Diabetes Nutrition Basics for Optimal Health and Blood Glucose

Dietary needs for children and adolescents with diabetes are similar to those without diabetes. There are 3 main nutrients in food: fats, proteins, and carbohydrates. These three main nutrients have differing effects on blood glucose levels. Your body needs all of these types of nutrients to be healthy and strong. This book is your nutritional resource for creating a personalized, healthy and well-balanced eating plan for your child.

This booklet will cover the following topics in detail: basic food groups, carb counting, eating out, FAQs, resources, carbohydrate chart

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Basic Food Groups

Carbohydrates = Energy

Carbohydrates are one of three major nutrients in our diet. They provide fuel for our brain and nervous system. Yet, not all carbohydrates are equally healthy. After consuming a meal with carbohydrates, blood glucose levels will rise. During digestion, 90-100% of carbohydrates convert into glucose. This glucose will enter the blood stream 15 minutes to 2 hours after consumption. The dosing of insulin is proportional to the amount of carbs consumed. Children need energy from carbohydrates in order to utilize proteins for optimal growth and development.

Carbohydrate-Containing Foods



Healthy Carbs

The following carb-containing foods also give your child important nutrients such as vitamins and minerals:

- Breads and whole grains (100% whole grain bread, 100% whole wheat pasta, brown rice, quinoa, farro, bulgur, barley, millet)
- Starchy and non-starchy vegetables (potatoes, pumpkin squash, lima beans)
- Fruits, milk, and yogurt
- Dried beans, lentils, and peas

The following carb containing foods do not offer many nutrients and may make blood sugar management more difficult

- -Sweets, desserts, candy, sugary beverages Gatorade, juices, energy drinks, soda
- Processed packaged snack foods like pretzels, cookies, chips, popcorn, crackers, cereal, energy bars, granola bars



Protein and Fats O O O O O O O O O O O O O O O O

Protein and fats play an important role in many basic functions of the body including providing energy, and helping cells and tissues function well.

Protein has minimal effects on blood glucose levels if eaten as part of a meal. But protein will have an effect on your blood glucose if eaten in larger amounts. In most cases, your child needs only 3 ounces (about the size of 1 deck of cards) at each main meal. Choose a lean cut of protein (for example skinless poultry breast, tenderloin, 90% fat free meat, fish) to limit unhealthy fats in your diet





Fats typically do not convert into blood sugar. However, fat does slow down digestion, and this can cause your carbohydrates to be digested more slowly overall. After consuming a high-fat meal (examples: French fries, cheese burger, pizza, Chinese food, pasta with cream sauce, or fried chicken), your child's blood glucose may continue to rise up to 6-12 hours after the meal. Since most of the insulin for the meal is used up within 2-4 hours, there will be a risk of early low blood glucose (BG) followed by sustained high BG's after fatty meals. Ask your endocrinologist how to adjust insulin to handle these types of high fat meals.

Carb Counting: Tools and Strategies

The basis of carbohydrate counting is knowing which foods contain carbohydrates. Remember, the quality of carbohydrate matters. Use appropriate portion sizes for your child, and estimate carb counts at each meal and snack. Estimating the amount of carbohydrates in various foods may require practice. Here are some ideas.

Meal Planning

The first step in carb counting is to have a meal plan. The meal plan should guide you to decide how much carbohydrate, protein, and fat to eat at each meal and snack. Use the plate method and carb counting strategies for meal planning. Consistency is the key to a successful meal plan. But the meal plan must be flexible and realistic. Include favorite familiar meals, as most of us are creatures of habit when it comes to food. Make a list of meals that your family enjoys to create a weekly menu plan, and consider writing carb counts on your list for future reference.



Meal Planning Strategies

- 1. Visualize your plate or bowl. Take the time to read food labels, and discover how many servings your bowl or plate hold.
- 2. Use your hand size to estimate a proper serving size
- 3. Contemplate balance: Your goal is to prepare balanced meals that include carbohydrates, protein, and healthy fats.
- 4. Consider the source of your nutrients: Whole grains are healthier than refined grains. Refined grains include: white rice, white bread, breakfast cereal, crackers)
 - Whole fruits are healthier than fruit juices (see FAQs)
 - Choose lean meats like skinless poultry, lentils, fish, and eggs for protein
 - Limit fats from butter, cheese, red meat, skin of poultry, and fried foods
- 5. Smart Snacking: A snack is a small portion of food eaten between meals. Eating a snack can prevent hunger between meals, aid in providing adequate nutrition, and keep you energized and satisfied throughout the day. For better blood glucose control, we recommend that a snack should consist of foods that contain less carbohydrates and more protein. However, having diabetes does not mean you are required to have a snack.



Palm size = 3 to 4 ounces







Use Measuring Cups

Measure food once a month to reinforce proper serving sizes and to re-gauge your estimates. You can also place a typical portion on your child's plate, then use a measuring cup or spoon to quantify it.





Serving Size: information is for one serving	Serving Size Servings per	tion Fac 1/4 cup (30 g) container approx. 16	ts	
	Amount Per	Serving		
Calories: a key for weight loss	Calories 144	Calories from	Fat 71	
		% Daily V	alue*	
Total Fat: low-fat is less than 3 grams	Total Fat 8g		13%	
of fat per 100 calories	Saturated	8%		
	Trans Fat)g		
	Cholesterol (Omg	0%	
Total Carbohydrate: including sugar,	Sodium 31mg	9	1%	
starch, fiber and other	Total Carboh	Total Carbohydrate 15g		
	Dietary Fib	9%		
Fiber: select foods that are higher in	Sugars 5g			
fiber and limit foods that contain	Protein 4g			
added sugar	Vitamin A	0% • Vitamin C	1%	
	Calcium	2% • Iron	8%	
	*Percent Daily Va Your daily values your calorie need	lues are based on a 2,000 cal may be higher or lower depen S.	orie diet. ding on	

Use the Nutrition Facts Label

Be sure to read nutrition labels very carefully. Food labels help you identify how many grams of carbohydrate are contained in one serving of food. By reviewing the ingredient list, you can evaluate the quality of carbohydrates and the level of processing (examplesin FAQs). The total carbohydrate amount includes dietary fiber and grams of sugar. It is important to pay attention to the serving size, as the nutrition facts pertain to just one serving size.

Example of Counting Carbs Using a Food Label (see label above)

1. Find the serving size 2. Find the grams of total carbs per serving 3. Determine how many servings your child will be eating

For example:

- for two servings, multiply the grams of total carbs by 2
- for a half serving, divide the grams of total carbs by 2

1/4 cup 15q 2 servings or 1/2 serving

 $15q \times 2 = 30q$ 15q / 2 = 7.5q

Invest in a Kitchen Scale

Many foods come in different shapes and sizes which can make carbohydrate counting more challenging. Cooked food, such as rice and pasta, may be difficult to measure using measuring cups. Chips can also be difficult to measure using cups, as the amount can vary significantly if the chips are intact vs crumbled into small pieces. Weighing food in these situations is a more accurate method to count carbohydrates. A kitchen scale is a handy tool.

A "carbohydrate factor" is defined as a percentage of food that is carbohydrate.

How to figure out the carb factor:

- 1. Reference the USDA data base, Calorie King book, or the food label
- 2. Identify grams of carbohydrates and grams of food per serving
- 3. Use the following formula

total carbs in one serving (grams)

Carb Factor =

Weight of one serving of food (grams)



For example: Breakfast Cereal

Weight of one serving of rice krispies = 30 gmTotal carbs in one serving (30 g) rice krispies = 26.1 gmCarb Factor for rice krispies = 26.1/30 = 0.87

Therefore, there is 0.87 g carbohydrates in every 1 g of rice krispies

Now, using the carb factor, you can calculate the grams of carbs in any food item using a scale! Here's how:



- 1. Measure the weight of the food in grams.
- 2. Use the following formula:

Food weight (grams) x carb factor for that food = grams of carbs in that food

So, if you weigh out 70 grams of rice krispies on a food scale, using a carb factor of 0.87, you can easily determine that your cereal contains 60.9 grams of carbs.

It may seem like a lot of work, but it can be simple! Here are some helpful hints:

- 1. Make meals that your family enjoys
- 2. Create your own carb count database by writing down food items your family regularly eats and typical portion sizes. If you are using a food scale, then add a column for carb factors to this database.
- 3. Take a team approach to healthy eating within your family by ensuring that all family members adhere to the same meal plan.
- 4. Try to create a schedule and menu of eating throughout the day and include 3 balanced meals and 2 snacks as needed for appetite regulation.
- 5. Avoid using food as a reward or punishment for your child.



Food Items	My child's Serving in grams	Carb Factor	Total Carb
2 Whole wheat toast	56	0.46	25.76 gm
1 Egg	0	0	0 gm
1 Apple	120	0.14	16.8 gm

EATING OUT

Home cooked meals are always the healthiest option, but occasionally you may want to eat out. Here are some tips.

Choosing a Restaurant

Look for a restaurant which offers wide a variety of menu option

Check an online menu (if available) for nutritional information.

Avoide eating at "all you can eat" buffet type restaurants as it can be difficult to keep track of carb counts.



Ordering Your Meal (if frequently eating out)



Find a menu item which contains ingredients from all major food groups. Try to picture your plate while ordering.

Avoid filling up on complimentary bread and butter or chips and salsa.

Always ask for dressing and sauce on the side.

Help your child pick a menu option by narrowing it down to 2-3 healthy menu items and then allowing your child to choose (if your child is less than 7 years old).

The entire family should follow similar guidelines when eating out.

Restaurants often serve 2-3 portions in a single meal.

To prevent overeating, try the following:

- 1. Consume salad or green vegetables first.
- 2. Request a take-out box and pack half of the meal in the box to take home.
- If portion sizes are larger, you can order one meal to be split amongst
 2-3 family members. Most restaurants will honor this request.





What is Carbohydrate counting?

For people with diabetes who require insulin, carbohydrate counting is a method of matching an insulin dose to the total grams of carbohydrates that you eat. This helps keep blood sugar levels more stable after meals. Accurate carb counting is essential to calculate an optimal insulin dose. Carb counting is something that takes time and patience to learn, but it is a skill which is fundamental to care for your child's diabetes.

What is the best carb counting method for my child?

There is no "best carb counting method". The best carb counting method is simply one which you can use effectively and consistently, which keeps your child's blood glucose in a target range.

What should my child eat?

- Choose foods that are rich in nutrients
- Focus on the quality of carbs
- Healthy carbs are those which come in their natural form, such as whole grains, vegetables, and whole fruits. Such foods are minimally processed and contain plenty of nutrients and fiber. Your body has to work harder to digest them and therefore these foods can keep blood sugars more stable than processed foods
- Limit packaged/processed foods such as crackers, cookies, and canned fruits in syrup, cakes, donuts, chips, and energy bars. These items will often spike blood sugars. Such foods aren't healthy.
- Make sure the entire family follows the same diet so no one feels singled out or deprived.

How many carbs should my child consume each day?

Carbohydrates play an important role in your child's growth and development. Carbohydrates should be a part of a healthy meal plan. How many carbohydrates your child needs depends on your child's age, activity level, weight, and appetite. There is no magic number. Your dietitian can help to give you some rough guidelines. Be sure to include a wide variety of carbohydrates from whole grains, fruits, vegetables, low-fat milk and yogurt.

What is fiber? How does it affect blood glucose levels?

Fiber is a non-digestible plant material. It is found in whole grains, dried beans, lentils, fruits, vegetables, nuts, and seeds. There are two types of fiber; soluble and non-soluble.

Soluble fiber dissolves in water and delays release of glucose into the blood stream. Some soluble fiber is fermentable which helps to maintain colon health.

Non-soluble fiber absorbs water, creates bulk, and prevents constipation but has no effect on blood glucose

Bottom line: fiber is a good and healthy addition to your diet.

Are sugar substitutes safe to use?

Artificial sweeteners contain zero calories and do not affect blood sugar levels. They are often found in beverages. They are safe if used in very small amounts; however the best and healthiest choice of beverage for your child is fresh clean water. Artificial sweeteners include: saccharine (Sweet'N Low, Sugar Twin), sucralose (Splenda), aspartame (Equal), and extract of the Stevia Rebaudiana plant (Stevia, Truvia, Purevia)

Which foods can spike blood glucose levels?

Blood glucose levels rise after consuming carbohydrates. Small temporary increases in blood glucose levels are normal after eating a meal. Carbohydrates are found in a wide variety of both healthy and unhealthy foods. Unprocessed or minimally processed carbohydrates—whole grains, whole fruit, cooked beans—tend to raise blood glucose slowly. Processed carbohydrates—breakfast cereal (cold), instant oatmeal, white bread, sugary beverages, fruit juices, white rice, and potatoes—contain rapidly digestible carbohydrates and tend to spike blood sugar quickly and higher than average.

What are sugar alcohols? Do they affect my carb count?

Low calorie or reduced calorie sweeteners are sugar alcohols (erythritol, sorbitol, xylitol, mannitol, isomalt, maltitol). They have about half the sugar from the sugar alcohol and can raise blood sugar but to a lesser degree. Many food products contain sugar alcohols, such as sugar free candies, gums and other sugar free desserts.



Sugar alcohol is incompletely absorbed. Estimate that only half of the sugar in sugar alcohol will be absorbed and impact your blood sugar.

In this example the total carbohydrate per serving will be 20 grams *MINUS ONE HALF* (1/2) the carbohydrate in the sugar alcohol. One half of the sugar in sugar alcohol per serving is: 16g CHO / 2 = 8 grams of CHO.

So the <u>TOTAL CARBOHYDRATE PER SERVING is:</u> 20 grams CHO minus 8 grams CHO for the sugar alcohol = <u>12 grams CHO</u>

I counted the carbs perfectly (weighed and measured everything) and my child's blood sugar went high afterwards. Why did this happen?

Keeping your child's blood glucose levels stable can be challenging. There are many reasons for having high blood glucose levels despite counting your carbs accurately.

- Breakfast cereals and other highly processed foods can spike blood glucose levels despite measuring or even weighing the cereal
- High fat/high carb foods can cause late rises in glucose levels as they take longer to digest, long after the Humalog insulin has worn out
- On a relatively inactive day for your child, such as an all-day car ride, you may see high blood glucose levels after a meal
- Insulin requirements increase with puberty
- Physical and emotional stress, lack of sleep, illness or even hot weather can also cause high blood glucose levels
- BG spikes can happen if insulin is not timed correctly with respect to a meal. For best outcomes, give insulin prior to eating. A higher pre-meal BG may require a longer wait time.

If high BG trends are persistent after taking into account the above factors, please contact your diabetes healthcare team.

The restaurant website gave me the carb count and I used it to calculate the insulin dose but my child's blood sugar went high afterwards.

For the most part, when we eat out, fat in the meal is contributing to the high blood glucose. A high fat meal (especially high in saturated fats) makes our body insulin resistant. That means more insulin is needed to keep blood glucose in range. Fat slows down the digestion of carbohydrates, which can cause rise in blood glucose levels for up to 4-6 hours after a meal.

Occasionally a high fat meal is okay, but frequent meals with high fat/saturated fat can be healthy for everyone and can make it challenging to manage blood glucose levels. If after using the restaurant's carb count, you get a high number, please adjust up on the carb count for next time.

Is there anything my child can't eat?

It is recommended that everyone, with or without diabetes, should limit foods that contain high amounts of saturated and Trans fats, sodium, and unhealthy carbs. The following are some examples of the food that should be limited.

Any sugary beverages including juices, sport drinks, lemonade, freshly squeezed juice at home, 100% fruit juices (except for treating hypoglycemia), any deep fried foods, highly processed foods such as frozen pizza, frozen dinners, cookies, any concentrated sweets, including granola bars, protein or energy bars. If these are readily available in your household, **your child/teen will consume it.**

Why are whole fruits better than fruit juice?

Whole fruits come in a package of antioxidants, other nutrients, and fiber. Fiber makes us feel full and also slows absorption of fruit sugars. Fruit juices are stripped of fiber and contain mostly sugar that raises blood sugar fast. Therefore drinking fruit juice is one of the recommended treatments for hypoglycemia. However, daily consumption of juice or any sugary beverages are not recommended as they will spike blood glucose levels.

What is processed food?

Almost all foods are processed to varying degrees. To avoid confusion, focus on consuming whole foods, which generally have no to minimal processing. Flavor added to foods like sauces, salad dressings, canned or frozen fruits, vegetables, and fish have all gone through some kind of processing to preserve the freshness and taste. Ready to eat food like crackers, granola bars, and deli meat are heavily processed. Things like frozen pizza and microwavable frozen dinners are even more heavily processed.

Does my child need to follow a specific "diabetic diet"?

Kids with diabetes do not have to follow a specific diet. Your child will benefit from a healthy diet that includes whole grains, lean protein, whole fruits, vegetables, a small amount of healthy fats, and water to drink with meals. The goal is to understand the carbohydrate content in food and count all carbs with insulin. Consuming 3 meals and snacks as needed may help with appetite regulation. The entire household should follow the same diet to sustain it and to build healthy habits together as a family. Following a healthy diet can help prevent long-term diabetes related health problems.

Should my child/teen eat a low carb diet to more easily manage blood glucose?

The goal for diabetes nutrition management is to maintain a target blood glucose by balancing food, insulin and physical activity. Low carb diets continue to be popular but there is no formal definition of a low carb diet. People who are following low carb diet plans, often control or eliminate whole grains, fruits, milk, some vegetables, and legumes. Your child/teen's nutrition needs are different than adults. Decreasing or cutting back on healthy carbohydrates may invite nutrient deficiencies, including fiber and some B- vitamins. Experts recommend that approximately half of the calories we consume come from healthy carbohydrates, as carbohydrates are the body's preferred energy source.

What about sugar free foods?

Carbohydrates have the greatest effect on blood glucose levels. When a food package indicates, "sugar free", it does not necessarily mean that it is "carbohydrate free." In "sugar free" products, food manufacturers replace sugar with sugar substitutes, such as aspartame, saccharin, sucralose, acesulfamet-k, and neotame. Some sugar free foods contain sugar alcohols, such as sorbitol, xylitol, mannitol, and isomalt. However, these sweeteners actually contain carbohydrates. Therefore, it is important to check the food label for how many grams of carbohydrates are contained in one serving, whether or not the food is labeled "sugar free."

CARBOHYDRATE CHART Breads

Food Items	Weight in grams	Common measures	Grams of carbohydrates	Carb factors for food scale
Bagel, plain	89	4" bagel	47.17	0.53
Bread, raisin	28.35	1 slice	14.83	0.52
Bread, wheat	28	1 slice	12.91	0.46
Bread, white	22	1 slice	11.97	0.54
Chapatti	38	1	20	0.52
Hamburger bun	54	One bun	24	0.44
Naan, refrigerated	90	1 piece	45.39	0.50
Pancake, plain, dry mix. Complete prepared	38	1	13.95	0.37
Pita bread	28 gm	4" small	15.60	0.55
Tortilla, corn	26	1 tortilla	12.12	0.46
Tortilla, flour	32	1 tortilla	17.79	0.55

CARBOHYDRATE CHART Fruits

Food Items	Weight in	Common	Grams of	Carb factors for
	grams	measures	carbohydrates	food scale
Apples	138	1 apple	19.06	0.14
Apricots	35	1 apricot	3.89	0.11
Bananas	118	1 banana	26.95	0.23
Blueberries	145	1 cup	21.01	0.14
Cherries	68	10 cherries	10.89	0.16
Grapes	168	1 cup	30.67	0.18
Kiwi	186	1 cup sliced	26.47	0.16
Mango, fresh	165	1 cup	24.72	0.15
Melon, cantaloupe, honeydew	165	1 cup	14.25	0.09
Nectarines	136	1 nectarine	14.35	0.10
Orange	131	1 orange	15.39	0.12
Рарауа	140	1 cup cubed	13.73	0.10
Peach	98	1 peach	9.35	0.10
Pear	166	1 pear	25.66	0.15
Persimmons, Japanese	100	1 persimmon	18.5	0.18
Pineapples	165	1 cup	22.28	0.13
Pomegranates	87	1/2 a cup	16.26	0.18
Strawberries	166	1 cup	12.75	0.08
Watermelon	152	1 cup	11.48	0.08

CARBOHYDRATE CHART Cereals and Grains

Food Items	Weight in grams	Common measures	Grams of carbohydrates	Carb factors for food scale
Barley cooked	150	1 cup	34.26	0.23
Malt O Meal cooked with water	240	1 cup	25.68	0.11
Oats cooked with water	234	1 cup	25.27	0.11
Pasta cooked	140	1 cup	39.68	0.28
Quinoa cooked	185	1 cup	39.40	0.21
Rice white cooked	158	1 cup	44.51	0.28
Rice brown cooked	195	1 cup	44.77	0.23

CARBOHYDRATE CHART Legumes Cooked

Food Items	Weight in grams	Common measures	Grams of carbohydrates	Carb factors for food scale
Black beans	172	1 cup	40.78	0.23
Garbanzo beans	165	1 cup	44.97	0.27
Kidney beans	177	1 cup	40.36	0.23
Lentil, green, brown	198	1 cup	39.86	0.28
Peas, split, dried, cooked	196	1 cup	40.20	0.20
Pinto beans	171	1 cup	42.49	0.25

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CARBOHYDRATE CHART Non Starchy Vegetables

Food Items	Weight in grams	Common measures	Grams of carbohydrates	Carb factors for food scale
Asparagus, cooked, drained	90	1/2 a cup	3.70	0.04
Baby corn	138.1	1 cup	32.3	0.23
Green beans	135	1 cup	8	0.06
Beets	42.5	1 each	4	0.09
Brussels sprouts	156	1 cup	11.08	0.07
Broccoli, cooked	156	1 cup	11.20	0.07
Cabbage, shredded, cooked	150	1 cup	8.27	0.05
Cactus, cooked	149	1 cup	4.89	0.03
Carrots, fresh	78	1 each	7.0	0.09
Cauliflower, cooked	124	1 cup	5.10	0.04
Cucumber	300	1 each	9.09	0.03
Edamame	118	1 cup	10.12	0.08
Spinach, cooked	190	1 cup	9.12	0.048
Tomatoes	148	1 each	7.0	0.047

CARBOHYDRATE CHART Starchy Vegetables

Food Items	Weight in grams	Common measures	Grams of carbohydrates	Carb factors for food scale
Corn	77	1 ear	19.33	0.25
Corn, frozen, cooked	164	1 cup	31.65	0.19
Baby lima beans	180	1 cup	35.01	0.19
Mixed vegetables	64	1/2 a cup	10.31	0.16
Parsnips, cooked	156	1 cup	26.54	0.17
Peas, green	160	1 cup	22.82	0.14
Plantain, cooked	154	1 cup	47.97	0.31
Potato, skinless, cooked	156	1 cup	31.22	0.20
Winter squash, baked	205	1 cup	18.14	0.9
Yams, cooked	136	1 cup cubed	36.71	0.27



Food Items	Weight in grams	Common measures	Grams of carbohydrates	Carb factors for food scale	
Brownie	60	1 piece (2" square)	38.97	0.65	
Chocolate cake	71.87	1 piece	41	0.57	
Yellow cake with chocolate frosting	144	1 piece	79.72	0.55	
Donut, glazed	49	1 each	21	0.42	
Apple pie	155	1 slice	57.50	0.37	20

Additional Resources

The websites listed below are a good places to start learning about diabetes and nutrition.

Living healthier with diabetes www.kp.org/diabetes

Community Resources

carbDM.org

Carb DM has play dates for children with diabetes, monthly gatherings for adults with type 1 diabetes, workshops and lectures with topics relevant to type 1 diabetes, mentoring, advocacy, and more.

www.carbDM.org

Contact Tamar Sofer-Geri at 650-464-4236

Diabetes Youth Foundation (DYF)

Summer camps & year round programs <u>dvf.org</u> 925-680-4994

Juvenile Diabetes Research Foundation (JDRF)

Greater Bay Area Chapter 121 Second St., 2nd Floor San Francisco, CA 94105 jdrf.org 415-977-0360

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