



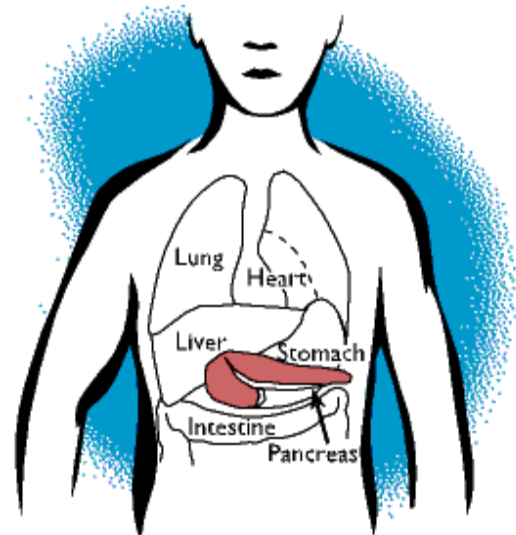
Type 2 Diabetes

Type 2 is the most common form of diabetes. In this form, the body does not produce enough insulin or the body ignores the insulin that is produced. Insulin is required by the body in order to use sugar. Insulin takes the sugar from the blood into the cells. When glucose builds up in the blood instead of going into the cells, it can cause some problems:

- In the short-term, your cells may be starved for energy
- In time, high blood glucose may damage your eyes, kidneys, nerves or heart

About Insulin

- Inside the pancreas, beta cells make the hormone insulin. Beta cells release insulin to help the body use or store blood glucose from food.
- In individuals with Type 1 diabetes, the pancreas no longer makes insulin. The beta cells have been destroyed and insulin shots are the only way to keep blood glucose levels down.
- Individuals with Type 2 diabetes make insulin, but their bodies don't respond well to it. Most people with Type 2 diabetes can control their condition through diet and exercise. Only a small amount of people need diabetes pills or insulin shots to help their bodies use glucose.



Although diabetes occurs in people of all ages and races, some groups have a higher risk for developing type 2 diabetes (DM) than others. Examples include:

- African Americans
- Latinos
- Native Americans
- Asian American/Pacific Islanders
- Aged population

Conditions that can arise from Type 2 DM

- Hypoglycemia
- Hyperglycemia
- Hyperosmolar Hyperglycemic Nonketotic Syndrome (HHNS)



—HYPOGLYCEMIA—

Hypoglycemia, or low blood glucose (sugar) is a problem that happens from time to time in everyone who has diabetes. It is sometimes referred to as “insulin reaction.” Although it may be unavoidable at times, it is important to recognize and treat it immediately before symptoms worsen.



Symptoms of Hypoglycemia

- Shakiness
- Dizziness
- Sweating
- Hunger
- Headache
- Pale skin color
- Sudden moodiness or behavior changes, such as crying for no apparent reason
- Clumsy or jerky movements
- Seizure
- Difficulty paying attention or confusion
- Tingling sensations around the mouth

You should check your blood glucose level according to the schedule you work out with your doctor. In addition, you should check your blood glucose any time you have any of the symptoms of low blood glucose. If you check and observe a low blood glucose level, then treat for hypoglycemia quickly. A good rule if you are unable to check your blood glucose is: “When in doubt, treat”

Treating Hypoglycemia

The quickest way to raise your blood glucose and treat hypoglycemia is with some form of sugar, such as:

- 3 glucose tablets
- 1/2 cup of fruit juice
- 5-6 pieces of hard candy



If hypoglycemia is not treated quickly enough, you could lose consciousness. If you do, immediate treatment will be required, such as an injection of glucagon or emergency treatment at a hospital. Glucagon, like insulin, is injected but serves a different purpose. Glucagon works to raise your blood glucose. Your doctor can prescribe glucagon and tell you how to use it.

—HYPERGLYCEMIA—

Hyperglycemia is the technical term for high blood glucose. It happens when the body has too little, or not enough, insulin or when the body can't use insulin properly.



Potential Causes of Hyperglycemia

- Eating more than planned
- Exercising less than planned
- The stress of illness, such as a cold or flu
- Other stresses, such as family conflicts or dating problems

It is important to monitor blood glucose levels frequently. If hyperglycemia is detected, treatment should begin immediately. Failing to treat hyperglycemia could lead to a condition called ketoacidosis. Ketoacidosis occurs when the body doesn't have enough insulin. Without insulin, the body can't use glucose for fuel, so it is left breaking down fats for energy.

Symptoms of Hyperglycemia

- High blood glucose
- High levels of sugar in the urine
- Frequent urination
- Increased thirst



Symptoms of Ketosis

- Shortness of breath
- Breath that smells fruity
- Nausea and vomiting
- A very dry mouth



Waste products (ketones) are generated as your body breaks down fats. Large amounts of ketones cannot be tolerated by the body. So, your body will try to excrete these ketones through the urine. However, not all will be able to be excreted, and the rest is left to build up in the blood. This buildup is what leads to ketosis.

How to Treat Hyperglycemia

Exercise is often effective in lowering blood glucose levels. However, if your blood glucose is above 240 mg/dl, check your urine for ketones. If they are present, do NOT exercise. This can actually lead to higher blood glucose levels than prior to beginning the exercise. You will need to work with your doctor on finding the best way to lower your blood glucose level.



—HYPEROSMOLAR HYPERGLYCEMIC NONKETOTIC SYNDROME—

HHNS is a serious condition most frequently seen in older persons. It can occur in both type 1 and type 2 diabetes, although it is most commonly seen in type 2. HHNS is usually brought on by something else, such as an illness or infection.

In HHNS, your blood sugar levels rise. Your body tries to rid itself of excess sugar by passing it through the urine. Initially, a lot of urine is produced and you have to go to the bathroom often. With time, you may not have to go as often and the urine can become very dark. You may be very thirsty. Even if you are not thirsty, it is very important to consume a lot of liquids to prevent dehydration. If HHNS continues, severe dehydration can potentially lead to seizures, coma or even death.

Warning Signs of HHNS

- Blood glucose level over 600 mg/dl
- Dry, parched mouth
- Extreme thirst
(which may gradually disappear)
- Warm, dry skin that does not sweat
- High fever
(>101 degrees Fahrenheit)
- Sleepiness or confusion
- Loss of vision
- Hallucinations
(seeing/hearing things that aren't there)
- Weakness on one side of the body

To Prevent HHNS

- Check your blood glucose regularly
- Speak with your doctor about how often you should check your blood glucose and what your target range should be

Importance of Monitoring Blood Glucose

- Keeping your blood glucose in your target range can help prevent or delay the start of diabetes complications, such as nerve, eye, kidney and blood vessel damage.
- Once an individual learns that he/she has diabetes, it is important to work with your health care team to create a diabetes care plan.
- The plan aims to balance the foods you eat with exercise, and possibly, with diabetes pills or insulin.
- There are two types of checks that you can do to help keep track of how your plan is working:
 - Blood glucose checks
 - Urine ketone checks



Blood Glucose Monitoring Checks

This is the main tool you have to check diabetes control. The check can tell you your blood glucose level at any one time.

Keeping a log of results is important.

You can present this log to your healthcare provider. The log provides the healthcare provider with a good picture of your body's response to your diabetes care plan. It will allow for your doctor to make changes if necessary.

Urine Checks

Urine checks are not as accurate as blood glucose checks. They should not be done to test for glucose levels unless blood testing is impossible. A urine check for ketones, however, is another matter.

This is an important check when your diabetes is out of control or when you are sick. Everyone with diabetes should know how to check their urine for ketones.



Experts feel that anyone with diabetes can benefit from checking their blood glucose. The American Diabetes Association recommends blood glucose checks if you have diabetes and are:

- Taking insulin or diabetes pills
- On intensive insulin therapy
- Pregnant
- Having a hard time controlling your blood glucose levels
- Having severe low blood glucose levels or ketones from high blood glucose levels



When You Should Test For Ketones

Ask your doctor or nurse when to check for ketones. You may be advised to check for ketones when:

- Your blood glucose is more than 300 mg/dl
- You feel nauseated, are vomiting, or have abdominal pain
- You are sick (example— with the cold or the flu)
- You feel tired all the time
- You are thirsty or have a very dry mouth
- Your skin is flushed
- You have a hard time breathing
- Your breath smells "fruity"
- You feel confused or "in a fog"



Tight Control and Diabetes

The benefit of tight control of blood glucose can be in the prevention or slower progression of many complications of diabetes, giving you extra years of healthy, active life. However, tight control is not for everyone and it involves hard work. Much of the previous research on the benefits of tight control and diabetes has involved type 1 diabetes. But doctors believe that tight control can also prevent complications in people with type 2 diabetes as well. Most people with type 2 diabetes do not take insulin, so it may not be apparent how such tight control could occur in these individuals.

- Losing weight is one way to achieve tight control. By shedding excess pounds, you may be able to bring your glucose levels down to normal. Your doctor should work with you to find an eating and exercise plan right for you.
- Exercising is another way to achieve tight control. Even without a weight loss, exercise proves beneficial with blood glucose control. It allows for your cells to take glucose out of the blood.

Tight Control- Not Recommended For:

- Children
- The elderly
- Some individuals who already have complications, such as individuals with end-stage kidney disease or severe vision loss
- Some individuals with diseases, such as coronary artery disease or vascular disease
- Individuals with hypoglycemia unawareness

Pennington Nutrition Series Pub No 33

Authors:

Heli Roy, PhD, MBA, RD

Shanna Lundy, BS

Beth Kalicki

Division of Education

Phillip Brantley, PhD, Director

Pennington Biomedical Research Center

Steve Heymsfield, MD,

Executive Director

2/06; Rev. 10/09; Rev. 3/11

American Diabetes Association

The Pennington Biomedical Research Center is a world-renowned nutrition research center.

Mission:

To promote healthier lives through research and education in nutrition and preventive medicine.

The Pennington Center has several research areas, including:

Clinical Obesity Research

Experimental Obesity

Functional Foods

Health and Performance Enhancement

Nutrition and Chronic Diseases

Nutrition and the Brain

Dementia, Alzheimer's and healthy aging

Diet, exercise, weight loss and weight loss maintenance

The research fostered in these areas can have a profound impact on healthy living and on the prevention of common chronic diseases, such as heart disease, cancer, diabetes, hypertension and osteoporosis.

The Division of Education provides education and information to the scientific community and the public about research findings, training programs and research areas, and coordinates educational events for the public on various health issues.

We invite people of all ages and backgrounds to participate in the exciting research studies being conducted at the Pennington Center in Baton Rouge, Louisiana. If you would like to take part, visit the clinical trials web page at www.pbrc.edu or call (225) 763-3000.