



Colorado Department
of Public Health
and Environment

Gestational Diabetes

Nutrition Guidelines

Introduction	pg 1	Developing a Meal Plan	pg 5
Assessment	pg 1	Healthy Eating Tips	pg 6-7
Weight History	pg 1	Additional Nutrition Tips	pg 7
Weight Gain & Calorie Intake Recommendations	pg 1-2	Estimating Portion Sizes	pg 8
Physical Activity Assessment	pg 2	Addressing Weight Gain	pg 9
Diet Assessment	pg 2	Physical Activity Recommendations	pg 9
Comprehension Level	pg 2	Evaluation	pg 9-10
Instruction	pg 3	Follow-Up After Delivery	pg 10
Understanding Carbohydrates	pg 3-4	Nutrition Education Resources	pg 11

INTRODUCTION

Gestational diabetes mellitus (GDM) is glucose intolerance identified for the first time during pregnancy. As a pregnancy progresses, women become insulin resistant due to the increased production of certain placental hormones which are necessary to shunt nutrients to the growing fetus. If the pancreas is unable to meet the increasing insulin demands, the outcome is glucose intolerance resulting in hyperglycemia (high blood glucose).

Good nutrition and controlling both carbohydrate and caloric intake will help control blood glucose levels. Optimally, a registered dietitian and/or certified diabetes educator will provide Medical Nutrition Therapy. Medical Nutrition Therapy is a nutritional treatment for a specific condition, in this case gestational diabetes, based on a detailed assessment of individual factors such as pre-pregnancy weight, physical activity level, pregnancy weight gain to date and diet history. The primary goal is to control blood glucose levels by controlling intake of carbohydrates and saturated fats while ensuring adequate nutrition without excessive weight gain. If a registered dietitian or certified diabetes educator is not available in the community to provide Medical Nutrition Therapy, a registered nurse or community health worker may educate on the nutrition principles of gestational diabetes mellitus.

ASSESSMENT

Gather information on weight history, pre-pregnancy weight, pregnancy weight gain to date, rate of weight gain, physical activity level, and dietary habits. Determine appropriate educational materials based on ability to understand written and spoken information, cultural diversity and individual needs.

WEIGHT HISTORY

- Identify total weight gain in previous pregnancies, significant weight fluctuations (gain or loss) during pregnancy and/or prior to pregnancy, and dieting habits including a history of or current anorexia or bulimia.

WEIGHT GAIN AND CALORIE INTAKE RECOMMENDATIONS DURING PREGNANCY

- Determine Body Mass Index (BMI) using pre-pregnancy weight (PPW) and height (no shoes) on a BMI chart or wheel, or by calculating kg/m^2 . For more information on how to calculate BMI, refer to the Additional Nutrition Education Resources.
- Identify weight gain and calorie intake recommendations according to BMI category. Use Chart 1, adopted from the Institute of Medicine's Guidelines.

Gestational Diabetes *Nutrition Guidelines*

- Plot weight on a prenatal weight gain grid to obtain an accurate assessment of total pregnancy weight gain and rate of weight gain. Determine if weight gain is above, at or below the recommended range. If weight gain is within the recommended range, rate of weight gain should be no more than ~ ½ - 1 pound/week in the second and third trimester. If weight gain has already exceeded the recommended range, monitor that the woman slows weight gain in order to prevent further excess gain.
- Individualize calorie needs based on BMI, rate of weight gain and physical activity level. The calorie range will determine the quantity of food that can be eaten each day. Intake may be adjusted as the pregnancy progresses based on weight gain and blood glucose levels.

CHART 1: WEIGHT GAIN AND CALORIE INTAKE RECOMMENDATIONS FOR WOMEN WITH GDM*

BMI (kg/m²)	Recommended weight gain (lbs.)	Estimated calorie intake kcal/kg/day PPW
Underweight (< 19.8)	28 – 40	36 – 40
Normal weight (19.8 – 26)	25 – 35	30
Overweight (26.1 – 29)	15 – 25	24
Obese (>29)	15	12 – 18
Twin Gestation	35 – 45	Add an extra 500 kcal/day to the above recommendations.

* Adopted from National Academy of Sciences Institute of Medicine Guidelines for Pregnancy

PHYSICAL ACTIVITY ASSESSMENT

- Ask about current physical activity. If not currently physically active, assess willingness to change. Consult with the medical provider before developing an activity plan to check for contraindications.
- Moderate activity (30 minutes, five days/week) can help maintain normal blood glucose levels and control weight gain.

DIET ASSESSMENT

- Ask about prenatal multivitamin intake or intake of any herbs and other supplements. If not currently taking a prenatal multivitamin, encourage one daily or at least 1 mg of folic acid if unable to tolerate a prenatal vitamin due to nausea. Woman should use iodized salt to meet the increasing iodide needs in pregnancy (250 ug/day) given most prenatal vitamins do not contain iodine. Ask about food allergies or intolerances, nausea, vomiting, constipation or heartburn, which may affect intake.
- Use a diet assessment tool (24-hour recall, 3- to 5-day food diary, food frequency questionnaire) to determine meal trends, food preferences and nutritional adequacy.
- Find out who prepares the meals, or if she knows how to cook. Ask about meal preparation facilities, as well as financial resources for groceries and supplies.

COMPREHENSION LEVEL

- Assess ability to understand written and verbal instruction by asking her to repeat information or read from the educational materials. Consider highest grade completed in school.

INSTRUCTION

Use information gathered during the assessment to guide instruction. Address individual needs and preferences, and areas of concern identified in the assessment. Use examples that include preferred and tolerated foods. Information must be individualized so the woman clearly understands and demonstrates comprehension.







UNDERSTANDING CARBOHYDRATES

Carbohydrate foods are converted to glucose in the body and cause blood glucose levels to rise. Learning to control carbohydrate intake throughout the day is very important. Explain the types of foods containing carbohydrate and the importance of controlling total carbohydrate. Provide information that helps the woman understand carbohydrate content of the typical foods she eats. In addition, consider the woman’s learning level when teaching carbohydrate-control methods.

Carbohydrate Foods

Many foods contain carbohydrates, including grains, beans, fruit, milk and some vegetables. All carbohydrate foods will increase blood glucose levels. Therefore, it is important to balance the amount of carbohydrate foods eaten throughout the day. Choose higher fiber foods and appropriate portion sizes to help maintain control of total carbohydrate. Chart 2 identifies common carbohydrate foods and portion sizes.

CHART 2: COMMON CARBOHYDRATE FOODS AND PORTION SIZES

	Food Group	Common Carbohydrate Foods	Example Food and Portion Size (~15g of carbohydrate)
	Grains/Beans	Bread, rolls, bagels, muffins, tortillas, pita bread, noodles, spaghetti, macaroni, rice, dry and cooked cereals, lentils, dried beans (garbanzo, kidney, black and butter beans)	1 slice of bread ½ bun ⅓ cup pasta or rice ½ small bagel, ¼ large restaurant bagel 8-inch flour tortilla ½ cup beans, cooked ¾ cup cereal, unsweetened ½ cup cooked cereal, unsweetened
	Fruit	All fruits- fresh, frozen, dried, canned or juice	1 apple, orange, pear (small) ½ banana 12-15 grapes 1 cup berries, melon ¼ cup raisins (unsweetened) ½ cup canned fruit (in juice or light syrup) ½ cup 100% juice
	Milk	All milk and yogurt (plain, flavored or with low-calorie sweeteners)	1 cup milk (skim, 1%, 2%) 1 cup yogurt (plain or with low-calorie sweeteners) ⅓ cup yogurt, sweetened
	Starchy Vegetables	Potatoes, corn, peas, squash	1 small potato (4" long) ½ cup mashed potatoes ½ cup corn or peas 1 cup cooked squash
	Combination Foods	Casseroles, soups, stews, pizza	Check food labels or restaurant food guides for more details. These foods may have large amounts of carbohydrates and may have greater effects on blood glucose levels.
	Snacks & Sweets	Chips, pretzels, crackers, french fries, desserts, ice cream, frozen yogurt, candy, cake, cookies, pie	Check food labels or restaurant food guides for more details. These foods may have large amounts of carbohydrates and may have greater effects on blood glucose levels.

UNDERSTANDING CARBOHYDRATES (CONTINUED)

Using Food Labels

To estimate the amount of carbohydrates eaten and to make healthy choices, it is important to understand how to read a food label.

Nutrition Facts	
Serving Size 1/2 cup 1 NLEA serving 30g (30 g)	
Servings per container 10	
Amount Per Serving	
Calories 60	Calories from Fat 9
% Daily Value*	
Total Fat 1g	2%
Saturated Fat 0g	1%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 105mg	4%
Total Carbohydrate 25g	8%
Dietary Fiber 14g	57%
Sugars 0g	
Protein 2g	
Vitamin A 0%	Vitamin C 10%
Calcium 10%	Iron 25%
*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
Fiber	25g 30g
Calories per gram:	
Fat 9	Carbohydrate 4 Protein 4
NutritionData.com	

Serving Size: Pay attention to whether the amount eaten is equal to the serving size listed. The other parts of the food label are based on this serving size. Encourage the woman to calculate total carbohydrates based on the amount of food eaten. (Ex: Serving size = 1/2 cup; 1 cup is eaten = 2 servings. Since serving size is doubled, nutrients will be doubled too.)

Saturated Fat: Most labels separate types of fat. Pay attention to saturated fat content. Choose foods with low amounts of saturated fat (<5% Daily Value).

Total Carbohydrate: Look at the total carbohydrate, not just sugars. It is the total grams of carbohydrate that will affect the blood glucose level.

Fiber: Fiber does not raise blood glucose levels and may help to blunt the glucose-raising effect of carbohydrate foods. Foods with 5 grams of fiber or more are high-fiber foods. For these foods, subtract dietary fiber grams from total carbohydrate grams to calculate total carbohydrate. (Ex: 25g carbohydrate – 14g fiber = 11g carbohydrate)

Counting Carbohydrates

Carbohydrate foods have the greatest effect on blood glucose. It is helpful to plan meals by balancing carbohydrate foods at each meal. This will help maintain blood glucose levels within the target range. Track how many carbohydrates are eaten at each meal by recording the carbohydrate grams or carbohydrate choices on a food record.

- **Fifteen (15) grams of carbohydrate = 1 carbohydrate choice.** Therefore, 30 grams of carbohydrate = 2 choices, 45 grams of carbohydrate = 3 choices, etc.
- Chart 3 below can help determine carbohydrate choices when amounts are not in 15-gram increments.

CHART 3: CARBOHYDRATE CONVERSION CHART

Grams of Carbohydrate	Carbohydrate Choices
6-10	1/2
11-20	1
21-25	1 1/2
26-35	2
36-40	2 1/2
41-50	3
51-55	3 1/2
56-65	4

DEVELOPING A MEAL PLAN

A meal plan describes the types and amounts of carbohydrate foods eaten and timing of meals. The meal plan helps maintain normal blood glucose levels, provides adequate nutrition to mother and baby, and prevents excessive weight gain. Many women can control blood glucose by making a few changes to their food choices. Some women will not respond to nutrition therapy alone and will require medications to control blood glucose levels.

Meal Plan Components

- Maintain a minimum of 175 grams of carbohydrate or 12 carbohydrate choices per day (approximately 700 kcals from carbohydrates).
- Use diet history to create a meal plan that will ensure blood glucose control at each meal. Smaller meals should contain no more than one or two carbohydrate choices (15-30 grams of carbohydrate) and larger meals no more than three to four carbohydrate choices (45-60 grams of carbohydrate).
- Distribute carbohydrate-containing foods into smaller, frequent meals evenly spaced throughout the day. When total calories are divided into smaller, more frequent meals, the pancreas is often able to secrete adequate amounts of insulin and this may prevent the need for medications and minimize hunger, ketones in the urine, heartburn and nausea.
- Schedule at least two hours between meals to allow for two-hour postprandial blood glucose levels.
- It is best not to allow more than 10-12 hours between the last evening meal and the next morning meal.
- Consider including a small snack at bedtime (one carbohydrate choice and one protein choice) to help prevent ketone formation, especially if dinner and breakfast are separated by more than 10-12 hours.
- Use a food and beverage record to track intake. Include type and amount (cups, etc.) of food eaten, meal times, and fasting and postprandial blood glucose levels (one or two hours after the start of the meal).

SAMPLE MEAL PLAN

Time	Sample Meal	Grams of Carbohydrate	Carbohydrate Choices
7 a.m.	1 cup skim milk, 1 piece whole wheat toast, 1 egg	30	2
9 a.m.	1 cup berries, ¼ cup cottage cheese	15	1
Noon	⅓ cup whole wheat pasta, 1 orange, 1 cup low-fat milk, 2 oz. grilled chicken, ½ cup broccoli, 1 cup green salad	45	3
3 p.m.	½ cup canned pineapple or 1 slice whole wheat bread with 2 tbsp. peanut butter	15	1
5 p.m.	½ cup black beans and 1 tortilla, 12-15 grapes, 2 oz. lean beef, ½ cup tomato salsa, ½ cup steamed green beans	45	3
9 p.m.	1 cup skim milk and 6 whole wheat crackers, 1 oz. cheese	30	2

Special Considerations for the Breakfast Meal

Blood glucose levels may be elevated in the morning due to increases in hormones that counter insulin's action and inadequate amounts of insulin to suppress liver production of glucose during the night. Large amounts of carbohydrate foods at breakfast may increase the already elevated blood glucose levels. Carbohydrate foods usually are less tolerated at breakfast than at any other meal. The following are suggestions for maintaining normal blood glucose levels at breakfast:

- Limit carbohydrate to 15-30 grams or one to two carbohydrate choices.
- Avoid foods high in carbohydrate such as pancakes with syrup, Pop Tarts, honey, jelly, sweetened cereals, danish rolls, doughnuts, cinnamon rolls, muffins, bagels and large tortillas.
- Choose breakfast items that contain protein such as cottage cheese, eggs, lean meats, peanut butter, cheese, low-fat yogurt, a slice of whole grain toast with peanut butter or a small corn tortilla with beans.
- Avoid fruit juice. Drink water!
- Monitor blood glucose response to unsweetened cereals and fruit. Some women may not be able to achieve target values after eating these foods at the morning meal.

HEALTHY EATING TIPS

Choosing healthy foods from all food groups will help control blood glucose levels and weight gain. Below are tips for making healthy food choices. These recommendations are an important part of a healthy pregnancy.

Understanding Fats

Saturated fats contribute to higher levels of maternal triglycerides, which have been associated with macrosomia (large for gestational age) in the baby. Choose foods lower in saturated fat. If weight gain is excessive, a lower-fat diet overall can help slow the rate of weight gain since fats have more than twice as many calories per gram as carbohydrate or protein.

- **Saturated Fat** is usually solid at room temperature and comes from meat and animal products such as hamburger, eggs, cheese, bacon and butter. Saturated fat should be limited to less than 10 percent of calories and trans fats should be avoided.
- **Unsaturated fat** is usually liquid at room temperature and is found in most vegetable oils (ex: canola and olive oil), peanuts, almonds, sunflower seeds, olives, avocados, and cold-water fish such as salmon and albacore tuna. Unsaturated fat should be eaten in moderation.

PRACTICAL TIPS FOR DECREASING FAT INTAKE

- ❖ **Remove the skin and fat** from chicken and turkey. Trim all visible fat from meat.
- ❖ **Bake, roast, broil, grill or boil** meats instead of frying or adding fat.
- ❖ **Cook with small amounts of oil if needed**, and choose vegetable oils such as canola or olive oil.
- ❖ **Choose low-fat or nonfat cheeses.** They contain less saturated fat.
- ❖ **Choose low-fat or nonfat milk and yogurt.**
- ❖ **Use minimal amounts of butter or margarine.**
- ❖ **Avoid adding sauces or gravies** to meats, vegetables, pasta and other foods. Try flavoring with herbs and spices instead.
- ❖ **Replace chips and cookies** with whole grain pretzels or low-fat crackers.
- ❖ **Check food labels** for processed foods that contain high amounts of fat and refined sugar.

High-Fiber Foods

- **High-fiber foods can help control blood glucose levels** because they slow digestion and absorption of nutrients.
- **Whole-grain foods** are high in nutrients and fiber. Food labels should state, "made with 100% whole grain" for bread, crackers, tortillas and pasta. Try bran cereal, brown rice or bulgur. Use whole wheat or other whole grain flours in cooking and baking. Choose corn tortillas over flour tortillas.
- **Fresh fruits** are high in nutrients and fiber, but also are carbohydrates. Choose them over fruit juices. Oranges, grapefruit and tangerines are high in Vitamin A and Vitamin C, important nutrients for pregnancy.
- **Dark green, deep red, orange and deep yellow vegetables**, such as spinach, broccoli, romaine, carrots, chilies and peppers are high in nutrients needed for pregnancy.
- **Beans, peas and other legumes are a good source of fiber.**

Protein Foods

- **Protein foods do not increase blood glucose levels.** Include three servings daily.
- **Poultry and lean cuts of beef or pork** (90 percent or leaner) contain less saturated fat.
- **Nuts and seeds** are good sources of protein that are low in saturated fat.
- **Eggs** (fully cooked) are a good source of protein and can easily be added to many meal plans.
- **Fish** is usually low in saturated fat. However, amount and type of fish must be monitored due to health risks of mercury levels found in various fish, described under Additional Nutrition Tips.
- **Cheese** is a good source of protein.

Vitamins

- **Take a prenatal multivitamin every day.** Choose one that contains folic acid, calcium and iron. Mother and baby need the extra nutrients!

Fluids

- **Drink 8-10, 8-oz. glasses of water every day** to stay well hydrated.
- Limit fruit juice to ½ cup of 100 percent juice per day, depending on blood glucose response.
- Avoid soda and other sugared drinks such as fruit punch or Kool-Aid.

Calcium Foods

- **Include four servings of milk and/or dairy foods daily**; adolescents should aim for five servings.
- Milk is an excellent source of calcium, and low-fat milk will provide fewer calories. Milk also contains protein and carbohydrate.
- Other sources of calcium include cheese, yogurt, fortified cereals and other grains, spinach, collard greens, soybeans, rhubarb, and fortified orange juice.
- If milk and/or other dairy foods are not tolerated or accepted, include other nondairy sources of calcium in the diet and consider an additional calcium supplement.

ADDITIONAL NUTRITION TIPS

In addition to making healthy choices, women need to be careful when consuming certain foods during pregnancy. The following information highlights some of the areas to monitor.

Low-Calorie Sweeteners

- Low-calorie sweeteners such as Sucralose (Splenda), Aspartame (Equal), Acelsulfame-potassium (Sweet One, Sunette) are considered safe for use during pregnancy.
- All pregnant women should avoid saccharin-based sweetener (Sweet n' Low) because it crosses the placenta.

Caffeine

- Limit caffeine to <300 mg/day (two cups coffee/day).
- Caffeine is found in coffee, some soda pop, tea, chocolate and some medications.

Mercury

- Mercury can damage the unborn baby's nervous system and is found in tilefish, swordfish, king mackerel and shark.
- Some fish contain lower levels of mercury including shrimp, salmon, pollock, canned light tuna and catfish. Limit intake to ≤ 12 ounces/week.
- Albacore or "white" tuna is higher in mercury than canned light tuna. Limit consumption to ≤ 6 ounces/week.

Listeriosis

- Listeriosis is a serious infection caused by eating food contaminated with the bacterium *Listeria monocytogenes*. The infection can be transferred to the unborn baby and possibly cause miscarriage, stillbirth or serious health problems for the baby.
- To avoid listeriosis, reheat hot dogs until steaming hot. Avoid soft cheeses such as feta; Brie; Camembert; blue-veined cheeses; or Mexican-style cheeses such as queso blanco, queso fresco and Panela (unless they have labels that clearly state they are made from pasteurized milk). Do not eat refrigerated pâtés, meat spreads or refrigerated smoked seafood.

Alcohol

- The U.S. Surgeon General advises pregnant women to abstain from alcohol consumption to prevent birth defects and avoid developmental delays caused by prenatal alcohol exposure.

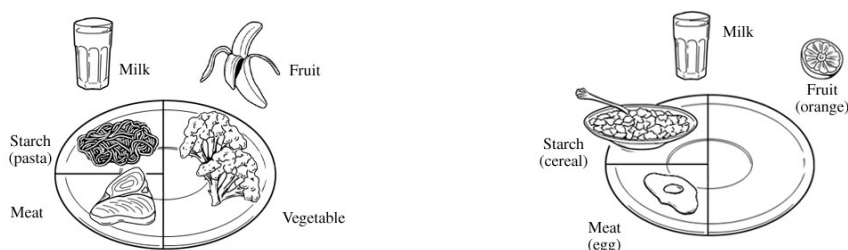
ESTIMATING PORTION SIZES

There are several tools that may be used to help a woman learn to control portion sizes. Demonstrate these tools and visuals with real examples when possible (deck of cards, divided 9-inch paper plate, measuring cups).

The 9-inch Plate

The 9-inch Plate is a simple, visual method to demonstrate appropriate portions of food on a plate. Breakfast, lunch and dinner meals should have approximately 45 grams of carbohydrate (three choices) each. Adjust the meal plan to meet individual needs based on blood glucose response. Limit carbohydrate at the breakfast meal to 30 grams (two choices) by eliminating one of the choices such as cereal or fruit.

- Divide a 9-inch plate in half, and then divide one half into two quarters to illustrate what proportions of the plate should be covered by various food groups. For accurate portion sizes, food should be only ½ inch thick on the plate.
- Nonstarchy vegetables should cover half the plate for lunch and dinner. Breads, grains or starchy vegetables should cover one quarter. Protein (meat, cheese, eggs) should cover the other quarter. Fruit and milk are represented outside the plate, but must be counted in the total carbohydrates eaten at the meal. If additional food is needed, choose foods from the vegetable and protein groups.
- Demonstrate how to make substitutions for the foods containing carbohydrates, if needed. For example, if the woman cannot tolerate milk products, mark off the milk serving at various meals. In its place, she may substitute another carbohydrate choice such as a fruit or bread. Be sure she still includes other high-calcium foods in the meal plan or takes a supplement.



The Common Item Visualization Method

Another simple visual method is to teach a woman how to relate portion sizes to common items she might be familiar with around the house. It is helpful to have examples of these items to show while explaining.

Some popular examples of common items that represent portion sizes include the following:



- Fist = 1 cup of cereal or one baked potato**
- Deck of cards = 3 oz. of meat or chicken**
- Checkbook = 3 oz. of grilled/baked fish**
- One dice or tip of the thumb = 1 tsp. of butter**
- Baseball = 1 cup salad greens or one medium fruit**
- ½ Baseball = ½ cup of cooked rice, pasta, potatoes
or ½ cup of fresh fruit or ½ cup ice cream**
- Two dominoes = 2 oz. cheese (~two slices cheese)**
- Ping-Pong ball = 2 Tbsp. peanut butter**
- Bar of soap = one burrito or one piece of cornbread**



ADDRESSING WEIGHT GAIN

Appropriate weight gain is important for a healthy pregnancy, and should be monitored carefully, especially in the overweight and obese population to prevent excessive weight gain. Tailor educational messages using information gathered during the assessment to address current excessive or inadequate weight gain.

Excessive

- Overweight and obese women need to control weight gain during pregnancy.
- Total weight gain should be no more than 15 – 25 pounds for overweight women. Obese women should only gain 15 pounds.
- Discuss need to slow weight gain. Explain how to achieve this by choosing healthier foods, controlling portion sizes and increasing physical activity.

Inadequate

- Underweight women are at higher risk for inadequate weight gain during pregnancy.
- Emphasize rate of weight gain should be ~ 1-1½ pounds/week or 4-6 pounds/month in the second and third trimester to achieve total weight gain recommendation.
- Ensure weight gain is adequate and weight loss does not occur. Continue to support and encourage healthier foods and moderate portion sizes to control blood glucose levels. Modify physical activity as needed.
- Underweight women who appear to have gestational diabetes are likely to have primarily pancreatic insufficiency rather than insulin resistance and may require insulin to control blood glucose levels and ensure adequate weight gain.

PHYSICAL ACTIVITY RECOMMENDATIONS

In addition to making healthy food choices and monitoring portion sizes, exercise helps maintain blood glucose levels and controls weight gain. Since muscles require glucose for energy, exercise is the body's natural way of taking glucose out of the blood. Instruct the woman on physical activity guidelines for pregnancy and the benefits of exercise in controlling blood glucose levels.

- Encourage moderate activity (i.e., 30 minutes of walking) within one to two hours after a meal to lower postprandial blood glucose levels. This is especially effective following the largest meal of the day.
- Develop an individualized exercise plan based on a physical assessment by the provider.
- Regular physical activity (30 minutes/day, five days/week) can help to reduce insulin resistance and prevent excessive weight gain.
- Actual heart rate should not exceed 140 beats/minute.
- Ensure adequate hydration and avoid overheating during all physical activity.
- Contraindications to physical activity include: preeclampsia, intrauterine growth restriction, abruption, placenta previa or vaginal bleeding. Be sure a health care provider reviews and approves all physical activity.

EVALUATION

FOOD AND BLOOD GLUCOSE RECORD

TARGET BLOOD GLUCOSE LEVELS
Fasting Blood Glucose < 95 mg/dl
1 hour postprandial < 130 – 140 mg/dl
2 hour postprandial < 120 mg/dl

- Assess blood glucose response to food choices and meal timing to determine if normal blood glucose levels have been maintained.
- Monitor patterns in blood glucose levels to determine areas where food choices need to be adjusted.
- Allow up to two weeks for blood glucose levels to optimize in response to nutrition therapy.
- Use caution when portioning foods such as pasta, pizza and white rice. These foods may raise blood glucose levels more than expected. Try eating smaller amounts and testing blood glucose two hours after the start of the meal to determine if blood glucose levels remained in the target range.

Gestational Diabetes *Nutrition Guidelines*

- Monitor the response if blood glucose levels increase after consuming a certain food. The woman may need to avoid that food or decrease the portion size. Consider testing blood glucose levels pre-meal to determine whether the response is related to the food eaten. High fat foods (e.g. pizza, French fries) may worsen insulin resistance and cause an increase in blood glucose levels.
- Assess that the woman does not restrict food intake to less than 12-18 kcal/kg/day prepregnancy weight in an attempt to avoid medication therapy.
- If medication therapy is begun, modify the meal plan to meet the medication regimen. Women taking short acting insulin analogues with each meal (Humalog, Novalog) may not need to have smaller meals between their regular meals due to the rapid peak and short duration of insulin action. In contrast, women using Regular insulin or glyburide with meals may need to include smaller, more frequent meals to avoid low blood sugar levels due to the delayed peak and longer duration of these agents.

FOLLOW-UP AFTER DELIVERY

It is **crucial** that women return to their provider to receive the appropriate postpartum counseling, testing and follow-up after delivery. About half of all women with gestational diabetes mellitus will develop type 2 diabetes within the next five-10 years.

- Encourage women to aim for their prepregnancy weight six to 12 months after the baby is born. If overweight, work to lose at least 5 to 7 percent (10 to 14 pounds for someone who weighs 200 pounds) of body weight over time, and keep it off in order to improve insulin sensitivity and reduce the risk of developing diabetes.
- Encourage breastfeeding, emphasizing the following benefits:
 - promotes weight loss for the mother
 - may decrease maternal progression to type 2 diabetes
 - reduces insulin resistance in mothers
 - may decrease obesity in the child
- Educate on continued lifestyle modifications, including healthy food choices and daily physical activity, to lessen insulin resistance and prevent or delay the onset of type 2 diabetes.
- Be sure the woman returns for a follow-up glucose tolerance test at six to 12 weeks postpartum. See algorithm in the Gestational Diabetes Clinical Guidelines for more information.

NUTRITION EDUCATION RESOURCES

INTERNATIONAL DIABETES CENTER MATERIALS

<http://www.parknicollet.com/healthinnovations/>

JOSLIN DIABETES CENTER

<http://www.joslin.org/>

NATIONAL INSTITUTE OF CHILD HEALTH & DEVELOPMENT

http://www.nichd.nih.gov/publications/pubs/gest_diabetes/

CALORIE KING

<http://www.calorieking.com/>

TABLE TOP NUTRITION

<http://tabletopnutrition.com/01-tabletop-home.shtml>

NATIONAL DIABETES EDUCATION PROGRAM

<http://ndep.nih.gov/index.htm>

AMERICAN DIABETES ASSOCIATION

<http://diabetes.org/home.jsp>

PORTION SIZE CARD

<http://hp2010.nhlbihin.net/portion/servingcard7.pdf>

UNDERSTANDING FOOD LABELS

<http://www.cfsan.fda.gov/%7Edms/foodlab.html>

CARDBOARD FOOD MODELS

<http://www.wdairyCouncil.com>

DETERMINING BMI AND APPROPRIATE WEIGHT GAIN

www.healthy-baby.org

SAFETY OF ARTIFICIAL SWEETENERS

<http://www.americanpregnancy.org/pregnancyhealth/artificialsweetner.htm>

COLORADO WIC PROGRAM

<http://www.cdphe.state.co.us/ps/wic/index.html>

REFERENCES

- American College of Obstetricians and Gynecologists, Committee on Practice Bulletins-Obstetrics 2001, Coustan, DR. Gestational Diabetes ACOG Practice Bulletin #30 2001: Washington: American College of Obstetricians and Gynecologists.
- American Diabetes Association, Proceedings of the Fifth International Workshop-Conference on Gestational Diabetes Mellitus, Diabetes Care 2007; 30, Suppl 2.
- American Diabetes Association. Standards of Medical Care in Diabetes. Diabetes Care 2005; 28, Suppl 1.
- American Diabetes Association. Gestational Diabetes Mellitus. Diabetes Care 2004; 27, Suppl 1.
- American Diabetes Association. Gestational Diabetes Mellitus. Diabetes Care 2003; 26, Suppl 1.
- American Diabetes Association. Standards of Medical Care for Patients with Diabetes Mellitus. Diabetes Care 2003; 26, Suppl 1.
- American Dietetic Association. Nutrition Practice Guidelines for Gestational Diabetes Mellitus. 2001.
- American Diabetes Association Clinical Education Series, Medical Management of Pregnancy Complicated by Diabetes, Third Edition, Lois Jovanovic, MD, Editor in Chief, 2000.
- California Diabetes & Pregnancy Programs, Guidelines for Care, State Program Guide. Maternal & Child Health Branch, Department of Health Services, State of California, 2002.
- Joslin Diabetes Center and Joslin Clinic Guideline for Detection and Management of Diabetes in Pregnancy, June 2003.
- National Academy of Sciences, Institute of Medicine, Food and Nutrition Board, Committee on Nutritional Status During Pregnancy and Lactation, Subcommittee for a Clinical Application Guide. 1992. *Nutrition During Pregnancy and Lactation: An Implementation Guide*. Washington, DC: National Academy Press.
- New Hampshire Guidelines for Gestational Diabetes Care, 2002.
- Sweet Success Express, Guidelines At A Glance for Pregnancies Complicated by Gestational Diabetes Mellitus.
- Utah Diabetes Prevention and Control Program. (2005, June). Diabetes in Pregnancy. Utah Diabetes Practice Recommendations. Salt Lake City, UT: Utah Department of Health.
- Barbour, LA. (2003). "New concepts in insulin resistance of pregnancy and gestational diabetes: long-term implications for mother and offspring." J Obstet Gynecol **23** (5): 545-9.
- Ben-Haroush, A, Yogev, Y, Chen, R, Rosenn, B, Hod, M, Langer, O. (2004). "The postprandial glucose profile in the diabetic pregnancy." Am J Obstet Gynecol **191**: 576-81.
- Case, J, Willoughby, D, Haley-Zitlen, V, Maybee, P. (2006). "Preventing Type 2 Diabetes After Gestational Diabetes." The Diabetes Educator **32** (6): 877-86.
- Crowther, CA. et al. (2005). "Effect of treatment of gestational diabetes mellitus on pregnancy outcomes." N Engl J Med **352**: 2477-86.
- Dabelea, D. et al. (2005). "Increasing prevalence of gestational diabetes mellitus over time and by birth cohort." Diabetes Care **28** (3): 579-84.
- Dabelea, D, Knowler, WC, Pettitt, DJ. (2000). "Effect of diabetes in pregnancy on offspring: follow-up research in the Pima Indians." J Matern Fetal Med **9** (1): 83-8.
- Dewey, KG. (2003). "Is breastfeeding protective against childhood obesity?" J Human Lactation **19** (1): 9-18.
- Kim, C, Newton, KM, Knopp, RH. (2002). "Gestational diabetes and the incidence of type 2 diabetes: a systematic review." Diabetes Care **25** (10): 1862-8.
- Lauenborg, J. et al. (2004). "Increasing incidence of diabetes after gestational diabetes: a long-term follow-up in a Danish population." Diabetes Care **27** (5): 1194-9.
- Metzger, BE, Nelson, L, Niznik, C, Dooley SL. (2006). "Update on gestational diabetes- 5th International Workshop-Conference on Gestational Diabetes." Women's Health **2** (2): 211-16.
- Radaelli, T, Varastehpour, A, Catalano, P, Hauguel-de Mouzon, S. (2003). "Gestational diabetes induces placental genes for chronic stress and inflammatory pathways." Diabetes **52** (12): 2951-8.
- Reader, DM. (2007) "Medical Nutrition Therapy and Lifestyle Interventions." Diabetes Care **30**: S188-S193.
- Saldana, TM, Siega-Riz, AM, Adair, LS. (2004). "Effect of macronutrient intake on the development of glucose intolerance during pregnancy." Am J Clin Nutr **79** (3): 479-86.
- Salsberry, PJ, Reagan, PB.(2005). "Dynamics of early childhood overweight." Pediatrics **116** (6): 1329-38.
- Schaefer-Graf, UM, Hartmann, R, Pawliczak, J, Passow, D, Abou-Daku, M, Vetter, K, Kordonouri, O. (2006). "Association of Breastfeeding and Early Childhood Overweight in Children From Mothers With Gestational Diabetes Mellitus". Diabetes Care **29** 1105-07.