the day. Carbohydrates include starchy vegetables, fruits, grain products, milk, yogurt, beans, legumes and added sugars.
- Timing and spacing of meals is individualized and based on lifestyle preference and treatment goals. Eating three meals per day, including breakfast, is recommended.
- Choose foods high in fibre and achieve a dietary fibre intake of 25 to 50 grams per day from a variety of sources. High fibre foods include whole grains, vegetables, fruits, legumes, pulses, nuts and seeds.
- Choose low glycemic foods in place of high glycemic foods within the same food category. Examples of low glycemic index foods are whole grains, yams, legumes, milk and berries.
- Limit intake of added sugars (<10% total daily energy intake).
- Choose food sources of unsaturated fats instead of foods high in saturated fats most often. Restrict saturated fats to <7% of total daily calorie intake and limit trans fats to a minimum.
- Limit sodium intake to less than 2300 mg per day.
- Limit alcohol intake to ≤2 drinks per day for women and ≤3 drinks per day for men (≤10 standard drinks per week for women and ≤15 per week for men).

Health Benefits

Appropriate nutrition therapy for people with diabetes by a Registered Dietitian (RD) can lower glycosylated hemoglobin (A1C) levels by up to 1.0% in people with type 1 diabetes [*Grade D, consensus*]¹ and up to 2.0% in people with type 2 diabetes.² [*Grade C, Level 3 evidence*]¹ Further improved clinical and metabolic outcomes can be achieved when used in combination with other components of diabetes care.¹

Healthy eating with *Eating Well with Canada's Food Guide* is appropriate for people with diabetes. *Eating Well with Canada's Food Guide* promotes:^{3,4}

- consumption of vegetables and fruit to reduce risk of cardiovascular disease (CVD) and cancer.
- consumption of milk products to reduce risk of osteoporosis.
- consumption of whole grains to reduce risk of CVD.
- consumption of (fatty) fish to reduce risk of CVD.
- and maintains a healthy weight when combined with active living.

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Key Questions

Healthy Eating to Manage Diabetes

- Why is healthy eating important for diabetes management?
- Why should an individual with diabetes eat regular meals?
- Can type 2 diabetes be managed with lifestyle alone?

Healthy Weights

- What is a healthy body weight?
- How can an individual achieve a healthier body weight?

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- What are appropriate portion sizes?
- What does a healthy meal look like?
- What is a healthy snack?

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- Why is it important to spread out carbohydrate intake over the day?
- What is carbohydrate counting?

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- What are the diet recommendations for controlling blood pressure in people with diabetes?

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- What about vitamin and mineral supplementation for individuals with diabetes?
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- Why include physical activity?
- What type of physical activity is recommended?
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- What is a low blood sugar?
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Resources

- Are there any handouts on diabetes I can use with my patients?

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Introduction

Diabetes is a metabolic disorder characterized by hyperglycemia due to insufficient insulin secretion, insufficient insulin action or both.¹ Type 1 diabetes is a result of pancreatic beta cell destruction, usually caused by an autoimmune process. The body stops producing insulin and, therefore, exogenous insulin is required. Type 2 diabetes is a condition in which the body does not make enough insulin and/or does not use insulin properly.

Individuals with diabetes are at an increased risk for macro and microvascular complications associated with chronic hyperglycemia. These include coronary heart disease, stroke, nephropathy, retinopathy, foot ulceration and infection, erectile dysfunction and neuropathy.¹

Healthy Eating to Manage Diabetes**Why is healthy eating important for diabetes management?**

A healthy diet as a part of a healthy lifestyle can help to prevent or manage hyperglycemia, hypertension and dyslipidemia, thus reduce hospitalization rates.¹ Education about healthy eating to manage diabetes shortly after diagnosis is important to ensure that the desired lifestyle interventions and individualized nutrition treatment plan are implemented.^{5,6} Frequent follow up either in one-on-one or small group settings has shown to improve dietary adherence in people with type 2 diabetes. *[Grade B, Level 2 evidence]*¹

Why should an individual with diabetes eat regular meals?

In general, timing and spacing of meals should be individualized based on lifestyle preferences and treatment goals. Spacing and regularity in meal consumption may help control blood glucose levels in people with type 2 diabetes. *[Grade D, Level 4 evidence]*¹ People with type 1 diabetes, or those with type 2 diabetes taking meal time insulin, should be encouraged to match insulin to carbohydrate intake *[Grade C, Level 2 evidence for type 1 diabetes]* or maintain consistency in carbohydrate intake to match a fixed meal time insulin dose. *[Grade D, Level 4 evidence for type 1 diabetes]*¹

Some individuals may benefit from healthy snacks, which may improve glycemic control and reduce hunger and subsequent over-consumption at the next meal.⁷ Inclusion of snacks should be individualized and balanced against the potential for weight gain.¹

For customized meal planning recommendations, individuals with diabetes should be referred to a Registered Dietitian.

Can type 2 diabetes be managed with lifestyle alone?

Type 2 diabetes can be managed through diet and lifestyle changes. According to the *Canadian Diabetes Association Clinical Practice Guidelines*, if blood sugar and/or A1C targets are not achieved within 2 – 3 months of lifestyle management, antihyperglycemic medication should be initiated. *[Grade A, Level 1A evidence]*¹

Healthy Weights

What is a healthy body weight?

Approximately 80 to 90% of individuals with type 2 diabetes are overweight or obese as defined by their BMI.¹ Body mass index (BMI) and waist circumference (WC) are tools used to identify individuals at increased risk of developing health problems because of body weight or shape.

BMI is a calculated value of weight (kg) divided by height (m²). Those with a BMI of 25 or greater are considered to be overweight or obese. BMI ranges that are associated with the lowest risk of morbidity and mortality in adults are 18.5 to 24.9 kg/m² and slightly higher (22 to 29.9 kg/m²) in adult's ≥65 years of age.⁸

Waist circumference is an indirect measure of both subcutaneous and visceral abdominal fat, and can be used to monitor body composition changes. Having excess abdominal fat is an independent predictor of disease risk and mortality. WC cutoff points, established by Health Canada, that are associated with increased risk are ≥102 cm (40 inches) for males and ≥88 cm (35 inches) for females.⁸ Ethnic specific measurements are available as research has indicated the level of disease risk varies between ethnicity.⁹ (Refer to Table 1 below)

Table1. Waist Circumference^{10,11}

Measurement	Country or Ethnic Group	Categorical Cut-off points	
		Men	Women
Waist Circumference	North American	>102 cm	>88 cm
	Europid*, Sub-Saharan African, Eastern Mediterranean, and Middle East (Arab)	≥94 cm	≥80 cm
	South Asian, Chinese (Chinese, Malay, Asian Indian), Japanese, South and Central American	≥90 cm	≥80 cm

*Europid ethnic group can use both European and North American cutoff points to allow better comparisons.

Other lifestyle habits, such as diet, smoking, alcohol intake, physical activity, and certain medical conditions also affect health risk.⁸

For BMI and WC values and classifications, refer to [Nutrition Guideline: Body Measurements](#)

How can an individual achieve a healthier body weight?

A healthy lifestyle is needed to achieve and maintain a healthier weight. A healthy lifestyle includes eating a healthy diet and regular physical activity or exercise, as outlined in these Nutrition Guidelines.

A normal weight, as defined by BMI, may be unrealistic and unattainable weight loss goal for obese individuals to reach due to the total amount of weight loss required. A modest weight loss of 5 to 10% of initial body weight can significantly improve insulin sensitivity, glycemic control, blood pressure (BP) and dyslipidemia. Weight loss goals should focus on lifestyle interventions to achieve and maintain this modest weight loss over a realistic amount of time (e.g. 6 months). Weight loss rate should not exceed 1 to 2 kg/month (1 – 2 pounds per week).¹

Refer to [Nutrition Guideline: Adult Weight Management](#)

Portions

What are appropriate portion sizes?

Individuals with type 2 diabetes often benefit from initial nutrition education regarding appropriate portion sizes to promote weight loss and improve blood sugars. For recommended serving sizes of some common foods, refer to *Eating Well with Canada's Food Guide*. *Eating Well with Canada's Food Guide* is used to promote healthy eating messages and appropriate portion sizes for all Canadians. *Eating Well with Canada's Food Guide* is not a tool for teaching [carbohydrate counting](#), as described in the carbohydrate section, due to the variable carbohydrate content of the food portions in the different food groups.

Some convenient ways to measure food portions are:

- A baseball equals a serving of salad or two servings of grain products (1 cup or 250 mL).
- The size of a hockey puck equals a serving of meat, fish, or poultry (2 ½ ounces or 75 grams).
- Two golf balls equal a serving of dried fruit, nuts, or seeds (¼ cup or 60 mL).
- A golf ball equals a serving of peanut or nut butter (2 Tbsp or 30 mL).
- Two white erasers equals a serving of most cheeses 1 ½ ounces (50 grams).

Using hands are also a strategy for providing guidance about portion sizes:⁷

- Using a fist to guide grain products or fruit serving size.
- Using two handfuls to guide the serving size of vegetables at a meal.
- Using the palm of the hand and thickness of the little finger to guide appropriate serving size for meat, fish or poultry.
- Using the tip of the thumb to guide the serving of added fat to meals.

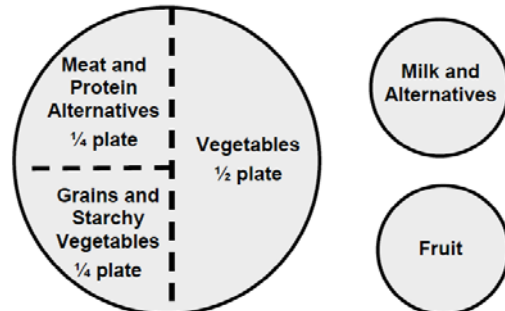
Refer to [Nutrition Guideline: Portion Sizes](#)

What does a healthy meal look like?

A healthy meal will include one food from at least three of the four food groups from *Eating Well with Canada's Food Guide*.³ The diabetes healthy plate shown below identifies that a quarter of the plate should be covered by meat or protein alternative to indicate that these foods are higher in protein rather than carbohydrates.

To build a healthy meal:

- Fill ½ of the plate with Vegetables
- Fill ¼ of the plate with Grains and Starchy Vegetables
- Fill ¼ of the plate with Meat and Protein Alternatives
- have 1 serving of Milk and Alternatives
- have a small fruit on the side (or as snack between meals)



A well balanced meal will help with portion control and meeting recommended servings from the four food groups.³ Larger portions can lead to increased calorie intake and increased body weight.

Refer to *Nutrition Guidelines: [General Healthy Eating for Children and Adults](#); [Planning Healthy Meals and Snacks](#); [Portion Sizes](#); [Label Reading](#)*

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What is a healthy snack?

A healthy snack includes foods from *Eating Well with Canada's Food Guide*. Choosing one to two different food groups at the suggested servings below is recommended. The snack examples listed below equal one serving:

Vegetables and Fruit

- 1 piece of fresh fruit
- ½ cup (125 mL) raw vegetables
- ½ cup (125 mL) unsweetened canned fruit
- 3 dried apricots or prunes

Milk and Alternatives

- 1 cup (250 mL) skim or 1% milk
- ¾ cup (175 mL) plain or sugar-free yogurt
- 1 cup (250 mL) cottage cheese, low-fat and no sodium added
- ½ cup (125 mL) low-fat pudding

Grain Products

- 2 to 3 low fat crackers like Melba toast, Ryvita® or Wasa®
- 1 slice of whole grain bread
- 3 low fat cookies
- ½ cup (125 mL) of a high fibre cereal

Meat and Alternatives

- 2 eggs, hardboiled
- 2 tbsp (30 g) peanut butter
- ¼ cup (60 g) shelled, unsalted nuts or seeds
- 1 small can (85 g) of tuna
- ¾ cup (175 g) hummus

For individualized dietary patterns, people with diabetes should be referred to a Registered Dietitian.

Carbohydrates

What are carbohydrates?

The food we eat is made up of the macronutrients fat, protein and carbohydrates. These macronutrients provide calories to the body. Carbohydrates include sugar, starch and fibre. Both sugar and starch are digested and absorbed into the body as glucose, which provides energy to the brain, muscles, and cells. They are referred to as “available carbohydrate”. Dietary fibre is also carbohydrate, but is an “unavailable” carbohydrate source because it is not metabolized into blood glucose.¹² (See [carbohydrate counting](#).)

It is recommended that carbohydrate should be no less than 130 g and 45% of total calorie intake per day. This minimum carbohydrate promotes a balanced diet that is sufficient in water soluble vitamins, various minerals and prevents high intakes of fat.¹³ [*Grade D, consensus*]¹

Major sources of available carbohydrate include starchy vegetables, fruits, grain products, milk, yogurt, beans, lentils, and sugar (e.g. molasses, honey, and table sugar).

Why is it important to spread out carbohydrate intake over the day?

A variety of carbohydrate foods need to be eaten daily to get enough calories (energy), fibre, vitamins and minerals from the diet. Carbohydrate foods have the most significant effect on raising blood glucose. Since these foods elevate blood glucose levels, it is important to distribute carbohydrate foods evenly throughout the day in meals and snacks. The *Canadian Diabetes Association* recommends that consistency in carbohydrate intake, and spacing and regularity in meal consumption, may help control blood glucose and weight. [*Grade D, Level 4 evidence for type 2 diabetes*]¹

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What is carbohydrate counting?

Counting carbohydrates is a method used by people with diabetes to help manage or anticipate their blood glucose levels after eating. Carbohydrate counting also encourages awareness of the carbohydrate content of meals and snacks and can promote better distribution of intake over the day. Education about carbohydrate counting provided by a Registered Dietitian can encourage dietary patterns that matches carbohydrate intake with lifestyle, diabetes medications and/or insulin. Carbohydrate counting requires an increased level of literacy and numerical skill and therefore may not be appropriate for everyone.

Registered Dietitians, in coordination with a diabetes multidisciplinary team, can help determine individualized insulin to carbohydrate ratios (ICR). The ICR is a tool that helps match the meal insulin dose to the amount of carbohydrate consumed to better manage post meal blood glucose.

Carbohydrate counting allows for individualized diabetes dietary patterns. Education following the *Canadian Diabetes Association Beyond the Basics* “carbohydrate choice” system is often used to introduce the concept of carbohydrate counting.¹⁴ Carbohydrate rich foods are in portions which provide 15 grams of “available” carbohydrate. Available carbohydrate is calculated by subtracting the fibre content of a food portion from the total carbohydrate amount in the food portion.

Below are examples of portions of foods which contain approximately 15 grams of available carbohydrates:

- 1 medium fruit, or 1 cup of fresh fruit
- ¼ cup (60 mL) of dried unsweetened fruit
- ½ cup (125 mL) of unsweetened fruit juice
- ½ cup (125 mL) of pasta, potatoes, yams, couscous, quinoa, barley
- 1/3 cup (80 mL) of rice
- 1 slice of bread
- ½ hot dog or hamburger bun or English muffin
- ¼ of a bagel or ½ of a small bagel
- 1 cup (250 mL) of milk or unsweetened soy beverage
- ¾ cup (175 mL) plain or sugar-free yogurt
- 1 Tbsp (15 mL) of sugar, jam, honey, and syrup

For customized carbohydrate intake recommendations individuals with diabetes should be referred to a Registered Dietitian.

Refer to [Nutrition Guideline: Planning Healthy Meals and Snacks](#)

Fibre and Glycemic Index**How does fibre benefit people with diabetes?**

Fibre is beneficial for the general population because it improves regularity of bowel movements, reduces blood cholesterol levels, helps manage blood glucose and/or insulin levels, and provides a small amount of energy (calories) through fermentation in the colon.¹⁵ Fibre intake recommendations for people with diabetes are higher than for the general population due to the recognized benefits.³

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- Soluble fibre (found in oat bran and oatmeal, psyllium, fruit, dried beans, peas and lentils, and barley) has been shown to lower low density lipoprotein levels. It has also been shown to delay gastric emptying and the absorption of glucose in the small intestine, therefore reducing postprandial glucose concentrations.³
- Insoluble fibre (found in wheat bran, whole grain foods such as whole wheat bread, vegetables, fruits and dried peas, beans and lentils) has been associated with decreased risk of CVD.³

How much fibre is recommended for people with diabetes?

The recommended intake for adult with diabetes is 25 to 50 grams per day from a variety of sources, including soluble and insoluble fibres.¹

Fibre requirements can be met by eating more whole grains, such as whole grain and whole wheat breads and cereals, legumes, vegetables and fruit. This means eating at least the minimum number of *Eating Well with Canada's Food Guide* servings of vegetables and fruits and grain products each day.

Refer to [Nutrition Guideline: Fibre](#)

Should individuals with diabetes choose low glycemic index foods?

Glycemic index (GI) is a scale from 1 to 100 that ranks carbohydrate-rich foods by how much they raise blood glucose levels when compared to a standard food (glucose or white bread).¹⁶ GI is a reflection of the rate carbohydrates are digested and absorbed as glucose following consumption. High GI foods (≥ 70 out of 100) convert quickly with a rapid rise in blood glucose and larger insulin secretion, while low GI foods (≤ 55 out of 100) are converted more slowly and produce a lower blood glucose and insulin response.¹⁷

Choosing low GI foods in place of high GI foods within the same food category is recommended for people with diabetes. [*Grade B, level 2 evidence for both type 1 and type 2 diabetes*]¹

Tips to include the Glycemic Index as part of healthy eating:¹⁶

- Enjoy vegetables, fruits and low fat milk products with meals. These generally have a low GI.
- Plan meals using medium and low GI starchy foods such as the following:
 - Low GI: 100% stone ground whole wheat or heavy mixed grain bread, All Bran® or psyllium cereals, oat bran, barley, bulgur, al dente cooked pasta/noodles, parboiled/converted rice, sweet potato, yam, beans and lentils
 - Medium GI: whole wheat or rye bread, pita, puffed wheat cereal, oatmeal, basmati/brown rice, couscous, new/white potatoes, sweet corn, popcorn, Stoned Wheat Thins® and rye crisps
- Limit intake of foods with a high GI, such as:
 - High GI: white bread and bagels, bran flakes, corn flakes or Rice Krispies® cereals, short-grain rice, Russet potatoes, French fries, pretzels, rice cakes and soda crackers

The decision to teach an individual to use the GI should be based on the individual's interest and ability.¹ Glycemic index is a complex concept as many factors affect the GI of a food and individuals will require additional education to use it successfully.¹⁷ Using the GI to choose foods is only one part of healthy eating; serving sizes must still be monitored even when choosing low GI foods, and nutrition guidelines for overall health followed.¹⁷

For individualized dietary pattern recommendations, people with diabetes should be referred to a Registered Dietitian.

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Which fruits are recommended and which fruits should be avoided for people with diabetes?

All fruit can fit into a healthy meal pattern. Some fruits can be better choices than others based on their GI and the rate in which they will raise blood glucose after consumed.¹ Temperate fruits, such as apples, pears, oranges, peaches, plums, apricots, cherries and berries, have a lower glycemic index when compared to tropical fruits (e.g. pineapple, mango and melons). Portion size of a fruit will also impact blood sugar control.

Refer to [Nutrition Guideline: Vegetable and Fruit Intake](#)

Sugars and Sweeteners

Why should an individual decrease intake of his/her sugar-sweetened foods?

Research shows that intake of sugar-sweetened foods has increased markedly over the past 30 years, some of which may be displacing more nutritious foods in the diet.¹⁸ The World Health Organization advises that individuals should have no more than 10% of their daily caloric intake from added sugar to reduce the risk of chronic disease, such as cardiovascular disease, obesity and diabetes.¹⁹ [*Grade C, level 3 evidence*] Sweetening agents, such as agave nectar, honey and cane sugar, are often viewed as “natural sugars”. Although perceived as natural, they still have similar effect on blood glucose control as other forms of sugar.

Excessive consumption of sugars from sugar-sweetened foods may increase blood glucose and triglyceride levels in some individuals. Sugar-sweetened foods should be limited. Table 2 provides recommended maximum daily allowable amounts of added sugar, either by the person or food manufacture.

Table 2. Maximum Daily Added Sugar Based On Daily Calories

Daily Calorie Goals	Maximum Total Daily Sugars - Added	Teaspoons of Sugar (4g/tsp)
1200 – 1500 kcal	30 – 38 g	7.5 – 9 tsp (37.5 – 45 mL)
1600 – 1800 kcal	40 – 45 g	10 – 11 tsp (50 – 55 mL)
1900 – 2100 kcal	48 – 53 g	12 – 13 tsp (60 – 65 mL)

Naturally occurring fructose obtained from fruit has not shown to have the harmful effects associated added fructose consumption.²⁰

Refer to [Nutrition Guideline: Food and Drinks High in Calories, Fat, Sugar or Salt](#)

Are sweeteners other than sugar safe to include in the diet of individuals with diabetes?

There are many sweeteners, other than sugar, that Health Canada has approved safe for use. Sweeteners go through a vigorous process including safety testing before being deemed safe by Health Canada.²¹ There are two categories of sweeteners; non-nutritive and nutritive sweeteners.^{22,23}

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Non-nutritive sweeteners provide no significant caloric value. Canada approves the use of acesulfame-potassium (ace-K), aspartame, neotame, steviol glycosides and sucralose in food products and as table-top sweeteners. Thaumatin is a newer non-nutritive sweetener that is approved for use in food, but not as a table top sweetener.²² Ingredient lists on food packages must indicate that these sweeteners are in the product.²⁴

Cautions²⁴

- Saccharin is approved for use in specified food products, but can only be sold in pharmacies as a table top sweetener. When sold as a table top sweetener a cautionary statement about not to be used by pregnant women except under the advice of a physician is needed.
- Cyclamate is only permitted as a table top sweetener under specific conditions and must state that it should only be used on the advice of a physician

Table 3. Non-nutritive Sweeteners

Sweetener	Common Name and Brand Name	ADI ²⁴ (mg/kg/day)	Quantity required to reach daily limit* ²³
Acesulfame Potassium	Sunett®	0 – 15†	25 cans of diet soda
Aspartame	Equal®, NutraSweet®	0 – 40†	14 cans of diet soda
Cyclamates	Sucaryl®, SugarTwin®, Sweet 'N Low®	0 – 11†	3 packets of Sugar Twin
Neotame	New to market	0 – 2	n/a
Saccharin	SugarTwin®, Hermesetas	0 – 5†	29 packets
Steviol glycosides	Stevia, Truvia®	0 – 4	10 packets of Truvia
Sucralose	Splenda®	0 – 8.8	51 packets
Thaumatin	n/a	0 – 0.9	n/a

*Quantity based on 70 kg (154 lb) person.

† Acceptable daily intake according to the Joint Expert Committee of Food Additives, United Nations and World Health Organization²⁴

Nutritive sweeteners²⁵ provide a sweet taste and a source of energy from carbohydrates. Nutritive sweeteners include sugars such as table sugar, agave nectar, molasses, honey and corn syrup which provide 4 calories/gram.

Sugar alcohols (polyols) provide an average of 2 calories per gram and have little to no effect on blood glucose. *Matching rapid insulin dose to sugar alcohol content of food is not recommended.* Sugar alcohols should be subtracted from the total carbohydrate amount when counting carbohydrates.¹ Sugar alcohols include sorbitol, mannitol, zylitol, erythritol, D-tagatose, Isomalt, lactitol, maltitol. Consumption of sugar alcohols should be limited to ≤10 grams per day to limit adverse gastrointestinal symptoms in some individuals.¹ Higher doses can result in intestinal discomfort including diarrhea, gas and bloating.

Many foods that state “sugar-free” or “no sugar added” on the label tend to be higher in fat, calories, low in fibre and may still contain carbohydrate. Some individuals with diabetes may eat large quantities of these sweetened foods, believing them to be healthier choices.

Moderation is encouraged when consuming or recommending products sweetened with nutritive or non-nutritive sweeteners, to ensure that they are not replacing more nourishing foods.

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Fats**What is the recommended fat intake for an individual with diabetes?**

The recommendations for total fat intake in people with diabetes are similar to those without diabetes. Dietary patterns should encourage a total fat intake of 20 to 35% of total daily energy intake. [Grade D, consensus]¹

The type of fat consumed is more important for people with diabetes than the total amount due to their increased risk of cardiovascular disease:² [Grade D, consensus]¹

- Include foods rich in polyunsaturated omega-3 fatty acids and plant oils (e.g. fatty fish, walnuts, flaxseed oil and canola oil).
- Choose monounsaturated fats in place of saturated fats.
- Restrict saturated fats to <7% of total daily energy intake.
- Restrict trans fatty acids from industrial hydrogenation to a minimum (e.g. commercially fried foods, bakery products made with shortening, partially hydrogenated oils and fats).

Refer to [Nutrition Guideline: Heart Healthy](#)

How can an individual make healthy fat choices?

Choose heart healthy fats:

- Include a small amount, 2 to 3 tablespoons (30 to 45 mL) of unsaturated fat each day. This includes oil used for cooking, salad dressings, non-hydrogenated margarine and mayonnaise.³
- Choose non-hydrogenated margarines and vegetable oils such as canola, olive, and soybean.
- Limit butter, hard margarine, lard and shortening.³
- Eat fish at least two times each week.³

Tips to lower saturated and trans fat intake:

- Choose lower fat milk products like skim or 1% milk and lower-fat yogurt.
- Choose cheese with less than 20% M.F.
- Limit intake of higher fat dairy products, creams, and ice cream.
- Avoid using lard, shortening and hard margarines.
- Replace hard fats such as butter with non-hydrogenated margarine.
- Choose lean meats, remove visible fat and skin.
- Avoid or limit processed meats like bologna, wieners, bacon, sausages, and pepperoni.
- Replace higher fat meat choices with lean meats and alternatives like chicken and turkey breast, extra lean ground beef and chicken, eggs, legumes (beans, peas and lentils) or tofu.
- Reduce high fat baked goods such as cakes, donuts, cookies and snack foods such as chocolate bars, and chips, and include healthier higher fat foods, such as nuts and seeds, to meals and snacks.
- Prepare food with less fat and avoid deep frying. Bake, broil, steam, grill, sauté, poach or barbecue.

Refer to [Nutrition Guideline: Heart Healthy](#)

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Do individuals with diabetes need to worry about blood cholesterol?

Diabetes is associated with a high risk of vascular disease.¹ Cardiovascular disease (CVD) is the primary cause of death in people with both type 1 and 2 diabetes.¹ Individuals with diabetes should be encouraged to adopt a healthy lifestyle to lower their risk of CVD. This includes adopting healthy eating habits, achieving and maintaining a healthier weight, engaging in regular physical activity and smoking cessation.¹

Achieving a low-density lipoprotein cholesterol (LDL-C) of ≤ 2.0 mmol/L is the primary blood lipid goal for most individuals with diabetes.¹

- To lower blood cholesterol levels it is recommended to limit intake of saturated fat to less than 7% of total calories and to restrict trans-fat intake to a minimum. This can be achieved by following the recommendations in the above [“How can an individual make healthy fat choices?”](#) section.
- Soluble fibre helps to lower LDL by binding to fatty acids in the gastrointestinal tract. It also decreases the amount of cholesterol produced by the liver.²⁶ See [“How does fibre benefit people with diabetes?”](#).
- While lifestyle modification should be encouraged in all individuals with dyslipidemia, most will be unable to achieve the recommended lipid targets without medications.¹

Effective risk reduction requires a multifaceted approach targeting all risk factors including, obesity, hypertension, hyperglycemia, dyslipidemia, microalbuminuria, smoking, sedentary lifestyle and diet.¹

Refer to [Nutrition Guideline: Heart Healthy](#)

Protein**What is the recommended intake of protein for an individual with diabetes?**

The recommendation for dietary protein intake for people with diabetes is no different than for those without diabetes. Usual protein intake typically ranges between 1.0 to 1.5 g protein per kilogram body weight per day.¹ This often represents 15 – 20% of total daily calories coming from protein.

In people with diabetes and chronic kidney disease it is recommended that protein intake be closer to the recommended dietary allowance of 0.8 g/kg/d.¹

Referral to a dietitian is recommended for people with diabetes and chronic kidney disease.

Dietary Patterns**What dietary patterns are recommended for people with diabetes?**

There are several dietary patterns that can support glycemic control and reduce cardiovascular risk in people with diabetes.¹ These dietary patterns have similarities to *Eating Well with Canada's Food Guide* in that they promote the intake of whole grains, vegetables and fruit, and limited saturated fats, sugar and sodium. Most research has focused on Mediterranean and vegetarian dietary patterns in people with type 2 diabetes. The DASH (Dietary Approaches to Stop Hypertension) diet has shown to decrease blood pressure in people both with and without hypertension regardless of sodium level. Studies of the DASH diet in people with diabetes are limited.^{1,27}

What is a Mediterranean diet and what are the advantages for people with diabetes?

The Mediterranean diet is primarily a plant based diet which includes fruits, vegetables and breads, other forms of cereals, potatoes, beans, nuts and seeds. It has a moderate to high intake of olive oil, a low intake of red meats, a low to moderate intake of dairy, fish and poultry and a low to moderate intake of red wine. Water intake and regular physical activity are also important parts of this lifestyle and eating pattern.

A Mediterranean meal pattern has shown to reduce A1C and improve fasting lipid profile.²⁸ [Grade B, level 2 evidence] If a patient is interested in following a Mediterranean meal pattern, consider referring them to a dietitian for further education.

Refer to [Nutrition Guideline: Heart Healthy](#)

What are the advantages of following a vegan or vegetarian diet for people with diabetes?

A vegetarian dietary pattern does not include meat, fish or poultry and emphasizes high consumption of plant-based foods such as vegetables, fruits, nuts, legumes and whole grains. This type of dietary pattern is usually lower in saturated fat than a typical North American diet.

A vegetarian dietary pattern can be equal or more beneficial at promoting weight loss, improving glycemic control and reducing cardiovascular risk compared to diets historically recommended by diabetes associations. [Grade B, level 2 evidence] The improvement in glycemic control in people with type 2 diabetes is mainly due to the decrease in body weight when people follow a low-fat and reduced calorie vegetarian diet.²⁸

Refer patients interested in adopting a vegetarian diet to a dietitian.

Refer to Nutrition Guidelines: [Vegetarian Eating](#), [Heart Healthy](#)

What are the diet recommendations for controlling blood pressure in people with diabetes?

Many individuals with diabetes will develop hypertension, which is a major determinant of both microvascular and cardiovascular complications in individuals with diabetes.¹ Lifestyle interventions to lower blood pressure may include following a DASH dietary pattern. [Grade C, level 2 evidence] DASH dietary pattern emphasizes vegetable, fruits and lower-fat dairy product and emphasizes whole grains, poultry, fish and nuts. The DASH diet is most effective when combined with a lower sodium intake.^{1,29}

A decrease in dietary sodium has shown to decrease blood pressure in both hypertensive and non-hypertensive individuals.^{30,31} It is recommended to limit sodium intake to less than 2300 mg of sodium a day for the general population.^{31,32} This sodium recommendation also applies to individuals with diabetes. In individuals with diabetes and hypertension a sodium restriction of closer to 2000 mg should be considered³³ and implemented on an individual basis.²⁹

Reading food labels can help decrease sodium in the diet. Watch for words such as *salt*, *sodium* or *soda* in the ingredient list. Read the Nutrition Facts table to choose foods with <5% daily value per serving.³²

Diabetes

Applicable to: Nurses, Physicians and Other Health Professionals

Other ways to lower sodium in the diet include:

- Limit intake of processed and packaged foods.
- Avoid salty snack foods.
- Prepare lower sodium foods at home, and eat less restaurant and fast food.
- Eat smaller portion sizes of foods that contain salt.
- Choose a variety of foods that are *low in salt*, *reduced-sodium* or have *no salt added*.
- Avoid using salt in cooking and at the table.

Refer to Nutrition Guidelines: [Sodium](#); [Hypertension](#)

Eating Out

How can restaurant meals be made healthier?

Eating at restaurants more frequently is associated with higher weight and consuming more calories.^{34,35} Food served at restaurants is often higher in fat and sodium, and lower in fibre. Portion sizes are also often larger than what an individual would eat at home.^{34,35}

Tips for making eating out healthier:

- Share meals with someone.
- Avoid fried appetizers, side dishes and entrees.
- Aim for a half plate of vegetables.
- Ask for leftovers to be packed up.
- Don't go out to eat when really hungry.
- Consider a tossed salad with lower fat dressing on the side as a starter course.
- Limit eating out to two times per week or less.
- Limit or avoid intake of beverages with added sugars.
- Check nutrition information online to look for lower calorie choices.

Consider referring an individual with diabetes who eats out regularly to a Registered Dietitian.

Refer to [Nutrition Guideline: Eating Out](#)

Vitamins, Minerals and Natural Health Products

What about vitamin and mineral supplementation for individuals with diabetes?

Most individuals with diabetes can meet their nutrition needs by eating a well-balanced diet as recommended by *Eating Well with Canada's Food Guide*. Routine vitamin and mineral supplementation is not necessary, except for:

- Folic acid and vitamin B₁₂ in women who could become pregnant, are pregnant or are breastfeeding.
- Vitamin D:
 - Children and adults (age 1 – 70 years) should consume 400 IU of supplemental vitamin D per day.
 - Adults over the age of 70 should consume 800 to 1000 IU of supplemental vitamin D every day.
 - Some individuals will require a vitamin D supplement above this amount.³⁶

Diabetes

Applicable to: Nurses, Physicians and Other Health Professionals

Other vitamin and/or mineral supplementation may be recommended in cases where a deficiency, limited dietary intake or special need is identified. Supplements such as meal replacements, specialty bars or formulas designed for diabetes are not needed for good glycemic control.¹

For complete recommendations, refer to Nutrition Guidelines: [Vitamin and Minerals](#); [Calcium and Vitamin D](#)

What about natural health products (NHPs) in the management of diabetes?

Natural health products (NHPs) include all herbal medications and dietary supplements, including minerals, vitamins and other micronutrients. Studies suggest up to 78% of individuals with diabetes use NHPs for various indications.

Some NHPs have shown to lower A1C in trials lasting three months or greater in adults with type 2 diabetes. Most of these trials are small single studies and therefore the NHPs are not recommended due to lack of evidence regarding safety and efficacy. *[Grade D, consensus]*

Individuals with diabetes should be asked if they are using NHPs, as there is the potential for side effects or drug interactions. *[Grade D, consensus]*

Refer to [Nutrition Guideline: Natural Health Products](#)

Alcohol**Can an individual with diabetes drink alcohol?**

The guidelines and precautions regarding alcohol consumption for the general population are the same for people with diabetes.^{1,37}

- 10 standard drinks a week for women, with no more than two standard drinks a day
- 15 standard drinks a week for men, with no more than three standard drinks a day

One standard drink is:

- 12 ounces (341 mL) of beer
- 5 ounces (142 mL) of wine
- 1.5 ounces (43 mL) of distilled spirits

Additional considerations for people with diabetes include:

- Higher intake than recommended may result in an increase in blood pressure and triglycerides, well as an increase in total caloric intake.³¹
- Alcohol contains between 100 and 150 calories per standard drink, which can increase total daily calories significantly.³⁸ The additional calories from the alcohol and potential coinciding drink mixes may lead to weight gain, displace other nutritious foods and add extra sugar to the diet.
- Hypoglycemia can occur anywhere up to 24 hours after drinking alcohol in individuals using insulin or insulin secretagogues.¹
- Individuals with type 1 diabetes should be aware of the risk of morning hypoglycemia if alcohol is consumed 2 to 3 hours after the previous evening meal. *[Grade C, level 3]*

Diabetes

Applicable to: Nurses, Physicians and Other Health Professionals

When consumed with food, moderate amounts of alcohol do not cause hyperglycemia or hypoglycemia, or require modification of the usual meal plan.¹

Guidelines for people with diabetes to follow:³⁹

BEFORE drinking alcohol:

- Eat regular meals, take medication and monitor blood glucose levels frequently.
- Wear diabetes identification such as a Medic Alert® bracelet.
- Ensure someone with the individual knows the signs of hypoglycemia (light-headedness, shakiness, sweating, and drowsiness) and how to treat it so they can help.
- Glucagon (a treatment for low blood glucose) won't work with alcohol in the body. For this reason, make sure that someone knows to call an ambulance if the individual passes out.

WHILE drinking alcohol:

- Eat carbohydrate-rich foods when drinking alcohol.
- Eat extra carbohydrate-rich foods if dancing, playing sports or doing other physical activity.
- Mix drinks with sugar-free mixes and use less alcohol.
- Drink slowly. Make the second drink without alcohol.

AFTER drinking alcohol:

- Inform a responsible individual about alcohol consumption. This individual should look for any signs of hypoglycemia. Delayed low blood glucose can occur anytime up to 24 hours after drinking alcohol.
- Check blood glucose more frequently and before going to bed. Eat a carbohydrate snack if blood glucose is lower than usual.
- Set an alarm to wake up on time the next day for any food, medication or insulin normally taken.
- Do not miss medication or insulin as it can lead to high blood glucose, ketones and diabetic ketoacidosis (DKA)

Physical Activity

Why include physical activity?

Studies have shown decreased mortality in individuals with type 1 and type 2 diabetes who participate in regular physical activity. Being sedentary usually has far greater adverse health consequences than exercise associated risks for most individuals.¹ Regular physical activity has shown to improve glycemic control in people with type 2 diabetes, but not in people with type 1.

Physical activity helps to:

- Increase cardiovascular fitness.¹
- Decrease insulin resistance and improve glycemic control in people with type 2 diabetes.¹
- Improve lipid profile.¹
- Control blood pressure.¹
- Maintain weight loss.¹
- Maintain healthy muscles, bones and joints.⁴⁰
- Relaxation and reduced stress.⁴⁰

What type of physical activity is recommended?

A physical activity program is generally safe for people with diabetes. Before starting a prescribed exercise program, people with diabetes should be evaluated for presence of diabetes complication, cardiovascular concerns and musculoskeletal issues.^{1,41} Both endurance (aerobic) and strength (resistance) exercises are encouraged for people with diabetes.

Endurance (aerobic) activities are activities that increase heart rate and may make an individual breathe a little heavier; such as brisk walking, swimming, dancing, raking leaves and biking. This type of activity needs to last at least 10 minutes in duration for a total of 30 to 60 minutes per day, with a minimum of 150 minutes per week. It is recommended that endurance activities be spread over at least three non consecutive days of the week, with no more than two consecutive days without exercise.¹

Strength (resistance) activities are activities that use muscles to move a weight or lift or push something heavy, such as weight-lifting or using weight machines. These should be done at least 2 to 3 times per week. Initial instruction and periodic supervision by an exercise specialist is recommended for this type of activity.^{1,42}

Supervised exercise programs involving both aerobic or resistance exercise tend to have better outcomes in individuals with type 2 diabetes.¹

How does physical activity affect blood glucose control?

Physical activity or exercise has varying effects on blood glucose control. Typically, exercise increases glucose uptake by the muscles and insulin sensitivity. As a result, most exercise will result in a decrease in blood glucose. Therefore individuals managing their diabetes with medication and/or insulin require education about preventing hypoglycemia.¹

Physical activity that includes brief and very intense bouts of exercise (such as competitive track, hockey and intense resistance training) can cause a rise in blood glucose during or after the exercise.¹ This problem is more common in people with type 1 diabetes.

Strategies to optimize glycemic control during and after exercise will include increased frequency in blood glucose monitoring, medication/insulin adjustments and carbohydrate supplementation.¹

Low Blood Sugars

What is a low blood sugar?

A low blood sugar or hypoglycemia is defined as a blood glucose under 4.0 mmol/L or the presence of autonomic or neuroglycopenic symptoms.¹ People who are able to self-treat while experiencing exclusively autonomic, or a combination of autonomic and neuroglycopenic symptoms, are considered to have mild or moderate hypoglycemia respectively. If the individual requires assistance of another person, they are considered to be experiencing severe hypoglycemia.

Diabetes

Applicable to: Nurses, Physicians and Other Health Professionals

Autonomic symptoms:¹

- trembling
- palpitations
- sweating
- anxiety
- hunger
- nausea
- tingling

Neuroglycopenic symptoms:¹

- difficulty concentrating
- confusion
- weakness
- drowsiness
- vision changes
- difficulty speaking
- headache
- dizziness

Individuals taking insulin or antihyperglycemic agents that have a risk of hypoglycemia should be taught the symptoms, risk, prevention measures and appropriate treatment of hypoglycemia.¹

How should a person with diabetes treat a low blood sugar?

Treatment of mild to moderate hypoglycemia should consist of 15 g of rapidly absorbed carbohydrate.

Examples of 15 g of rapidly absorbed carbohydrate include:

- 15 g of glucose (glucose tablets)
- 175 mL (3/4 cup) regular pop
- 15 mL (1 Tbsp) honey
- 15 mL (1 Tbsp) sugar dissolved in water
- 175 mL (3/4 cup) fruit juice
- 6 Lifesavers (chewed)

Overtreatment should be avoided due to risk of rebound hyperglycemia and weight gain.¹ Blood glucose should be measured prior to treatment and re-measured 15 minutes after initial treatment of hypoglycemia. If blood glucose remains below 4.0 mmol/L, re-treatment with another 15 g carbohydrate dose is recommended.¹ Once blood glucose levels are within target, the individual should have the next routine meal, if that meal is planned within in one hour. If the next meal is not within one hour, a snack consisting of 15 g carbohydrate and protein should be consumed to prevent recurrent hypoglycemia.¹

Snack examples consisting of approximately 15 g carbohydrate and protein:

- ½ meat sandwich
- 1 slice of toast and peanut butter
- 1 medium apple and ¼ cup nuts
- 7 soda crackers or 3 – 6 (30 g) crackers and 1 ounce lower-fat cheese

Treatment of severe hypoglycemia in a conscious individual will require a higher dose of carbohydrate (e.g. 20 g), preferably as glucose (e.g. glucose tablets). Blood glucose should be tested every 15 minutes, and re-treated with 15 g of glucose for as long as the blood glucose remains below 4.0 mmol/L. Education about the use of glucagon should be provided to support people of those at risk of having severe hypoglycemia. [*Grade D, consensus*]¹

Sick Day Management

How can individuals manage their diabetes during illness?

Illnesses, such as a cold, flu or infection, put stress on the body. The most common reaction to stress is a rise in the blood glucose levels due to a release of hormones that help the body fight disease. If high blood glucose levels are not properly managed during illness diabetic ketoacidosis or hyperosmolar hyperglycemic state can result.¹

Sick day guidelines:⁴³

- Patients who are experiencing vomiting or diarrhea and are at risk of dehydration should consult with their doctors regarding their medications as it is recommended to hold or reduce the dose of some medications in these situations.⁴⁴
- Check and record blood glucose levels every 3 to 4 hours, or more if they are rising quickly.
- For type 1 diabetes, check for ketones if blood sugar is above 14 mmol/L. If ketones are present patients should consult with their doctor or diabetes educator.
- Check body temperature four times a day.
- Continue following usual meal plan, if able. If not, follow the guidelines below.

When an individual is sick and not able to follow usual eating patterns:

- Drink plenty of calorie-free fluids to prevent dehydration.
- Eat food or drink liquids containing carbohydrates (see Table 4) as needed to prevent low blood glucose.
- Avoid caffeinated liquids.

When an individual needs to follow a clear fluid diet:

- Drink calorie-free clear fluids throughout the day.
- Replace carbohydrate choices in meals and snacks with clear fluid choices that contain carbohydrate.

Table 4. Sick Day Food and Drink List

Examples of carbohydrate choices that have 15 grams of carbohydrate:		Calorie-Free Fluids
Foods	Fluids	
<ul style="list-style-type: none"> • 1 Tbsp (15 mL) sugar or honey • 3 graham wafers • 7 soda crackers or multigrain melba toasts • 1 slice of dry toast 	<ul style="list-style-type: none"> • 1 cup (250 mL) soup • ¾ cup (175 mL) cooked cereal • ½ cup (125 mL) ice cream • ½ cup (125 mL) regular Jell-O®* • 1 popsicle* • ½ cup (125 mL) pudding • ⅓ cup (75 mL) sherbet • ¾ cup (175 mL) diet fruit-flavoured yogurt • 1 cup (250 mL) milk • ½ cup (125 mL) unsweetened fruit juice (apple, cranberry, grape)* • ¾ cup (175 mL) regular pop* • 1 cup (250 mL) sports drink* (Gatorade® or PowerAde®) • ½ cup (125 mL) nutritional supplement like Boost® or Ensure® • ½ cup (125 mL) Glucerna® • ⅔ cup (150 mL) Resource® Diabetic* • 1 bottle (237 mL) Boost® Diabetic 	<ul style="list-style-type: none"> • Water* • Broth or bouillion* • Diet popsicles* • Sugar-free soft drinks or club soda* • Sugar-free Jell-O®* • Clear tea or coffee*

* Indicates clear fluids.

Resources

Are there any handouts on diabetes I can use with my patients?

Options to obtain more information on nutrition and diabetes include:

- Consult with a dietitian in your area.
- Refer to approved provincial Alberta Health Services diabetes nutrition handouts to support patient education. For more information, contact Nutrition.Resources@albertahealthservices.ca
- Refer to the Canadian Diabetes Association website at www.diabetes.ca

Internet Resources

- Dietitians of Canada: www.dietitians.ca
- Eating Well with Canada's Food Guide: www.healthcanada.gc.ca/foodguide
- Glycemic Index: www.glycemicindex.com
- Canadian Diabetes Association: www.diabetes.ca
- Canadian Physical Activity Guidelines: www.csep.ca/guidelines

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