

# Understanding Blood Sugar During Pregnancy

This handout contains 3 sections that are related. Most people are familiar with Type 2, or adult onset diabetes mellitus, usually seen in overweight older adults. Most women of childbearing age are also familiar with testing for Gestational Diabetes during pregnancy.

This handout explains, first, signs and symptoms of Type 2 diabetes. Followed in section 2 by an explanation of the physiology and controversies involved with Gestational Diabetes. The third section is an explanation of the diet recommendations for diabetes in pregnancy.

## Section 1: Screening for Type 2 Diabetes in Early Pregnancy

One third of people with Type 2 diabetes are not aware they have it. Until recently, Type 2 diabetes was associated with overweight or obese older adults with poor dietary habits. Unfortunately, it is occurring more frequently among children and young adults. Many women are not aware that they are at risk for, or may have, undiagnosed Type 2 diabetes before pregnancy. The symptoms may develop very slowly. Look for:

- **Areas of darkened skin.** Some people with type 2 diabetes have patches of dark, velvety skin in the folds and creases of their bodies — usually in the armpits and neck. This condition, called acanthosis nigricans, may be a sign of insulin resistance.
- **Difficulty with weight loss.** Even with severely restricted diets (less than 1000 cal) and extreme exercise, weight loss is very slow. This is a sign of insulin resistance.

As the diabetes progresses, the following begin to occur:

- **Increased thirst and frequent urination.** As excess sugar builds up in your bloodstream, fluid is pulled from the tissues. This may leave you thirsty. As a result, you may drink — and urinate — more than usual.
- **Increased hunger.** Without enough insulin to move sugar into your cells, your muscles and organs become depleted for energy. This triggers intense hunger.
- **Weight loss.** Despite eating more than usual to relieve hunger, you may lose weight. Without the ability to use glucose, the body uses alternative fuels stored in muscle and fat. Calories are lost as excess glucose is released in the urine.
- **Fatigue.** If your cells are deprived of sugar, you may become tired and irritable.
- **Blurred vision.** If your blood sugar is too high, fluid may be pulled from the lenses of your eyes. This may affect your ability to focus clearly.
- **Slow-healing sores or frequent infections.** Type 2 diabetes affects your ability to heal and resist infections.

For women with Type 2 Diabetes, the more out of control their blood sugars are the more likely they will develop pregnancy complications and fetal malformations similar to women with Insulin Dependent Diabetes Mellitus (IDDM), also known as Type 1 diabetes. The fetal malformations are caused by the abnormal blood sugars that were present at conception and throughout the first 7 weeks of the pregnancy while the baby's organs are forming. The earlier that Type 2 Diabetes is diagnosed, the sooner treatment can begin to maintain normal blood sugars and prevent pregnancy complications such as polyhydramnios, hypertension, and preeclampsia.

Studies suggest that specific criteria may help to diagnose previously undiagnosed Type 2 Diabetes. These include:

- An elevated Body Mass Index (see below\*)
- Systolic blood pressure greater than 120 mm Hg
- Glycohemoglobin (A1C) greater than 5.3%
- Presence of acanthosis nigricans (see above in symptoms of diabetes)

\*BMI needs to be adjusted for racial and ethnic groups to account for the differences in body composition and bone structure. A white woman should be considered obese with a BMI greater than 25.5, black women greater than 28.7, and Hispanic women greater than 26.2 kg/m squared.

If you meet criteria for undiagnosed Type 2 diabetes, a Hemoglobin A1C will be included in initial prenatal lab work. If it is greater than 5.3%, a 1 hour glucose tolerance test will be ordered along with a referral to a registered dietician and a Maternal Fetal Medicine specialist for co-management of blood sugars and the possibility of additional testing.

## Section 2: Gestational Diabetes in Pregnancy

### Background information

Gestational diabetes mellitus (GDM) is a transient abnormality of glucose tolerance during pregnancy. It may be mild or quite difficult to control, requiring diet restrictions and medication. In the medical and midwifery communities, the testing for, and diagnosis of, gestational diabetes can be controversial. GDM occurs in the second half of pregnancy, and testing is usually done at 28 weeks..

In normal pregnancy, the hormones lactogen, estrogen, and progesterone make extra glucose available to the baby by preventing insulin from doing its normal job of transporting glucose out of the mother's bloodstream and into her own cells. This insulin suppressant effect increases as pregnancy advances. As a result, maternal levels of blood glucose rise linearly throughout pregnancy, although *the woman has normal or above normal levels of insulin*. The normal and physiologic increased amount of blood sugar (glucose) that is available to the baby helps ensure that it has sufficient glucose for its own normal, but rapid growth and to convert to glycogen (stored glucose). The normal levels of insulin result in a decrease in blood glucose levels when the woman is not eating. The glucose levels, after an overnight fast, will return to normal or may become lower than nonpregnant levels because the body has had a chance to catch up.

### What is gestational diabetes?

Gestational diabetes refers to a transient condition occurring only in pregnancy and is based on blood glucose levels only slightly above norm. In 1979 it was determined that pregnant women in certain blood sugar ranges had an increased risk for developing true diabetes mellitus later in life. This predictor of diabetes later in life was thought to be a prediabetes condition. Eventually the theoretical link between this prediabetes condition and risks to the baby of a truly diabetic mother was made and the "disease" was called gestational diabetes. Prior to this time, pregnant women were evaluated for diabetes according to standards set for the non-pregnant population ( see Section 1).

### How is gestational diabetes diagnosed?

The pregnant woman is usually given a 1 hour glucose tolerance test. This consists of 50 grams of a sugary drink called Glucola. Her blood is taken before the drink is given and again 1 hour later. She is not allowed to eat and may only drink water between the two blood samples. The amount of pure simple sugar in the Glucola is equivalent to eating 18 Brach's jelly beans in a very short time.

### How is gestational diabetes treated?

Usually by improving the diet (see Section 3). It means fewer foods made with simple sugars and white flour. This means more high quality protein, complex carbohydrates and whole grains, more vegetables, and fewer fruits. The improved diet is how any pregnant woman should be eating to ensure a healthy pregnancy.

If the improved diet fails to control blood sugars within a specific range, the physician will start the woman on insulin injections. She will also need to monitor her blood sugars several times each day.

### Are gestational diabetes and Type 1 or Type 2 diabetes mellitus the same thing?

No. Insulin levels for the gestationally diabetic woman remain normal. *The true diabetic has abnormally low levels of insulin or a decreased number of insulin receptors*. The symptoms (elevated blood sugar) of gestational diabetes and treatment for the condition usually end with the infant's birth. The woman who has Type 1 or 2 diabetes mellitus will need to use diet restrictions and probably insulin before pregnancy, or during pregnancy and will need to continue to control her blood sugar after the birth to prevent damage to her eyes, kidneys, and circulatory system. Unfortunately, much of the research defining the risks of diabetes in pregnancy does not differentiate between the true diabetic and the woman diagnosed as gestationally diabetic.

## **Who is at risk for Type 1 or 2 diabetes mellitus and what are the risk factors?**

Certain population and ethnic groups have a higher prevalence of Type 1 or 2 diabetes mellitus. These include Black, Hispanic, Native American, and Asian women.

Other risk factors include:

- \* previous pregnancy history of macrosomic<sup>1</sup> baby (more than 9#), unexplained stillbirth, or congenital anomalies
- \* obesity (elevated BMI adjusted for race or ethnicity)
- \* family history of diabetes in close relative (parent, sibling, or child)
- \* poor or inadequate diet- little high quality protein, vegetables, complex grains, but lots of sugary or sweet foods.

## **How is true diabetes mellitus diagnosed?**

Diagnosis is usually based on clinical signs such as those below. There may also be a tendency toward recurrent vaginal yeast infection, slow healing, acetone breath (fruity smell), and a tendency toward other infections. The clinical signs of true (Type 1 or Type 2) diabetes mellitus include:

- \* glucose in the urine
- \* excessive thirst
- \* excessive urination
- \* ravenous appetite
- \* weight loss
- \* elevated blood glucose levels (most accurate when taken after a normal meal)

## **How accurate are the test for gestational diabetes?**

The results may be skewed by many factors. Some result in blood sugars that appear falsely low and other that are falsely high. These include:

- \* A poor or inadequate diet
- \* Hypothyroidism
- \* High doses of vitamin C
- \* Use of diuretics (water pills), steroids, aspirin, oral contraceptives, and some antiepileptic medications.
- \* Fever or viral infections
- \* Adrenaline from fear or anger
- \* Obesity
- \* Smoking
- \* Coffee or other caffeinated products.

Because the test result can be affected by so many factors the 1 hour test is considered a screening test, it only tells if you are at increased risk. If results indicate an increased risk for abnormal glucose tolerance during pregnancy any influencing factors should be investigated and removed for three days before repeating the test or performing a 3-hour GTT. The 3 hour test is considered diagnostic.

## **What are the risks of Type 1 or 2 diabetes mellitus in pregnancy?**

The uncontrolled levels of blood glucose early in the pregnancy, before development is complete, can result in birth defects to the heart, the kidneys, the intestinal system, the nervous system and the skeletal system. These birth defects occur 2-3 times more often in the babies of diabetic mothers.

Diabetes mellitus in the mother can also result in:

- \* a large, fat, edematous baby subject to low blood sugars due to a rapid postpartum decrease in fetal glucose levels. The increased size can also increase the risk for birth injuries and trauma.
- \* prematurity with respiratory distress and other problems
- \* unexplainable intrauterine death- especially after 36 weeks.
- \* higher risk of maternal complications such as toxemia, circulatory, visual, and kidney problems

## **Are there other risks for women diagnosed as gestationally diabetic?**

---

<sup>1</sup> There is a definite difference between truly macrosomic babies resulting from poor diabetic control and the healthy, larger babies resulting from a good maternal diet.

Yes, increased testing: more ultrasounds and other fetal weight surveillance  
Higher incidence of induced labor, epidural and forceps use; greater risk of cesarean delivery  
More doctor visits, diet restrictions, increased blood glucose monitoring during pregnancy and labor, possible use of insulin injections.

**Important things to remember:**

- \* Gestational diabetes has not been convincingly shown to increase risk -- except the risk of having a big baby. Even so, most babies of mothers with gestational diabetes will be of normal weight and most high-weight babies will be born to women who are not gestational diabetics.
- \* Even if risks exist, treatment has little effect on reducing them and introduces considerable risk, stress, and unpleasantness of its own.
- \* Maternal weight correlates with fetal weight. Thus, overweight or obese women should reduce their weight before becoming pregnant.
- \* Elective inductions and cesareans for suspected macrosomia do not improve outcomes, and they increase cesarean rates.
- \* Equally good outcomes for gestational diabetics can be achieved with far less intervention.
- \* The oral glucose tolerance test, used to diagnose gestational diabetes does not produce reliable, repeatable values.
- \* Bed rest, failure to consume adequate amounts of carbohydrates for three days before the test, and many medications can cause false positive test results.

**Should I have this test done?**

The answer depends on your family history and your risk factors. If there are close relatives who are diabetic, you are overweight, have a diet high in refined sugar and white flour, or are showing signs you may be diabetic, the test is recommended. Otherwise, the risks may outweigh the benefits.

It is also an issue of safety for you and your baby. If you truly are diabetic (have diabetes mellitus) the safest place to give birth will be in the hospital where you and the baby can receive medically appropriate care.

### Section 3: Diet for the Diabetic in Pregnancy

#### INSULIN RESISTANCE DIET WHITE CRANE MIDWIFERY, KAREN WENDT, CNM

Some of us do not utilize the insulin produced by our bodies in a correct manner. This results in weight gain, and eventually diabetes. Simple Carbohydrates are the food substances which are improperly metabolized when we suffer insulin resistance. Simple Carbs are such as sugars, potatoes, white flour, most pastas, white rice, syrups, corn products, honey, etc. Most of us eat entirely too much of these foods. This triggers insulin production from our pancreas and results in extreme highs and lows of blood sugar. The insulin breaks down the high blood sugar and stores it as fat. This results in weight gain, fatigue, feeling of hunger, sometimes palpitations, and increased bad cholesterol. Meat and other protein-rich foods increases the body's production of glucagon and levels out blood sugar. The pancreas then does not have to over produce insulin. We generally feel better.

To prevent big fluctuations in blood sugar and resultant over production of insulin, EAT AS FOLLOWS:

- Dairy: 3 or more helpings daily. This increases fat breakdown and decreases fat storage.
- Meat: 3 or more times daily (2 to 3 ounces is a helping). Increases metabolism 40% for 5 hours after eating. Protein shakes are not a substitute for meat. You must eat real meat, chicken, pork, venison, elk, moose, fish, etc.
- Vegetables: 9 or more helpings each day of any, and all vegetables, other than CORN. These provide the best source of fiber and complex carbs which decrease fat absorption and storage.
- Nuts: ½ Cup daily. Try to get unsalted or sea salted. This is also a great fiber source and increases good cholesterol.

Eggs are okay, but no more than one or two per day. Beans, whole or refried, are okay also. Other good foods on this eating program are yams (boiled or baked, and not candied), avocados, pickles, and pickled fish.

Take a multivitamin daily plus a Vitamin B6, 50-100 mg daily.

Coffee and Tea are okay, without sweetener

**DO NOT SKIP MEALS, ESPECIALLY BREAKFAST OR LUNCH – FASTING INCREASES INSULIN RESISTANCE.**

Do not eat past 7 PM

EXERCISE: Decreases insulin release for 24 hours. 30 minutes of sweating daily.

**AVOID:** Simple carbohydrates are sugars, potatoes, white flour, most pastas, white rice, syrups, corn products, jams, jellies, honey, etc. **IF IT IS NOT ONE OF THE FOLLOWING, YOU MAY EAT IT:**

- Soda Pop
- Alcohol
- Flour (white bread, pasta, cold cereals, tortilla, crackers)
- White Rice
- Fruits
- Potatoes
- Sweets, including artificial sweeteners
- Corn

Remember the one-hour rule- if you must eat simple carbs, choose one hour of the day in the afternoon, and only every third day, or better yet, once a week. Do not eat past 7 PM.

MEAL PLAN: eat until satisfied

Breakfast: meat, dairy, vitamins, (may have an egg)

Morning Snack: nuts (peanuts, pecans, macadamia, walnuts, cashew, etc.), celery and peanut butter, cheese, raw veggies, meat, etc.

Lunch: meat, dairy, vegetables.

Afternoon Snack: Same choices as morning snack. Protein bars contain too much sugar, so do not use.

Dinner: meat, dairy, vegetables – try adding fresh fruit back in after reaching your desired weight.

Suggested Reading: The Carbohydrate Addicts Diet, by Rachael and Richard Heller.