A man with grey hair and a beard, wearing a grey t-shirt and blue jeans, is riding a black mountain bike on a paved path. He is smiling and looking towards the camera. The background is blurred, suggesting motion.

exercise

DIABETES

Education Guide

A woman with curly brown hair, wearing an orange cardigan over a pink top, is sitting at a table. She is smiling and holding a fork over a bowl of cereal with fruit. She is also holding a book titled "The Diabetes Education Guide is designed to help you live a Max Life". A blue coffee cup sits on the table next to her.

nutrition

wellness

This Diabetes Education Guide is brought to you by:

nova
Diabetes Care

Recommended Exams for People Living with Diabetes*

Write your RESULTS here

Visit 1 Visit 2 Visit 3 Visit 4

every visit	Review Blood Glucose Records	Date				
	ADA GOAL: Pre-meals 70 - 130 mg/dL ADA GOAL: 2hrs after meals < 180 mg/dL	Value	pre-meal	pre-meal	pre-meal	pre-meal
Blood Pressure	Date					
	ADA GOAL: Sys < 130 / Dia < 80 mmHg	Value	post-meal	post-meal	post-meal	post-meal
Weight	Date					
	GOAL: Body Mass Index < 25	Value				
2-4 times per year	HbA1c	Date				
	Blood test to measure past 3 months of blood glucose levels ADA GOAL: < 7.0%	Value				
Cholesterol	Date					
	(every 1-2 years based on risk)	Value				
Triglycerides	Date					
	(every 1-2 years based on risk) ADA GOAL: < 150 mg/dL	Value				
HDL and LDL	Date					
	(every 1-2 years based on risk) HDL Men > 40 mg/dL Women > 50 mg/dL LDL < 100 mg/dL	Value	HDL	HDL	HDL	HDL
once a year	Serum Creatinine	Date				
	Blood kidney test	Value				
Microalbuminuria	Date					
	Urine kidney test, ADA GOAL: < 30 mg	Value				
Foot Exam	Date					
	(thorough exam annually & visual exam every visit)	Value				
Dilated Eye Exam	Date					
	Value					

1-800-681-7390*
www.novadiabetescare.com

*Consult your physician for individual healthcare recommendations. Pregnant women and parents of children should ask for information specific to their special needs.

Reference: American Diabetes Association: Clinical Practice Recommendations 2008, Diabetes Care, volume 31, Supplement 1, January 2008, S16-35.

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This personal healthcare record is based on recommendations of the American Diabetes Association's Clinical Practice Guidelines and is not exhaustive of all records you may need. Only your physician can recommend your personal healthcare guidelines. We encourage you to work closely with your physician in the development of your personal plan of care. *not for emergency or medical information.

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What is diabetes?

Diabetes is a condition that occurs when glucose (sugar) builds up in the blood. When this happens, the body is not able to use the glucose for energy. This occurs when the insulin does not work right.

Think of diabetes as an “insulin problem” and not a “sugar problem.”

When you do not have diabetes, food enters the stomach and turns into glucose. When there is glucose in the blood, a hormone called insulin is released. The glucose needs to get into your body’s cells to give you energy. But glucose can’t get into the cells without help. Insulin helps by working like a key. It unlocks the cell doors and allows glucose to enter the cell. Once the glucose enters the cell, it is used for energy or stored for later use.

With diabetes, the pancreas, an organ near the stomach, may not make any insulin or not enough insulin. Sometimes, the body is unable to use the insulin it does make. So the glucose remains in the bloodstream. This causes the blood sugar levels to rise too high.

Insulin



Glucose



Without Diabetes

CELL



With Diabetes

Types of diabetes

Type 1

Type 1 diabetes used to be known as insulin dependent diabetes mellitus (IDDM) or juvenile diabetes. Only 5-10%¹ of people who have diabetes have type 1. With type 1 diabetes, the body attacks its own insulin making cells. This means that the pancreas can no longer make insulin.

Type 1 usually occurs in a child, teenager or young adult, but it can occur in older adults too. People with type 1 diabetes need to take insulin daily for life, to control their blood sugar levels.

Type 2

Type 2 diabetes was called non-insulin dependent diabetes mellitus (NIDDM) or adult onset diabetes in the past. It occurs in 90-95%² of all people with diabetes. With type 2 diabetes, the body makes insulin but it may not make enough. Sometimes the insulin doesn't work as it should. Type 2 is often called adult-onset diabetes, but a growing number of children and teens now have type 2 diabetes.

Risk factors for type 2 diabetes include:

- Older age
- Obesity
- Family history of diabetes
- History of gestational diabetes
- Impaired glucose tolerance
- Physical inactivity
- Race/ethnicity

(African Americans, Hispanic/Latino Americans, American Indians, and some Asian Americans and Pacific Islanders are at particularly high risk for type 2 diabetes.)

¹ Diabetes Care, Volume 33, Supplement 1, January 2010, S62

² Diabetes Care, Volume 33, Supplement 1, January 2010, S63

Gestational

Gestational diabetes is a type of diabetes that occurs during pregnancy. About 7% of pregnant women will develop gestational diabetes¹. If not treated, it can cause problems for mothers and babies. One-third of women who had gestational diabetes will go on to have type 2 diabetes later in life.

Pre-Diabetes (Increased risk for diabetes)

Pre-diabetes is the stage that occurs before a person gets type 2 diabetes. Blood sugar levels are higher than normal, but they are not high enough to be diagnosed with diabetes. Over 79 million Americans have pre-diabetes².

Other

Other types of diabetes may result from a specific illness, surgery, drugs, poor nutrition, infections and other factors.



There are many types of diabetes which can affect people at any age.

¹ Diabetes Care, Volume 33, Supplement 1, January 2010, S15

² <http://www.diabetes.org/diabetes-basics/diabetes-statistics/> Accessed 7/21/2011

How do I know I have diabetes?

The common signs of diabetes are:

- Feeling tired
- Urinating often
- Being very thirsty
- Feeling very hungry
- Having blurry vision
- Having an infection that does not go away
- Having wounds or sores that do not heal well
- Possible weight loss

Ways to Diagnose Diabetes

If your health care provider thinks you may have diabetes, there are some blood tests to find out for sure.

- 1. Fasting blood sugar.** For this test, you should not have eaten for 8-10 hours. A person without diabetes will have a fasting blood sugar between 70-100mg/dL. A person with pre-diabetes will have a fasting blood sugar between 100-125mg/dL. And a person with diabetes will have a fasting blood sugar of 126mg/dL or greater.
- 2. Oral Glucose Tolerance Test (OGTT).** This test measures your body's response to sugar. You are given a drink with a very high amount of sugar. Then your blood sugar levels are tested every 60 minutes for up to three hours. The 2 hour reading is often used to diagnose diabetes.
- 3. Random blood sugar.** A random blood sugar test measures your blood sugar at any point in time. It can be after you eat, in the middle of the day or in the evening.
- 4. Hemoglobin A1c (A1c).** A Hemoglobin A1c test measures average blood sugar levels over a period of up to 3 months.

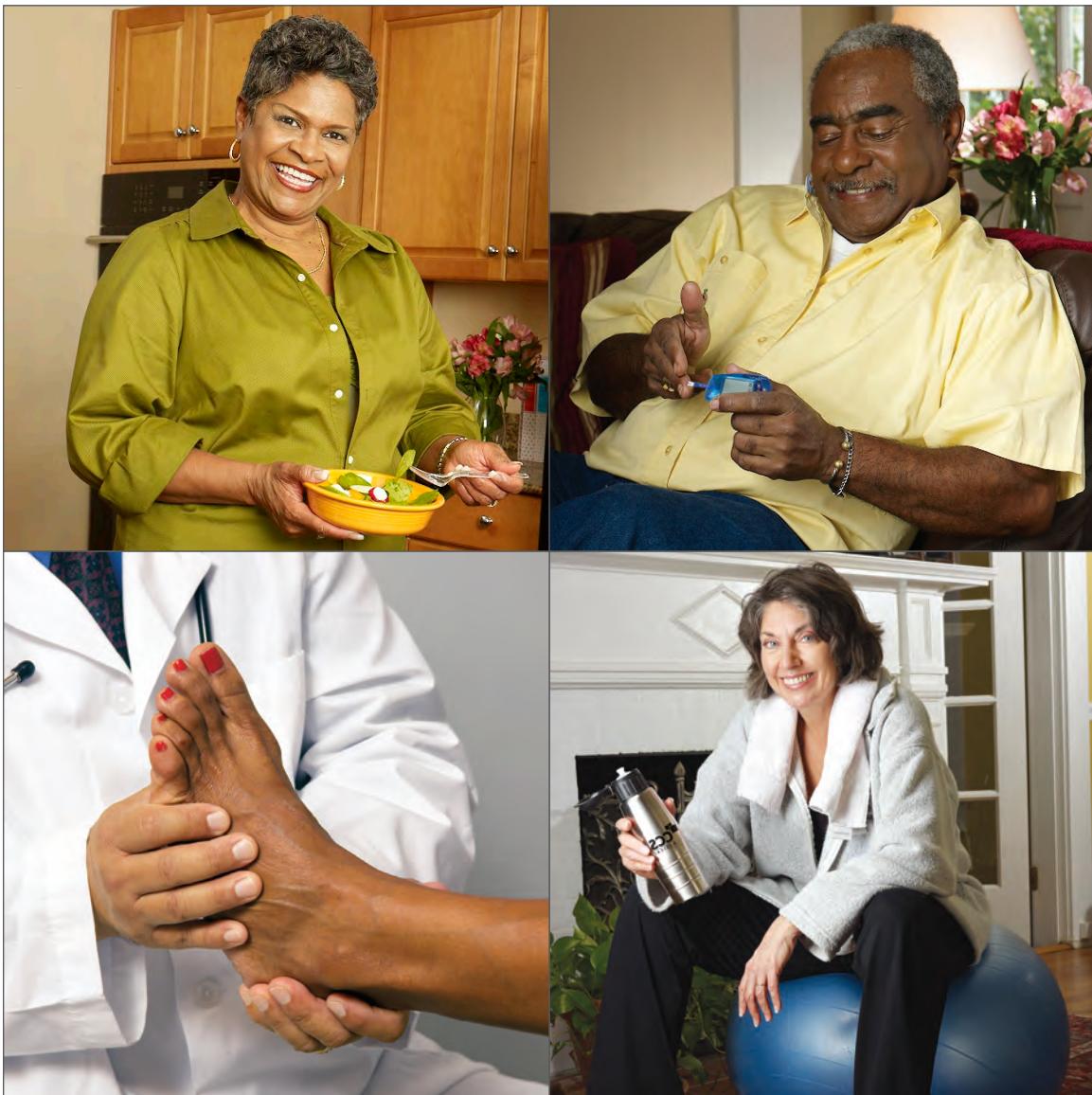
Blood Test	Without Diabetes	With Pre-Diabetes (Increased risk)	With Diabetes
Fasting Blood Sugar	Less than 100mg/dL	100-125mg/dL	126mg/dL or greater
Oral Glucose Tolerance Test (OGTT)	Less than 140mg/dL after 2 hours	Between 140-199mg/dL after 2 hours	200mg/dL or greater, after 2 hours
Random Blood Sugar	Less than 140mg/dL	Between 140-199 mg/dL	200mg/dL or greater
Hemoglobin A1C	Less than 5.7%	Between 5.7%-6.4%	6.5% or greater

Reference: *Diabetes Care*, Volume 33, Supplement 1, January 2010, S13.

How to Manage Diabetes

Whether you have type 1 or type 2 diabetes, managing diabetes is a balancing act. You need to balance food, exercise, medication and stress. It is vital to check your blood sugar levels to know how well you are managing your diabetes.

- Follow a meal plan that allows you to keep a healthy weight.
Watch portion sizes. Eat meals at regular times. Eat the right kinds of food.
- Exercise often.
- Take medicine as directed (if needed).
- Check your blood sugar regularly.

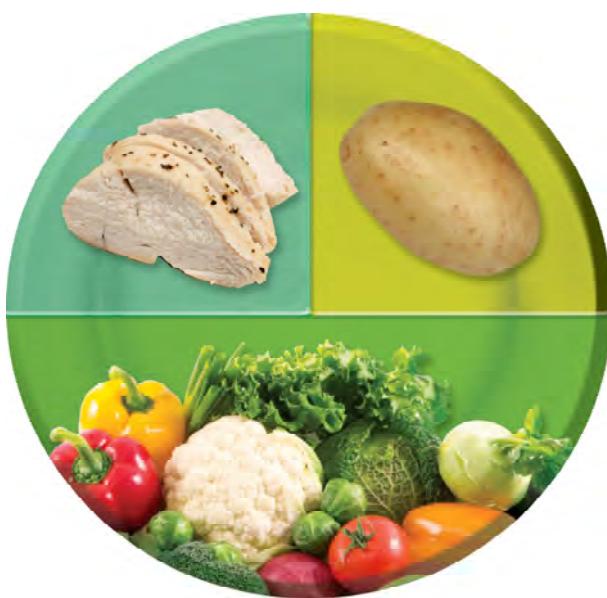


Diabetes and healthy eating

One of the most important ways to manage your diabetes is by eating the right foods in the right amounts. Learning how to plan meals and snacks plus knowing when to eat is also important. A Registered Dietitian or Certified Diabetes Educator can help you get started with your meal planning.

Some basic guidelines to follow are:

- **Do not skip meals.**
 - Eat when you are hungry. Stop when you are satisfied.
- **Eat meals and snacks at regular times every day.**
 - Eat three balanced meals a day, plus snacks.
 - Spread meals out over the day.
- **Eat a variety of foods.**
 - Add lots of color to meals with fresh fruits and vegetables.
 - Enjoy plenty of whole grains.
- **Make sure you get enough fiber every day.**
- **Watch portion sizes.**
- **Slow down and enjoy the flavor of each bite of food.**
- **Plan your meals.**



The USDA's Food Plate gives you an idea of how many servings of each food group to eat. If you have been instructed to reference the Exchange Lists for Diabetes, you should note that the guidelines for the fruit and vegetable groups on the USDA's Food Plate differ from the guidelines recommended in the Exchange Lists for Diabetes. Ask your dietitian or diabetes educator how to use the new plate to meet your own needs.

Major Nutrients in Food

Food contains three major nutrients. These are:

- Carbohydrate
- Protein
- Fat

Carbohydrates

Most of the carbohydrates we eat are in the form of starch or sugar.

Carbohydrates are the body's main energy source. Carbohydrates increase blood sugar the most. Almost 100% of carbohydrates are absorbed as sugar or glucose. On average, 50% of calories each day come from carbohydrates. Carbohydrates are measured in grams. Gram for gram, all types of carbohydrates have about the same effect on blood sugar levels.

Starchy Vegetables: 1 choice = 15 grams of carbohydrate and 80 calories	
Corn	½ cup
Corn on cob	½ cob (5 oz.)
Peas, green	½ cup
Potato, baked with skin	¼ large (3 oz.)
Potato, boiled, all kinds	½ cup or ½ medium (3 oz.)
 Potato, mashed with milk and fat	½ cup
Potato, french fried (oven-baked)	1 cup (2 oz.)
Squash, winter (acorn, butternut)	1 cup
Yam, sweet potato, plain	½ cup
Bread: 1 choice = 15 grams of carbohydrate and 80 calories	
Bagel (about 4 oz.)	¼ (1 oz.)
 Biscuit	1 (2½" across)
White, whole-grain	1 slice (1 oz.)
 Corn bread	1 - 1¾" cube (1½ oz.)
English muffin	½
Hot dog or Hamburger bun	½ (1 oz.)
Pancake	1 (4" across, ¼" thick)
Pita	½ (6" across)
Tortilla, corn or flour	1 (6" across)
Waffle	1 (4" square or across)

 = More than 3 grams of dietary fiber per serving

 = Extra fat, or prepared with added fat. Count as 1 starch + 1 fat

Snacks: 1 choice = 15 grams of carbohydrate and 80 calories	
Popcorn, with butter	3 cups
Popcorn, no fat added	3 cups
Popcorn, lower fat	3 cups
Pretzels	¾ oz.
Rice cakes	2 (4" across)
Snack chips: fat-free or baked tortilla, potato, baked pita chips	15-20 (¾ oz.)
Cereals and Grains: 1 choice = 15 grams of carbohydrate and 80 calories	
Cooked oats, oatmeal, grits	½ cup
Puffed cereal	1½ cups
Shredded wheat, plain	½ cup
Sugar-coated cereal	½ cup
Unsweetened, ready-to-eat cereal	¾ cup
Pasta, cooked	1/3 cup
Rice, white or brown, cooked	1/3 cup
Crackers: 1 choice = 15 grams of carbohydrate and 80 calories	
Animal crackers	8
Round-butter type	6
Saltine-type	6
Whole wheat regular	2-5 (¾ oz.)
Whole wheat low-fat	2-5 (¾ oz.)
Graham cracker	3 (2½" square)
Fruit: 1 choice = 15 grams of carbohydrate and 60 calories	
Apple, unpeeled, small	1 (4 oz.)
Banana, extra small	1 (4 oz.)
Canned fruit, unsweetened	½ cup
Cantaloupe or Honeydew	1/3 melon or 1 cup cubed
Dried fruit	2 Tbsp
Grapefruit, large	½ (11 oz.)
Grapes	17 (3 oz.)
Kiwi	1 (3½ oz.)
Orange, small	1 (6½ oz.)
Peach, fresh, medium	1 (6 oz.)

Fruit Juice: 1 Choice = 15 grams of carbohydrate and 60 calories	
Apple juice/cider	1/2 cup
Grape or prune juice	1/3 cup
Orange or grapefruit juice	1/2 cup
Milk: 1 Choice = 12 grams of carbohydrate and 100-160 calories	
Fat-free or low-fat (1%) milk, buttermilk, Lactaid®	1 cup
Fat-free or low-fat (1%) yogurt, plain or flavored with artificial sweetener	2/3 cup (6 oz.)
Reduced-fat (2%) milk	1 cup
Reduced-fat (2%) yogurt, plain	2/3 cup (6 oz.)
Whole milk, buttermilk	1 cup
Whole milk yogurt, plain	8 oz.
Other Carbohydrates: 1 choice = 15 grams of carbohydrate and 80-150 calories	
 Brownie, small, unfrosted	1 1/4" square
 Vanilla wafer	5
 Cake, no icing	2" square
 Sugar-free pudding	1/2 cup
Gelatin, regular	1/2 cup
Yogurt, frozen, fat-free	1/3 cup
 Ice cream, no sugar added	1/2 cup
Pancake syrup, light	2 Tbsp
 Trail mix, dried fruit base	1 oz.
Fruit juice bars, frozen	1 bar (3 oz.)
Non starchy Vegetables: 1 choice = 5 grams of carbohydrate and 25 calories 1 serving size = 1/2 cup of cooked vegetables or 1 cup of raw vegetables	
Artichoke	Broccoli
 Carrots	Cucumber
Spinach	Asparagus
Cabbage	 Brussels sprouts
Cauliflower	Eggplant
Mustard greens	Tomato
Summer squash	Water chestnuts
Beans (green, wax, Italian)	Peppers
Mushrooms	Zucchini

 = More than 3 grams of dietary fiber per serving

 = Extra fat, or prepared with added fat. Count as 1 starch + 1 fat

Carbohydrate counting

Carbohydrate counting is a meal planning method. This method is based on how many grams of carbohydrate you eat at each meal. It focuses on foods that increase blood sugar the most. This allows you to be flexible and enjoy carbohydrates throughout the day. The total number of carbohydrates eaten at every meal is based on your activity level, height and current weight.

Steps in carbohydrate counting

1. Identify foods that have carbohydrates

- Know what a carbohydrate serving is (see previous lists)
- One serving or choice = 15 grams of carbohydrate
- Examples of a carbohydrate serving or choice:
 - 1 slice of bread (1 ounce) • $\frac{1}{3}$ cup pasta
 - 1 small piece of fruit • 1 cup milk

2. Decide how many servings you will eat each day

3. Spread your carbohydrate servings over the entire day

4. Check your blood sugar two hours after the start of a meal

If your blood sugar is greater than 180mg/dL, you may need to adjust your carbohydrate intake at that meal.

Carbohydrate needs vary for each person. A Registered Dietitian or Certified Diabetes Educator can determine how many carbohydrate grams are right for you.

Counting carbohydrate servings

Grams of carbohydrate	How to count
0 - 5 grams	Do not count
6 - 10 grams	Counts as $\frac{1}{2}$ carbohydrate serving or choice
11 - 20 grams	Counts as 1 carbohydrate serving or choice
21 - 25 grams	Counts as $1\frac{1}{2}$ carbohydrate servings or choices
26 - 35 grams	Counts as 2 carbohydrate servings or choices

Protein

Protein is broken down into amino acids. Amino acids are used to repair and replace body tissues. Protein has much less effect on your blood sugar levels than carbohydrates. It does not easily turn into glucose.

Protein is found primarily in meat, fish, poultry, eggs, cheese, milk, nuts and dried beans. It is recommended that you eat 2-3 servings per day. You should select lean meats, chicken (white meat, without skin), low-fat or fat-free cheese and beans.

Meat and Meat Substitutes:			
Meat (1 ounce)		Meat Substitutes	
Beef	Turkey	Cottage cheese	1/4 cup
Chicken	Pork	Cheese	1 oz.
Fish	Salmon	Egg	1
Hot dog	Shellfish	Tofu	1/2 cup
Lamb	Tuna	Peanut butter, almond butter	1 Tbsp

Plant-Based Proteins: Count as 1 Meat and 1 Starch or 1 Carbohydrate Choice			
 Baked beans	1/2 cup	 Lentils	1/2 cup
 Beans, cooked: (black, lima, pinto)	1/2 cup	 Black-eyed peas	1/2 cup
		 Split peas	1/2 cup
 Hummus	1/3 cup	 Refried beans	1/2 cup

 = More than 3 grams of dietary fiber per serving

Fat

A small amount of fat in the diet is necessary to maintain good health. However, most of us consume more fat than we need. Too much fat increases your risk for heart disease. It can also cause weight gain and obesity. There are different types of fat. Some fats are healthier than others.

Foods with fat include:

- Butter, margarine, oil
- Whole milk and cheese
- Fried foods
- Salad dressing, mayonnaise, sour cream
- Nuts
- High fat meats
(bacon, hot dogs, processed lunch meat, etc.)

Saturated Fat

- Found mainly in animal products
- Solid at room temperature
- This type of fat increases your risk for heart disease and increases your cholesterol levels
- Less than 10% of your daily calories should come from saturated fat
- Foods high in saturated fat include: high-fat red meats, bacon, sausage, butter, whole milk and cheese, coconut and palm oil

Unsaturated Fat

- Found mainly in plant products
- Liquid at room temperature
- May help lower your blood cholesterol
- Polyunsaturated (good fats)
 - Corn, safflower, sunflower, soybean, and sesame oils
 - Omega-3 fatty acid is a polyunsaturated fat found in soybean and canola oils, high-fat fish, flaxseed and walnuts.
- Monounsaturated (best fat because they may raise “good” cholesterol)
 - Canola, olive and peanut oils
 - Avocados and nuts
 - Fish

Trans Fat (hydrogenated fat)

- Made when hydrogen is added to vegetable oils
- Raises your cholesterol (even more than saturated fats)
- Found in commercially baked goods, stick margarines, fried food and other processed foods

Cholesterol

- Most cholesterol is made by the body
- Only animal products contain cholesterol, such as meats, milk and cheese

Fats: 1 choice = 0 grams of carbohydrate, 5 grams of fat and 45 calories	
Unsaturated Fats – Monounsaturated Fats	
Avocado, medium	2 Tbsp
Peanut Butter (<i>trans</i> fat-free)	1½ tsp
Nuts - almonds, cashews, mixed (50% peanuts)	6 nuts
Oil – canola, olive, peanut	1 tsp
Olives- black (ripe)	8 large
Olives – green, stuffed	10 large
Polyunsaturated Fats	
Margarine, lower-fat spread, (<i>trans</i> fat-free)	1 Tbsp
Margarine, stick, tub (<i>trans</i> fat-free)	1 tsp
Mayonnaise, regular	1 tsp
Mayonnaise, reduced-fat	1 Tbsp
Oil: corn, soybean, safflower	1 tsp
 Salad dressing, regular	1 Tbsp
 Salad dressing, reduced-fat	2 Tbsp
Saturated Fats	
Butter, reduced-fat	1 Tbsp
Butter, stick	1 tsp
Cream, half and half	2 Tbsp
Cream, whipped, pressurized	¼ cup
Cream cheese, reduced-fat	1½ Tbsp
Shortening, solid	1 tsp
Sour cream, regular	2 Tbsp
Sour cream, reduced-fat or light	3 Tbsp

 = 480 milligrams or more of sodium per serving

Daily Calories from Fat and Cholesterol

- Total fat intake should be 25–35% of your total calories each day¹.
 - Saturated fat intake should be less than 10% of total daily calories. Aim for less than 7%².
 - Avoid *trans* fats.
 - Remaining fat intake should come from monounsaturated and polyunsaturated fats such as nuts, seeds, fish and vegetable oils.
- Cholesterol intake should be less than 300mg per day³.

Example of Daily Fat Grams

Calories	Total Fat Grams (30%)	Saturated Fat (less than 10%)	Poly and Mono- Unsaturated Fats
1200	40 g	Less than 13 g	27 g
1500	50 g	Less than 16 g	34 g
2000	65 g	Less than 22 g	43 g

Fat Tips:

- Choose a diet high in fruits, vegetables, whole grains and fat-free or low-fat dairy
- Bake, broil, grill or steam rather than fry foods
- Select monounsaturated and polyunsaturated fats
- Use liquid oils rather than solid spreads
 - Cook with olive oil rather than butter
 - If soft margarines are used, look for “0 g *trans* fat” on label
- Avoid fried foods
- Limit store-bought, ready-made baked goods
- Include baked, broiled or grilled fish, two or more times each week.
- Select lean meats and poultry
- Remove skin from poultry

^{1, 2, 3} www.americanheart.org/presenter.jhtml?identifier=4764. Accessed 6/7/10

How much should I eat?

Controlling Portions

When you have diabetes, eating the proper portions of foods is just as important as taking the proper dose of your pills or insulin. If your portions are too large, your blood sugar may go higher than it should. You may also take in too many calories and gain weight. If your portions are too small, you may not have the proper balance between food, pills or insulin and your blood sugar may drop too low.

If you are in a situation where you cannot weigh or measure foods, the suggestions in this chart may be helpful:

Portion Sizes

SERVING

1 oz. = 1 thumb



3 oz. = size of a deck of cards



1 cup = a fist



1 tsp = a thumb tip



$\frac{1}{4}$ cup = a golf ball



2 Tbsp = a large marshmallow



1 oz. = 4 dice

Important Things to Remember

- Everyone with diabetes should have a meal plan. Your doctor, dietitian or diabetes educator can help you develop a meal plan that works for you.
- Schedule your meals and snacks into your day the way you would schedule important appointments. Try not to let anything interfere with your meal “appointments.”
- Practice weighing and measuring foods so you develop a trained eye for portion size.
- Food portions should be large enough to satisfy you, but not so large they cause you to feel overly full.
- Meals should be approximately the same size and spread evenly throughout the day.
- Meals should include a variety of foods from all of the food groups.

Reading a food label

The type and amount of foods you eat affects how high and how fast your blood sugar goes up. Knowing how to read food labels can help you manage your diabetes.

The ‘Nutrition Facts’ section of the food label contains important information. A person with diabetes should look at:

Serving size

The food label will tell you the amount of calories and nutrients in a single serving of that food. This serving size may be less than what you usually eat.

Calories

This tells you how many calories are in a single serving.

Fat

The label breaks fat down into types of fat. A good guideline is to select foods with three grams of fat or less per every 100 calories. Also, avoid foods with *trans* fats.

Cholesterol

Eating foods with cholesterol can put you at a higher risk for heart disease. You should have no more than 300mg per day.

Nutrition Facts			
Serving Size 1 cup (228g) Servings Per Container 2			
Amount Per Serving			
Calories 270	Calories from fat 126	% Daily Value*	
Total Fat 14g	21%		
Saturated Fat 4g	20%		
Trans Fat 1g			
Cholesterol 28mg	9%		
Sodium 650mg	27%		
Total Carbohydrate 30g	10%		
Dietary Fiber 9g	36%		
Sugar 6g			
Sugar Alcohol 5g			
Protein 5g			
Vitamin A 4% • Vitamin C 2%			
Calcium 15% • Iron 4%			
* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.			
Calories	2,000	2,500	
Total Fat	Less than	65g	80g
Sat. Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g
Calories per gram: Fat 9 • Carbohydrate 4 • Protein 4			

Sodium

The recommended daily limit is 2,300 mg¹. However, a good rule is to choose foods with 400mg or less per single serving, or 800mg or less if the package is an entire meal.

Carbohydrate

This includes added sugars and carbohydrates found naturally in the food.

The amount of sugar in a serving of food is not as important as the amount of total carbohydrates. That is because carbohydrates turn into glucose after a food is digested. Carbohydrates elevate blood sugar. This is why knowing the amount of carbohydrates in a food is important. One serving of carbohydrate equals 15 grams.

Fiber

Fiber is a form of carbohydrate that cannot be broken down during digestion. We should eat 25-30 grams of fiber per day².

Important Things to Remember

- Everyone with diabetes should have a meal plan. If you do not know how many calories or how much carbohydrate, fat, cholesterol or sodium you should have, talk with your doctor, a dietitian or a diabetes educator.
- Look at food labels to help you make the healthiest food choices. You should know the right amount of carbohydrates to have at each meal and snack.
- Pay attention to the serving size. Compare the serving listed to the portion of the food that you normally eat.

^{1,2} www.diabetes.org/food-and-fitness/food/what-can-i-eat/taking-a-closer-look-at-labels.html Accessed 7/21/11

Nutrition Facts

Serving Size 1 cup (228g)

Servings Per Container 2

Amount Per Serving

Calories 270	Calories from fat 126
---------------------	-----------------------

% Daily Value*

Total Fat 14g	21%
----------------------	-----

Saturated Fat 4g	20%
------------------	-----

Trans Fat 1g	
--------------	--

Cholesterol 28mg	9%
-------------------------	----

Sodium 650mg	27%
---------------------	-----

Total Carbohydrate 30g	10%
-------------------------------	-----

Dietary Fiber 9g	36%
------------------	-----

Sugar 6g	
----------	--

Sugar Alcohol 5g	
------------------	--

Protein 5g	
-------------------	--

Vitamin A	4%	• Vitamin C	2%
-----------	----	-------------	----

Calcium	15%	• Iron	4%
---------	-----	--------	----

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

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat. Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

Sugar and fat substitutes

Commonly used sweeteners are table sugar, honey, fructose (the sugar found in fruit), carob, dextrose and corn syrup. They may be called “natural sweeteners.” It does not mean they are healthier for you. A few DO have the benefit of tasting sweeter than regular sugar so less is used to sweeten a food product. But they still contain calories and carbohydrates that can affect your blood sugar levels. There are two types of sugar substitutes:

Sugar Alcohols

You may know them as sorbitol, mannitol, maltitol and xylitol. They are used in many “dietetic foods” such as chewing gum, candies and desserts. Sugar alcohols provide about half the calories and carbohydrates of sugar.

Sugar alcohols do not contain alcohol. These sugar alcohols digest more slowly, but they still change to sugar. They can raise your blood sugar levels. Some people find eating even small amounts of foods containing sugar alcohols causes gas, cramps, bloating and/or diarrhea.

Follow this rule for carbohydrate counting

If a food has more than 5 grams of sugar alcohol, divide this by 2. Then subtract this amount from the “total carbohydrate” value on the nutrition label.

For example:

Total Carbohydrate =	26 grams
Sugar Alcohol =	22 grams

$$\begin{array}{r}
 26 \text{ grams (Total Carbohydrate)} \\
 - 11 \text{ grams (half of sugar alcohol)} \\
 \hline
 = 15 \text{ grams of carbohydrate}
 \end{array}$$

NOTE: The same rule applies for dietary fiber.

Reference: The American Diabetes Association/The American Dietetic Association, “Choose your Foods: Exchange Lists for Diabetes”, 2008: 54.

Low Calorie Sweeteners

These are also called “artificial sweeteners.” The most common ones are aspartame, sucralose, saccharin and acesulfame K. The newest sweetener is stevia. These products are many times sweeter than sugar, so you only use a very small amount. Because such a small amount is used, they do not provide calories or carbohydrates. These sweeteners do not affect your blood sugar.

Replacing regular sugar with these products in foods does lower the calorie and carbohydrate level (for example, diet soda vs. regular soda). You will not need to count them in your meal plan because they are “free foods.”

Fat Substitutes

Products made with fat substitutes may be helpful if you are trying to cut fat to lower cholesterol. They can also help you cut calories and lose weight. Be aware that some fat substitutes may be made from a carbohydrate base. Foods containing these may raise your blood sugar levels.

Currently, the FDA has approved one fat substitute as a food additive. It is called “olestra.” It is made from fat, but the body is unable to absorb it. It adds no calories to the diet. This food does have carbohydrates. Therefore, you need to count the amount of carbohydrates you are eating into your diet. Olestra may cause stomach and intestinal problems for some people.

Important Things to Remember

- Do not assume that “sugar-free” or “fat-free” foods are carbohydrate-free. You still need to read the nutrition label closely.
- If a food is called “dietetic”, it may not be calorie-free or even lower in calories. These foods may be lower in sodium and carbohydrate, but higher in fat. Always read the label.
- An alternative to using sugar substitutes is to simply cut back on the amount of sugar called for in recipes.
- Add nutmeg, vanilla, cinnamon or almond extract in place of sugar in recipes. This will give a sweet flavor without adding calories and carbohydrates.

Fiber

Many people have trouble getting enough fiber in their daily diet. The recommended goal is 25-30 grams of fiber a day. Fiber is found only in plant foods such as fruits, vegetables, whole grains, beans and legumes. Fiber is not digested and does not add calories.



Benefits of fiber:

- Makes you feel full sooner and you feel full longer
- Slows the rise in blood sugar after eating
- Lowers blood cholesterol
- Prevents constipation

There are two types of fiber:

Insoluble fiber

- Found in bran, whole grains, some vegetables and nuts
- Helps prevent constipation. It increases stool volume and lets it pass easily through the intestines

Soluble fiber

- Found in oats, beans, citrus fruits and barley
- May help lower blood sugar and cholesterol

Increase fiber slowly. Adding it too quickly can cause diarrhea, gas and bloating. Increase by no more than five grams a day. Drink plenty of water and non-calorie fluids. A high fiber diet can cause constipation if you do not get enough fluid.

Ways to increase your fiber intake:

- Use brown rice rather than white rice.
- Include a bean dish at least once a week; add beans to salads.

- Use whole grain cereals that have at least four grams of fiber per serving; combine with fresh fruit.
- Eat whole fruit rather than drinking juice.
- Snack on fruits, vegetables, popcorn or high fiber crackers.
- Eat the skin on fruits and vegetables when possible.
- Increase vegetables portions at lunch and dinner.
- With packaged foods, look for foods with at least two grams of fiber per 100 calories.
- Use whole grain bread rather than white bread. Whole grain should be the first item listed on the food label. Avoid large amounts of processed grains.

Average fiber content of foods

FRUITS	Serving Size	Grams of Fiber Per Serving
Apple with skin	1 medium	3
Figs, dried	2 medium	4
Pear	1 medium	4
Strawberries	1 cup	4
GRAINS, CEREALS AND PASTAS	Serving Size	Grams of Fiber Per Serving
Bran cereal	1/3 cup	8
Brown rice, cooked	1/2 cup	2
Pumpernickel bread	1 slice	3
Whole wheat pasta	1/2 cup	3
VEGETABLES	Serving Size	Grams of Fiber Per Serving
Broccoli	1/2 cup	2
Brussels sprouts	1/2 cup	3
Spinach	1/2 cup	2
LEGUMES, NUTS AND SEEDS	Serving Size	Grams of Fiber Per Serving
Baked beans, canned	1/2 cup	3
Lentils	1/2 cup	4
Peanuts, dry roasted	1/4 cup	3
Sunflower seeds	1/4 cup	2

Reference: *The American Dietetic Association's Complete Food & Nutrition Guide*, Roberta Larson Duyff, MS, RD, CFCS, Chronimed Publishing, 1998, p. 150.

Sodium

The body needs sodium to work right.

Sodium is needed for:

- Sending nerve impulses.
- Maintaining fluid balance in the body.
- Helping muscles to contract and relax.



There is natural sodium and added sodium. Natural sodium is a mineral found in many foods. However, most of the sodium we consume is added to the food we eat. Added sodium comes from processed and prepared foods. It also comes from adding table salt or soy sauce to our foods.

The kidneys help keep sodium levels in balance. When you have too much sodium in your body, the kidneys get rid of it. When you have too little sodium in your body, the kidneys save it. When too much sodium stays in the bloodstream, it can cause your blood pressure to increase.

Daily sodium intake should be less than 2,300mg per day¹. When you have diabetes, you may be more sensitive to the effect of sodium. Therefore, you should keep your sodium intake low. This can be difficult when you eat a lot of processed and prepared foods.

How can I reduce the sodium in my diet?

- Eat plenty of fresh fruits and vegetables.
- Always check food labels to see how much sodium is in one serving.
- Choose frozen or canned food items with low or no salt added.
- Use salt-free herbs and spices.
- Avoid fast foods.

1 teaspoon of sodium = 2,400mg

¹ www.diabetes.org/food-and-fitness/food/what-can-i-eat/taking-a-closer-look-at-labels.html. Accessed 7/21/11

Snacking tips

Snacks are important because they can prevent overeating at a meal. Snacks are also a way to increase your intake of fruits and vegetables. Eating smaller meals helps even out your blood sugar levels throughout the day. Try to choose snacks that are low in fat and high in fiber. A typical snack may have 15 grams of carbohydrate and some protein. Some examples are:

- Dried fruits and nuts (3-4 tablespoons)
- Whole grain crackers (6-8) with 1 ounce low-fat cheese
- Plain yogurt (6 oz.) with $\frac{1}{4}$ cup low-fat granola
- Carrot sticks or cucumbers with $\frac{1}{3}$ cup of hummus
- 1 ounce of lean deli meats and 1 slice whole grain bread
- 15-20 fat-free tortilla chips and 1 ounce low-fat cheese and diced tomato

Dining out tips

- **Choose the restaurant wisely.** Avoid buffet and fast food restaurants when possible. Check the menu choices online before you go out.
- **Watch your portion sizes.** Share an entrée or order an appetizer as your main course. Ask for a to-go container before your meal comes.
- **Eat slowly** and chew your food thoroughly.
- **Use salads or broth soups as appetizers.** Avoid cream soups.
- **Skip the bread basket** and the free chips.
- **Order baked, broiled, grilled or steamed foods.** Avoid fried and breaded appetizers and meals.
- **Order salad dressings, sauces and gravies on the side.**
- **Count your carbohydrate servings.**
- To avoid having low blood sugar, **wait to take your medication until you get to the restaurant** if you are on insulin or a medication that increases insulin levels.

Diabetes and alcohol

If you choose to drink alcohol, the American Diabetes Association has guidelines to follow. They recommend two drinks or less per day for men and one drink or less per day for women¹.

There are some people who should avoid alcohol all together. These include:

- Anyone with a history of alcohol abuse.
- Anyone who is pregnant.
- Anyone with medical problems such as pancreatitis, high triglycerides or nerve damage in arms or legs.

There are also some medications that may be dangerous with alcohol. Your pharmacist or doctor can advise you about these medications.

Are There Other Things to Consider?

Too much alcohol can impair judgment. It may make you forget to check your blood sugar or take your medications. You might also start eating too many foods that can raise your blood sugar. Alcohol also contains calories and can cause you to gain weight. If you need to lose weight, these calories need to be added into your meal plan.

If you choose to drink alcohol, here are some tips:

- Never drink alcohol on an empty stomach. Drink alcohol with a meal.
- Drink only if your diabetes is in good control.
- Select drinks that are lower in sugar and alcohol.
Light beers and dry wines are good choices.
- Choose sugar-free drink mixers.
- Avoid exercise before, during or after drinking alcohol.

Serving sizes of a drink with alcohol

Beverage	One Serving
Regular beer	12 ounces
Light beer	12 ounces
Wines	5 ounces
Hard liquor	1.5 ounces

¹ Diabetes Care, Volume 33, Supplement 1, January 2010, S24.

Diabetes and weight loss

If you are overweight, diabetes may be more difficult to control. Losing weight is often helpful in improving blood sugar, blood pressure and blood fats (cholesterol and triglycerides). Even a small amount of weight loss can make a difference.

Before starting any weight loss program, check with your doctor. Also, as you lose weight, your doctor may need to adjust your diabetes medicine.



Getting Started

- Set realistic weight loss goals. A weight loss of about $\frac{1}{2}$ -1 pound per week is good. Reward yourself when you meet your goals. (i.e. movie, good book or a new outfit).
- Develop a plan for healthy eating. A dietitian is a good person to help you set up a meal plan. Make sure the plan fits the types of food you like and fits your lifestyle.
- Increase your activity level. Exercise burns calories, reduces stress and can make you feel less hungry. Try to exercise for 30-45 minutes a day.
- Keep a food and exercise diary. Writing down what you eat for each meal and snack and what you do for exercise will help keep you on track.
- Try not to use food to cope with stress or feelings such as anger, sadness or boredom. Try to find healthier ways to cope.

Diabetes and exercise

Exercise is anything that gets your arms and legs moving. Exercise can improve your health in many ways. It can:

- Lower your blood sugar levels
- Help your body use its insulin better
- Help you lose weight and keep it off
- Make your heart and lungs work better
- Lower your blood pressure
- Lower your blood fats
- Make your muscles strong
- Lower stress levels

There are three types of exercise:

Aerobic exercise

- Walking, swimming, biking, dancing, water aerobics
- This is the best type for your heart and lungs.



Strength training exercise

(3 times per week)

- Lifting weights
 - This type builds muscle
- It helps you lose weight more easily.
It also helps maintain bone density.

Stretching exercise

- This type helps prevent injury. It also keeps you flexible.

How often should you exercise?

The American Diabetes Association recommends exercising for at least 150 minutes every week¹. This should be aerobic activity of moderate intensity. You could exercise for 150 minutes each week by exercising 21 minutes everyday or 30 minutes five days a week. Doing some exercise every day is ideal. If you cannot do 30 minutes all at once, break it up into two or three “mini” sessions. You should start with a warm-up. You can do about five minutes of stretching exercises. End your exercise with a cool-down for about 5-10 minutes. Do some more stretching.

¹ Diabetes Care, Volume 33, Supplement 1, January 2010, S26.

Getting started on an exercise program

Before starting on any exercise program, check with your doctor. Select the exercises you like. Try to combine all three types of exercise into your program. Start your program slowly. Set some goals. Keep an exercise log. Don't let yourself get discouraged. If you miss some days, get back into your routine as soon as possible.

Here are some tips to help make exercise safe:

- Check your blood sugar each time before you exercise.
- Also, you may want to check your blood sugar after exercising. This is important if you exercise for a long period of time. Checking also helps you learn how exercise may lower your blood sugar. Be aware that exercise can continue to lower your blood sugar up to 12 hours after you complete the activity.
- If you have foot problems, make sure you:
 - Wear shoes that fit well
 - Use insoles for more cushioning
 - Wear soft socks
 - Check your feet before and after exercising. If you do not have feeling in your feet or you have severe foot problems, try:
 - Swimming
 - Chair exercises
 - Rowing
 - Biking
 - Arm exercises
- If you have severe eye problems, avoid:
 - Weight lifting
 - High impact dance classes
 - Jogging
 - Racquet sports
- Drink lots of water before, during and after exercise
- Wear medical identification
- Stay out of very cold or very hot weather when exercising

If your blood sugar is over 240mg/dL and you have ketones (see page 39 to learn more about ketones) in your blood, do not exercise. Wait until your blood sugar is lower and the ketones go away. If your blood sugar is over 300mg/dL with no ketones, do not exercise. Lower your blood sugar first.

Walking is considered an excellent activity for most people with diabetes.

Exercise and Food

Exercise lowers blood sugar. If you take insulin or glucose-lowering pills, your blood sugar may get too low during or after exercise. The following chart lets you know what and when to snack.

Your snack should contain either starch or sugar. These foods increase your blood sugar quickly. You will need to have either 1 or 2 snack portions. One serving size of carbohydrate equals 15 grams. Here are examples of 1 snack with the correct portion size to eat or drink:

- $\frac{1}{2}$ cup of juice
- 1 small piece of fruit
- 2 tablespoons or 1 small box of raisins
- 3 glucose tablets
- 1 cup of milk
- 1 cup of light yogurt
- $\frac{1}{2}$ cup sugar-free pudding

If you are exercising for a long time (an hour or more), you may need to also have some protein. This could be 1 ounce of meat or cheese, 1 tablespoon of peanut butter or a $\frac{1}{4}$ cup of cottage cheese.

How Long And How Hard You Plan To Exercise	If Blood Sugar Is	Then Eat This Amount Of Snack
30 minutes or less Easy exercise (Walking or easy biking)	Less than 100mg/dL	2 portions
	100-180mg/dL	1 portion
	180mg/dL or more	No snack needed
About 1 hour A little harder exercise (Tennis, swimming, harder biking)	Less than 100mg/dL	2 portions of snack plus some protein
	100-180mg/dL	1 portion of snack plus some protein
	180mg/dL or more	1 portion of snack
2 hours or more Hard exercise (Football, hockey, basketball, hard biking, hard swimming, running)	Less than 100mg/dL	Do not exercise until blood sugar is over 100. Eat 1 portion of snack and recheck in 15 min.
	100-180mg/dL	Eat 2 portions of snack and some protein.
	180mg/dL or more	Check blood sugar each hour. Eat at least 1 portion of snack every hour.

Diabetes medicines

If you cannot manage your diabetes with diet and exercise, you may need medicine. Diabetes medicines can be taken by mouth or injected through the skin. All medicines for diabetes work differently. You may be on more than one medicine. Pills only work when the pancreas is making some insulin. They are only given to people with type 2 diabetes.

Oral Medications (pills)

Drug Class	Brand Name	Generic Name	How It Works	Side Effects
Sulfonylureas	Amaryl®	glimepiride	Stimulates release of insulin from pancreas	Low blood sugar; weight gain, skin rash, itching
	Glucotrol®, Glucotrol XL®	glipizide		
	Diabeta®, Glynase™ Micronase®	glyburide		
Meglitinides	Starlix®	nateglinide	Stimulates release of insulin from pancreas	Low blood sugar, stomach or intestinal problems
	Prandin®	repaglinide		
Biguanides	Fortamet®, Glucophage®, Glucophage®XR, Glumetza™, Riomet®	metformin	Reduces amount of sugar made by liver	Stomach or intestinal problems; may cause lactic acidosis
Alpha-glucosidase inhibitors	Precose®	acarbose	Slows digestion of carbohydrates	Stomach or intestinal problems
	Glyset®	miglitol		
Thiazolidinediones	Actos®	pioglitazone	Helps cells use insulin better	Weight gain; liver problems; may cause heart attack
	Avandia®	rosiglitazone		
Dipeptidyl peptidase IV (DPP-IV) inhibitors	Januvia™	sitagliptin	Increases release of insulin in response to a meal	Headache; upper respiratory infection; sore throat; runny or stuffy nose
	Onglyza™	saxagliptin	Increases level of insulin after meals.	Upper respiratory tract infection; urinary tract infection; or headache
	Tradjenta™	linagliptin	Reduces amount of sugar released by liver overnight and between meals	

Some medicines for diabetes are combinations of medicines.

Brand Name	Generics
ACTOplus met®	pioglitazone and metformin
Avandamet®	rosiglitazone and metformin
Avandaryl™	rosiglitazone and glimepiride
Glucovance®	glyburide and metformin
Metaglip™	glipizide and metformin
Janumet™	januvia and metformin
Duetact®	glimepiride and pioglitazone

http://www.joslin.org/info/oral_diabetes_medications_summary_chart.html Accessed 7/21/11



If your diabetes medicine is not listed in these charts, it may be new. Ask your healthcare provider to explain how it works.

Insulin and other Injectable Medications

Insulin is a hormone made of protein. It is made in the pancreas. Insulin allows glucose to enter most body cells. This lowers the level of glucose in the blood. In diabetes, there is either not enough insulin or the body will not let it work the way it should. Insulin cannot be taken by mouth. It is destroyed by normal stomach acid. In type 2 diabetes, insulin may be prescribed along

with diabetes pills or other diabetes injectables to manage blood sugar.



There are many types of insulin. Insulins differ by how quickly they start to work and how long they work in the body. The amount of insulin taken varies from person to person. Your healthcare team will work with you on how much you need to take and what type you need. Your insulin dose may need to be adjusted several times before it is right.

Types of Insulin¹ and Other Injectables²

Type	Brand Name	Generic Name	When to Use/ How It Works	Side Effects
Rapid Acting Insulin	Apidra® Humalog® NovoLog®	insulin glulisine insulin lispro insulin aspart	Given before you eat; Starts working within 5-15 minutes	Low blood sugar; weight gain
Short Acting Insulin	N/A	Regular (R)	Given before you eat; Starts working within ½ to 1 hour	Low blood sugar; weight gain
Intermediate Acting Insulin	N/A	NPH (N)	Given in morning or evening; Lasts for 10-20 hours	Low blood sugar; weight gain
Long Acting Insulin	Lantus® Levemir®	insulin glargine insulin detemir	Once a day dosing; Provides coverage over 24 hours	Low blood sugar
Pre-mixed Insulins	N/A	70/30, 50/50, 75/25	Usually given before breakfast and dinner	Low blood sugar; weight gain
Other Injectable	Byetta® Victoza®	exenatide liraglutide	Given before morning and evening meals; Helps increase insulin production Given once per day	Nausea; vomiting Constipation, decreased appetite; nausea
Other Injectable	Symlin®	pramlintide acetate	Given at mealtime; Used with insulin; Helps lower after-meal blood sugar levels	Low blood sugar; nausea; vomiting

¹ http://www.joslin.org/info/insulin_a_to_z_a_guide_on_different_types_of_insulin.html Accessed 7/21/11

² <http://www.diabetes.webmd.com/diabetes-non-insulin> Accessed 7/21/11

Insulin pens

Usually insulin is given with a syringe. Some insulin is available in pen form. It is an easy way to use insulin. However, it may cost more money. Insulin pens fall into 2 groups:

- Reusable insulin pens require you to load it with a cartridge of insulin. When the insulin is used, you replace the cartridge with a new one. A reusable pen can often be used for several years.
- Disposable insulin pens come filled with insulin. They are thrown away when they are empty. These are easier to use than reusable pens, but they cost more.

Insulin pumps

Some people use an insulin pump instead of daily injections of insulin. Pumps deliver small amounts of insulin throughout the day (basal rate). When you eat, you give yourself a bolus. A bolus is an extra dose of insulin. The insulin is delivered to the body through an infusion set. A cannula, which delivers the insulin, is placed under the skin in the stomach area. The site needs to be changed every two to three days.



Storage of insulin

If insulin is not stored properly, it may not work right. The insulin bottle in use can be kept at room temperature (less than 86°F degrees). Extra bottles should be stored in the refrigerator. Once opened, insulin remains stable at room temperature for 30 days. Be sure to read the directions that come with your insulin.

Examine your insulin for any change in color or “clumping.” Do not use the insulin if it does not mix or if the color is not right. Check the expiration date on the insulin box. Plan so that the amount you buy will be used up by the expiration date.

Sharps Disposal

Syringes and lancets should be thrown away in an approved sharps container. You can purchase one at most drug stores.



Many cities and towns have a free sharps disposal program. You can get information from your local hospital and local/county health departments. More information can be found on the Coalition for Safe Community Needle Disposal website, www.SafeNeedleDisposal.org

Managing your diabetes through blood sugar checks

Checking your Blood Sugar

Self-checking your blood sugar is one of the best ways to see how well you are managing your diabetes. It lets you and your doctor know how your medicine, food and exercise are working to control your blood sugar. With type 2 diabetes, you may want to check your blood sugar 1-2 times a day. If you are type 1 or type 2 on insulin, you should be checking 3-4 times a day. When you are sick, you will need to check more often. Talk to your doctor about how often you should check. Your doctor is the only person who should determine how often you should check your blood sugar.

Blood Sugar Goals

Preprandial (before meals)	70-130 mg/dL
Postprandial (2 hours after a meal)	Less than 180 mg/dL

Adapted from the American Diabetes Association Guidelines 2010 for non-pregnant adults.

It is helpful to check your blood sugar at various times of the day. This lets you look for blood sugar patterns. Checking two hours after a meal lets you see if what you ate

raised your blood sugar too high. You should also check when you make changes in your food, work or exercise schedule. You should write down your results and talk to your doctor about them. You and your doctor can make changes as needed to prevent future problems.



Have the following supplies ready before you check your blood sugar:

- **Test strips.** Make sure they are not out of date, they are the right strips for your meter and that the meter is coded to match the strips. Some meters, such as the Nova Max® brand, do not require coding.
- **Soap and water** to clean your hands.
- **Your lancing device.** Most meters now allow checking on sites other than your fingertips.
- **A blood glucose meter.** Ask your diabetes educator or pharmacist for help in learning how to use one, if needed.
- **A log or record book** to write down the results, even if your meter has a memory. If you misplace your meter, you will always have a written record to show your doctor.

Checking your blood sugar may seem hard at first. It becomes easier with practice. Most meters come with a toll-free customer service number that you can call if you need more help.

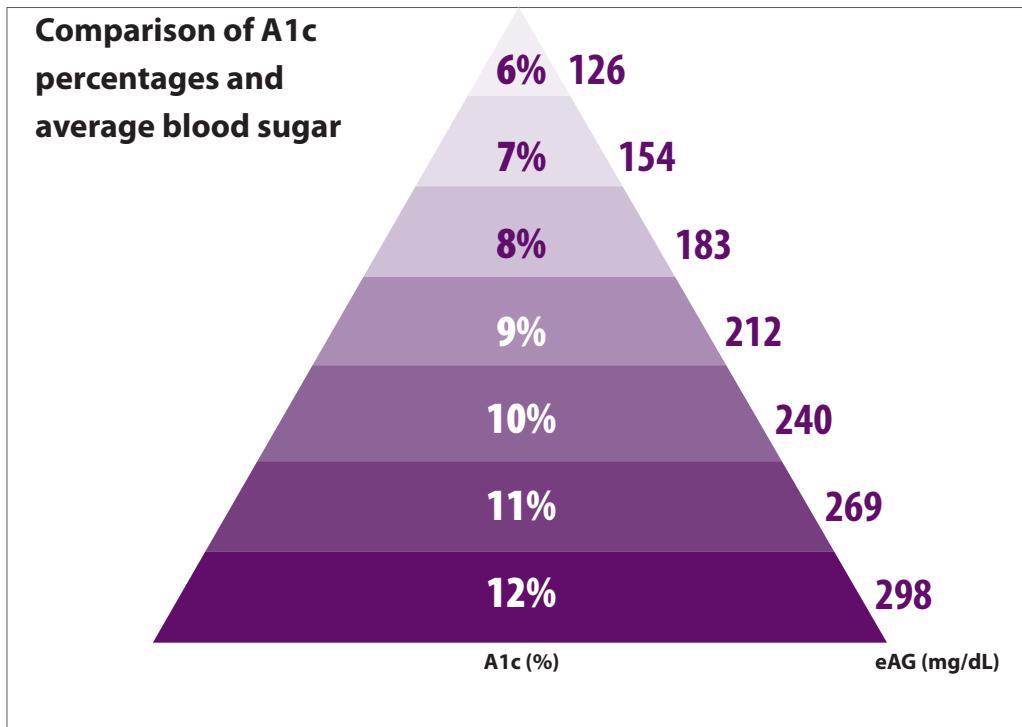


Hemoglobin A1c (A1c)

A1c is a laboratory blood check. It shows how well you have been controlling your blood sugar levels for the past 3 months.

The normal A1c range for people without diabetes is between 4-6%. When the results of this check fall within the normal range, it means that your blood sugar levels have been within the target range for the past 3 months. Results may vary slightly from one lab to another. Ask your doctor to find out what the normal range is for the lab he/she uses. Keeping A1c levels at 7% or lower helps to prevent or delay the complications of diabetes. Some doctors set the goal at 6.5%.

The chart below shows how the results relate to estimated average blood glucose levels:



Reference: *Diabetes Care*, Volume 33, Supplement 1, January 2010, S19.

estimated Average Glucose (eAG)

eAG is another term used to describe the A1c in a way that is similar to what you observe when you check your blood sugar with your monitor.

Continuous glucose monitoring (CGM) system

CGM is a new tool for taking control of your diabetes. It can let you and your doctor know what your sugar levels are now, and how they are changing over time.



The CGM works by inserting a sensor just under the skin in the abdomen. It can read out the sugar levels every few minutes. But it needs to be changed every 3-7 days. It also protects you with alarms in advance of high and low sugar levels. You will still need to check your blood sugar with a monitor to make sure the system is working right. The end result is that your A1c level can improve.

CGM is not for all people with diabetes. It is more helpful for those using insulin pumps or 3-4 daily insulin injections. Most insurance plans cover the cost after your deductible and/or co-pay has been met.

Low blood sugar (Hypoglycemia)

Low blood sugar = blood sugar less than 70mg/dL

If you take insulin or some diabetes medicines, your blood sugar may drop too low. It can occur very quickly. This is called hypoglycemia or an insulin reaction.

Symptoms



Causes of Low Blood Sugar

- Too much insulin or some diabetes medicines
- More exercise or activity than usual
- Not enough food or skipping a meal
- Drinking alcohol without enough food

How to Prevent Low Blood Sugar

- Eat at regular times – don't skip meals
- Only drink alcohol with food
- Take medicine as prescribed
- Plan your exercise
- Keep a blood sugar log to see patterns or trends
- Always carry glucose tablets or a quick source of carbohydrate
- Wear easily seen identification that says you have diabetes
- If you take insulin, ask your doctor about having glucagon on hand to treat

Dangers of Low Blood Sugar

- Loss of consciousness
- Seizures (convulsions)
- Death

If you have more than one low blood sugar in a week that you cannot explain, contact your doctor.

How to Treat Low Blood Sugar - “RULE of 15”

1. Take 15 grams of carbohydrate

Here are some examples (choose one):

- 3-4 glucose tablets
- 4-6 ounces regular soda
- 4-6 ounces fruit juice
- 1 cup (8 ounces) skim or 1% milk

2. Wait 15 minutes

3. Recheck blood sugar (should be above 70 mg/dL)

4. Repeat if blood sugar has not increased

5. After 2 treatments with carbohydrates, if blood sugar is not above 70 mg/dL, call your doctor or 911

Note: If your blood sugar returns to normal, and it will be more than 30 minutes until your next meal, eat a snack that contains protein and carbohydrate (such as, ½ sandwich).

Glucagon

Glucagon is a hormone made in the pancreas. It raises blood sugar when levels drop too low. When an unconscious person is not able to swallow a fast acting carbohydrate, it can be given. The glucagon kit has to be prescribed by a doctor. Like an insulin injection, it is given with a syringe. A family member or friend needs to learn how to give the injection. This glucagon kit is only used in an emergency.

High blood sugar (Hyperglycemia)

High blood sugar = blood sugar greater than your target range

- Greater than 130mg/dL before meals
- Greater than 180mg/dL 2 hours after a meal

Symptoms

Because high blood sugar occurs slowly, symptoms may be missed. Some people show no symptoms.



Causes

- Skipping diabetes medicine or not taking the right amount
- Stress (physical or emotional)
- Not enough activity or exercise
- Eating too much
- Illness
- Infection

What should you do when your blood sugar is too high?

- Check blood sugar more often
- Keep a blood sugar log to see patterns or trends
- Check for ketones in your blood
- Ask your doctor if your medicine needs to be adjusted
- Call your doctor right away if blood sugar levels are above targeted range and/or over 240mg/dL twice in a row
- Follow your meal plan
- Drink plenty of water every day
- See your doctor at least twice a year, and more often if blood sugar levels are not controlled
- Call your doctor immediately if your blood sugar is over 300mg/dL

Ketones

What are ketones?

Ketones appear in the blood when there is not enough insulin in the body to change sugar into energy. When the body cannot use sugar, it uses fat and

muscle stores for energy. The breakdown of the fat and muscle produces ketones. Ketones are an acid waste product that builds up in the blood. This can happen when there is too little insulin in the body due to not taking enough insulin or illness. It can also happen when there is not enough food due to weight loss or skipping meals. Because ketones are an acid, they can upset the way the body functions. This can lead to a serious condition. It is called diabetic ketoacidosis (DKA). It is a dangerous situation. Be aware it is more common in type 1 diabetes.

How to check for ketones

For many years checking urine for ketones was the common method. But now you can check your blood for ketones, instead. This is done the same way as checking your blood sugar. It is important to note, that not all meters check for blood ketones. Nova Max® Plus does check for both glucose and ketone levels with the same meter. You just need to use a different strip for ketones.

Advantages of testing for blood ketones over urine ketones

Testing your blood for ketones will give you an earlier warning because ketones show up in the blood earlier than in urine. This is helpful because sometimes you cannot give a urine sample because you are dehydrated. Dehydration is a common symptom of a high ketone level. By knowing the blood ketone level earlier, you can treat your symptoms. This may help you to stay out of the hospital. Keep some individually wrapped blood ketone strips in your meter case at all times.

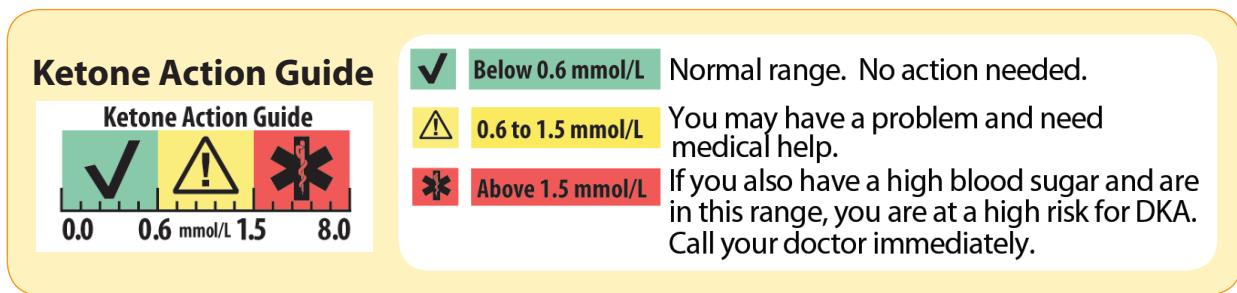
Who should check for blood ketones

- Children and teenagers with Type 1 diabetes
- Insulin pump users
- Pregnant women with diabetes
- All people with insulin dependent diabetes

When to check for blood ketones

- Blood sugar over 240 mg/dL
- Illness
- Stress
- Pregnancy

How to interpret blood ketone results



Warning signs of diabetic ketoacidosis (DKA)

- High blood sugar
- Fruity acidic breath
- Stomach pain or cramping
- Nausea and/or vomiting
- Rapid, labored breathing
- Blood ketone level above 1.5 mmol/L

Diabetic ketoacidosis can lead to:

- Fatigue
- Confusion
- Coma

If you have any of these signs and symptoms, call your doctor, 911 or go to the emergency room. This could be a life-threatening condition.

American Diabetes Association (ADA) recommends blood ketone testing

The American Diabetes Association (ADA) recommends that ketone testing should be performed on sick days and whenever glucose is consistently high. The ADA also states that blood ketone testing is preferred over urine ketone testing.¹

¹ American Diabetes Association, Tests of Glycemia in Diabetes, *Diabetes Care*, 2004;27(S1):S91-93.

Sick day guidelines

Being sick can raise your blood sugar. Taking care of your diabetes when you are sick is very important. Even a cold can cause your blood sugar to rise.

Even after you start to feel better, it is a good idea to check your blood sugar every 4 hours until you are back to your usual routine.

Here are some simple tips for sick days:

1. Check your blood sugar at least every 4-6 hours.
2. Check your blood ketones at least every 4-6 hours. Write down the results. Check more often if you are not sure about how you are doing.
3. Keep taking your insulin and/or diabetes medicine. Even when you cannot keep food down, you still need your insulin and/or diabetes medicine. For people with type 2 diabetes, when you are sick, insulin may be needed to keep your blood sugar in better control. Your doctor will tell you what to do, if this is needed.
4. Follow your meal plan.
 - Drink plenty of sugar-free liquids. Drink at least 8 ounces every hour you are awake.
 - If you cannot eat your usual food, try crackers, gelatin, clear soup, popsicles or applesauce.
 - If it is hard for you to eat or you have trouble keeping food down, eat or drink fluids with sugar in it. Try ginger ale or regular soda (not diet), non-citrus fruit juice or applesauce.
5. If your blood sugar is over 240mg/dL, check your blood for ketones every 4-6 hours. Call your doctor if your ketones measure above 0.6 mmol/L. Call right away if above 1.5 mmol/L.
6. Tell a family member that you are sick. Ask someone to stay with you, if possible.
7. Call your doctor when:
 - Your blood sugar is more than 240mg/dL twice in a row.
 - You vomit more than once.
 - You have diarrhea, which occurs more than five times per day or lasts longer than six hours.

- You have blood ketones over 0.6 mmol/L.
 - You feel weaker than usual or you cannot think clearly.
 - You have trouble breathing.
 - You cannot keep any fluids down.
 - You are unsure you can take care of yourself.
8. When you call your doctor be ready to tell him/her:
- Your symptoms (vomiting, diarrhea, pain).
 - Your blood sugar and blood ketone levels during the time you have been sick.
 - List of foods and fluids you have been able to keep down.
 - List of any medicines, including insulin and/or diabetes pills and over-the-counter medications (like cough syrup, pain relievers, etc.), you have taken.
 - How long you have been sick.
 - Any concerns or questions you have.
9. If your blood sugar is greater than 300mg/dL, call your doctor immediately, go to the emergency room or call 911. If you must go to the hospital or to the emergency room, tell the doctors and nurses that you have diabetes.

Complications

Why should you worry about high blood sugars?

High blood sugar levels can cause many serious problems. The long-term problems are called complications. Complications can begin even before you know you have diabetes. High levels of blood sugar damage the small vessels of the eyes, kidneys and nerves. It also damages the large vessels that lead to the heart, head, arms and legs. Oxygen and other nutrients cannot reach these areas. This leads to long-term damage, which affects the veins and arteries in the body. High blood pressure and smoking can also add to this damage.

You can prevent or delay long-term problems by managing your blood sugar.

Complication	Problems
Heart & Blood Vessel Disease (Cardiovascular Disease)	Heart attack Stroke Decreased blood flow in legs and arms High blood lipids (fats) High blood pressure
Nerve Disease (Neuropathy)	Burning, tingling and numbness in legs, feet and hands Heartburn Stomach pain Diarrhea Urinary tract infection Sexual problems
Kidney Disease (Nephropathy)	End-stage renal disease Dialysis
Eye Disease (Retinopathy)	Cataracts Blindness
Dental Disease	Gum infections

Cardiovascular Disease - Heart Attack or Stroke

Atherosclerosis, or hardening of the arteries, is the most common cause of heart disease in a person with diabetes. It begins with damage to the inner wall of the arteries. Cholesterol (plaque) builds up on the blood vessel walls and can break off. When the plaque breaks off, a clot can form in the blood stream. This blocks blood flow, which can prevent oxygen from getting to the heart or brain. This can lead to a heart attack or stroke. The symptoms of heart attack or stroke require immediate emergency medical care. Early treatment of these symptoms is vital.

Warning signs of a stroke	Warning signs of a heart attack
Numbness or weakness in the face, arm or leg, especially on one side of the body	Chest discomfort
Confusion, trouble speaking or understanding	Discomfort in other area of the upper body (jaw, neck, back, one or both arms, stomach)
Trouble seeing in one or both eyes	Shortness of breath
Trouble walking, dizziness, loss of balance or coordination	Other signs can be cold sweats, light-headedness or nausea
Severe headache with no known cause	

Peripheral Vascular Disease (PWD) or decreased blood flow

PVD occurs in the blood vessels other than the heart and brain. It occurs in the legs or arms when there is a lack of blood flow through the vessels. It may cause the legs to hurt or feel numb. Wounds may not heal as quickly. This can lead to infection and tissue death.

Hyperlipidemia

Hyperlipidemia means “high lipids” or high fats in the blood. The liver produces these fats. They also come from the food we eat. The American Diabetes Association (ADA) recommends that adults with diabetes have a blood lipid check done at least yearly.

Blood Lipid Goals

Lipid (Blood Fats)	Goal
LDL Cholesterol (also known as "bad" cholesterol)	Below 100mg/dL
HDL Cholesterol (also known as "good" cholesterol)	Greater than 40mg/dL in men Greater than 50mg/dL in women
Triglycerides (main form in which fat travels in the blood)	Below 150mg/dL

Reference: *Diabetes Care*, Volume 33, Supplement 1, Jan. 2010, S31.

Nerve Disease (Neuropathy)

Damage to nerve cells is called neuropathy. Damaged nerve endings can no longer send messages through the body normally. Nerve damage can happen slowly. You may not notice the earliest signs of nerve damage. Signs of nerve damage are numbness or tingling, pain and burning, and loss of feeling. Because you are unable to feel heat or pain, you can injure yourself and not even know it.

Kidney (Nephropathy)

Early detection and treatment can prevent or slow down kidney disease. Blood is filtered by the kidneys. They keep nutrients the body needs in the blood. And they get rid of waste products and water through the urine. High blood sugar can damage the small blood vessels of the kidney. Then kidneys cannot filter the blood normally. When this happens, waste products and protein build up in the blood. Usually there are no symptoms until the disease has progressed. Blood and urine lab checks done on a yearly basis are the best way to see if your kidneys are having problems.

Eyes (Retinopathy)

Eye disease occurs when weak spots develop in the walls of the tiny blood vessels in your eyes. This causes the vessels to leak, swell or break. There is no pain, but your vision can become very limited or blurred. Another problem that can occur is cataracts. This is caused by a build up of glucose in the lens of the eye which causes swelling and clouding. Annual eye exams are important to protect your eyesight. Treatment at an early stage can often prevent severe visual loss and blindness.

Guidelines for optimal diabetes health

Good medical care is important to everyone. However, it is very important to those with diabetes. Clinical studies have shown that high blood sugar levels may increase the risk for developing many serious complications of diabetes. Good diabetes care can help avoid many complications.

What is “good” care?

The American Diabetes Association (ADA) sets standards that health care providers should follow. The guidelines let you know what to expect from your doctor and ways to manage your diabetes. They are meant to give you the power to be well informed. Good diabetes care includes a team approach. Your health care team may include a doctor, diabetes educator, dietitian, heart doctor, eye doctor, foot doctor, dentist and you.



How can your doctor help you?

At each visit your doctor should:

1. Evaluate your blood sugar results and adjust your diabetes medication.
2. Discuss what you can do to reach your target ranges.
3. Check your blood pressure and weight.
4. Check your feet.
5. Review results from lab work (which should be done prior to visit).
6. Refer you to other health care providers, if needed.

Diabetes Health Checklist

Daily:	Monitor your blood sugar Follow a healthy meal plan Exercise Examine your feet
Every 6 months:	Dental exam and cleaning A1c check (more often if you are on insulin or have trouble controlling your blood sugar)
Once a year:	Complete history and physical exam Blood check for lipids and serum creatinine Urine sample for protein and microalbumin Eye exam (including having your eyes dilated) Flu vaccine Pneumonia vaccine (usually, once a lifetime)

Remember, YOU are the captain of your team. You know more about yourself than anyone. Your role is vital in the daily care of your diabetes. It is important to follow the plan of care that you and your team have chosen. Report the results of your care to your healthcare team.

Stress

Stress can also affect your diabetes. It can raise your blood sugar.

Stress can be caused by the feelings inside you or things going on around you. How much stress raises your blood sugar varies. Learning healthy ways of coping with stress is key in your diabetes care.

Some things that may help you cope with stress are:

- Reading
- Meditation
- Warm bath
- Exercise
- Talking with a supportive person
- Yoga
- Warm tea
- Breathing and relaxation exercises

Diabetes and smoking

If you have diabetes and smoke, this could increase your risk for diabetes complications. Smoking causes lung damage, increased heart rate and blood pressure. It also narrows the blood vessels. In a person with diabetes, these effects are increased. The risk of heart attack, stroke, and other blood vessel complications are much greater.

Options to help you quit smoking

- Nicotine Replacement Therapy (NRT)

This provides nicotine to the smoker but does not contain all the other poisons found in cigarette smoke. There are many NRT substitutes such as nicotine gum, patch and nasal spray.

- Zyban® or Wellbutrin® (Bupropion Hydrochloride) or Chantix™ (Varenicline)
These help decrease the withdrawal symptoms. Your doctor may choose to prescribe one of them. By the time your quit date arrives, your desire to smoke should decrease.

Your chance of success is greater when you also use a smoking cessation program with these options.

For help in finding a smoking cessation class

- American Heart Association
1-800-242-8721 - www.americanheart.org
(information available in Spanish or English)
- American Lung Association
1-800-586-4872 - www.lungusa.org

Daily living with diabetes

Living with diabetes involves daily care. In addition to managing your diabetes through meal planning, exercise and monitoring, there are other daily care activities. These include foot care, skin care and dental care. It also means paying attention to your diabetes whether at home, at work or when traveling.

It is a good idea to wear medical identification. If you get hurt, this lets people know you have diabetes. You can get information on purchasing medical identification from:

- Medic Alert Foundation International, 1-800-432-5378 or www.medicalert.org



Foot care

- Check your feet daily. Look for any changes, such as redness, dry or hot areas.
- Wash your feet every day. Make sure you dry your feet and toes well.
- Use a lotion to keep skin soft. Do not use lotion between toes.
- Cut toenails straight across regularly. If you have problems with your toenails, see a foot doctor.
- Choose shoes that are comfortable.
- For corns or bunions, do not use home treatments. See a foot doctor or your physician.
- Do not go barefoot. Always wear shoes that protect your feet and slippers that have a hard sole.

Skin care

- Keep skin clean and dry. Use talcum powder in areas where skin touches skin, such as armpits and groin.
- Moisturize your skin to prevent chapping, especially in cold or windy weather. Use a non-alcohol based lotion. Avoid very hot baths and showers, which can further dry your skin.
- Treat cuts right away. Wash minor cuts with soap and water. Use an antibiotic cream or ointment. Cover minor cuts with sterile gauze or an adhesive bandage. See a doctor right away if you get a major cut, burn or infection.
- See a doctor about skin problems if they do not go away.



Medication

- Always make sure you understand when and how to take your medication. Do not make changes without your doctor's approval.
- If you forget to take your medicine, do not double up on a dose. Ask your doctor what to do.
- Always carry a list of your medications with you. This list should include the dose and when you should take the medications.



Dental care

- Brush and floss your teeth and gums every day.
- Change your toothbrush every three months.
- Have your teeth examined and cleaned every 6 months.
- See your dentist if you have unusual pain, swelling or bleeding.

Diabetes at work

People with diabetes successfully perform all types of jobs. It is a good idea to tell your employer you have diabetes. You may need “reasonable accommodations” at your place of work. These may include regular work schedules, meal/snack breaks and a private place to check your blood sugar or take your diabetes medicine.

The Americans with Disabilities Act (ADA) is a federal law that prohibits discrimination against individuals with disabilities. Most problems in the workplace related to diabetes are due to a lack of understanding about the condition. If you are having problems in the workplace due to diabetes, the American Diabetes Association's Legal Advocacy Team can be a resource to you. You can reach them by calling 1-800-DIABETES.



Diabetes and traveling

Always plan ahead. This will make the trip more enjoyable and less stressful.

- See your doctor for a check-up four to six weeks ahead of a long trip.
- Have your doctor write a letter explaining your diabetes medicines and supplies.
- If you will change time zones, ask your healthcare provider for help adjusting your diabetes medicine.
- Pack extra supplies. Keep them with you in your carry on luggage.
- Check your blood sugar more often to see if traveling affects your blood sugar.

Pregnancy

If you are pregnant or planning to have a baby, you need to take extra care of yourself. Keeping your blood sugar at a good level may also help you have a healthy baby.

Gestational Diabetes Mellitus

Pregnant women who have never had diabetes, but now have high blood sugar levels may have gestational diabetes. Gestational Diabetes Mellitus (GDM) occurs in about 7% of all pregnant women¹. It is first seen in the second or third trimester. GDM does put a woman at risk for type 2 diabetes.

Diabetes and Pregnancy

Women who already have diabetes (either type 1 or type 2) and become pregnant can have healthy babies. Keeping the blood sugar levels in a good range and seeing the doctor often are necessary. Your blood sugar levels may be harder to control as the pregnancy continues. This is due to higher levels of hormones. You will need to check your blood sugar levels often, eat healthy and take the insulin your doctor orders.

Here are some steps you can take:

- **Meet with your doctor** to work out a plan to tightly control your blood sugar levels.
- **A dietitian can help with a meal plan.**
- **Check your blood sugar levels as often as your doctor tells you.**
This may be 4 – 6 times per day or more.
- **Check your blood for ketones**, if advised. Your healthcare team can help you understand the results and what to do.

For more information about gestational diabetes or diabetes and pregnancy, contact your doctor.

¹ *Diabetes Care, Volume 33, Supplement 1, January 2010, S15*

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Diabetes Resources

A variety of resources are available on the Internet. If you have access to the Internet, use a search engine under the heading “diabetes.” Make sure to check your resources and the sponsors of the website. Here are a few reputable sites to check first:

Diabetes Websites & Phone Numbers

- American Association of Diabetes Educators
www.diabeteseducator.org – 1-800-338-3633
Helps you locate diabetes educators in your local community.
- American Diabetes Association – www.diabetes.org – 1-800-DIABETES (1-800-342-2383). Provides a listing of ADA educational programs, events, and up-to-date information on diabetes. You can even find cookbooks, journals and news letters to order on this site.
- American Dietetic Association – www.eatright.org – 1-800-877-1600 x5000
Helps you locate registered dietitians in your area and provides recipes and topics on nutrition.
- Centers for Disease Control – www.cdc.gov/diabetes
1-800-CDC-INFO (1-800-232-4636)
Provides current diabetes statistics and links to other programs, information and articles.
- Juvenile Diabetes Research Foundation – www.jdrf.org – 800-533-CURE (2873)
JDRF is a leader in setting the agenda for diabetes research worldwide, and is the largest charitable funder of, and advocate for, type 1 diabetes research.
- National Diabetes Education Program – www.ndep.gov – 1-301-496-3583
Translates the latest science and spreads the word that diabetes is serious, common, and costly, yet *controllable* and for type 2, *preventable*.
- National Institute of Health – www.diabetes.niddk.nih.gov – 1-800-860-8747
Provides information on diabetes, as well as links to other diseases.

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Diabetic Ketoacidosis (DKA) is a very serious complication of diabetes that is often preventable. DKA can be life threatening, and is the leading cause of hospitalization and death in children and adolescents with diabetes.¹

Blood ketones: An early warning to prevent DKA

Blood ketone testing can provide you with an early warning that ketones are building in your blood. Knowing your ketone value allows you to take action to prevent DKA. Call your doctor for medical advice if your blood ketone is greater than 0.6 mmol/L.

The ADA recommends blood ketone testing

The ADA states "blood ketone testing becomes important during sick days and whenever glucose readings are consistently high."²



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1. Bismuth E et al. Pediatr Diabetes 2007;8(S6):24-33.
2. American Diabetes Association, Tests of Glycemia in Diabetes, Diabetes Care, 2004;27(S1):S91-93.

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Author: *Laura Richards, RN, BSN, CPT*

Author & Senior Editor: *Kristine A. Erdman, RN, BSN, CDE, CPT*

Editors: *Mary Ann Strobel, MS, RD, LD/N, CDE*

Eileen Finnerty, RN, CDE

Contributing Editors: *Jennifer Andrews, MBA*

Moira McMahon

Graphic Design: *Ashley Newman*

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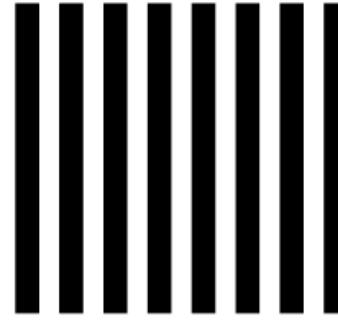
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