

Chapter 2

What Is Diabetes?

TYPE 1 (INSULIN-DEPENDENT) DIABETES

Type 1 (also known as insulin-dependent diabetes mellitus [IDDM] or juvenile or childhood) diabetes is the most common type found in children and young adults. **This condition occurs when the pancreas doesn't make enough insulin.**

TYPE 2 DIABETES

There is another kind of diabetes that is sometimes found in overweight pre-teens and teenagers, and is also the most common type of diabetes in adults over age 40 years. It is called **type 2 diabetes**, or sometimes adult-onset or non-insulin-dependent diabetes mellitus (NIDDM). In type 2 diabetes, **insulin is still made** in normal or increased amounts (at least initially), but it doesn't work very well in helping the body use sugar. People who develop childhood (type 1) diabetes are insulin dependent for life. They will always have this type of diabetes. They will not convert to type 2 diabetes as they grow older. Likewise, people with type 2 diabetes do not convert to type 1 diabetes.

In type 2 diabetes, ketones (Chapter 5) may still be present at diagnosis as well as high blood sugars (Chapter 7) and an elevated HbA_{1c} test (Chapter 14). If ketones are present, insulin shots may be started. At a later time, if the antibody tests (Chapter 3) are negative and the blood sugars and HbA_{1c} test have decreased to near normal, the oral tablets may be tried. **Insulin cannot be taken in pill form because the acid in the stomach would break it down.** Type 2 diabetes is discussed in more depth in Chapter 4.

TEACHING OBJECTIVES:

Design informational sessions for families in all chapters with consideration for their:

- educational level
- primary language
- culture or ethnicity
- family structure
- learning style
- previous experience with the medical community

LEARNING OBJECTIVES:

Learners (parents, child, relative or self) will be able to:

1. Define the basic disease process of type 1 and type 2 diabetes (also see Chapters 3 and 4).
2. Define normal and abnormal blood sugars along with HbA_{1c} as part of the diagnosis of diabetes.
3. Define symptoms of type 1 or type 2 diabetes and compare with the symptoms experienced by the patient at diagnosis.

WHY WE NEED INSULIN:

- **Insulin allows sugar to pass into our cells so that it can be “burned” for our energy.** The cells are like a furnace, which burn fuel to make energy. Our bodies constantly need energy for all of our body functions, such as allowing our heart to beat and our lungs to breathe. Sugar comes from two places (see Figure in this chapter). “**Internal**” sugar comes from our body’s own production in the liver or from the release of stored sugar from the liver. This sugar is released into the blood stream. “**External**” sugar comes from the food we eat. It enters the stomach and then moves into the intestine where it is absorbed. When people **do not** have diabetes, the pancreas makes insulin to regulate both internal and external sugar.



This means a person without diabetes can eat sugary foods and their blood sugar will remain in the normal range.

When people have type 1 diabetes, the pancreas does not make enough insulin. The blood sugar can’t pass into the body’s cells to be burned. Instead, the blood sugar rises to a high level and overflows through the kidneys into the urine. When sugar enters the urine, water is pulled from all over the body to go out with the sugar.

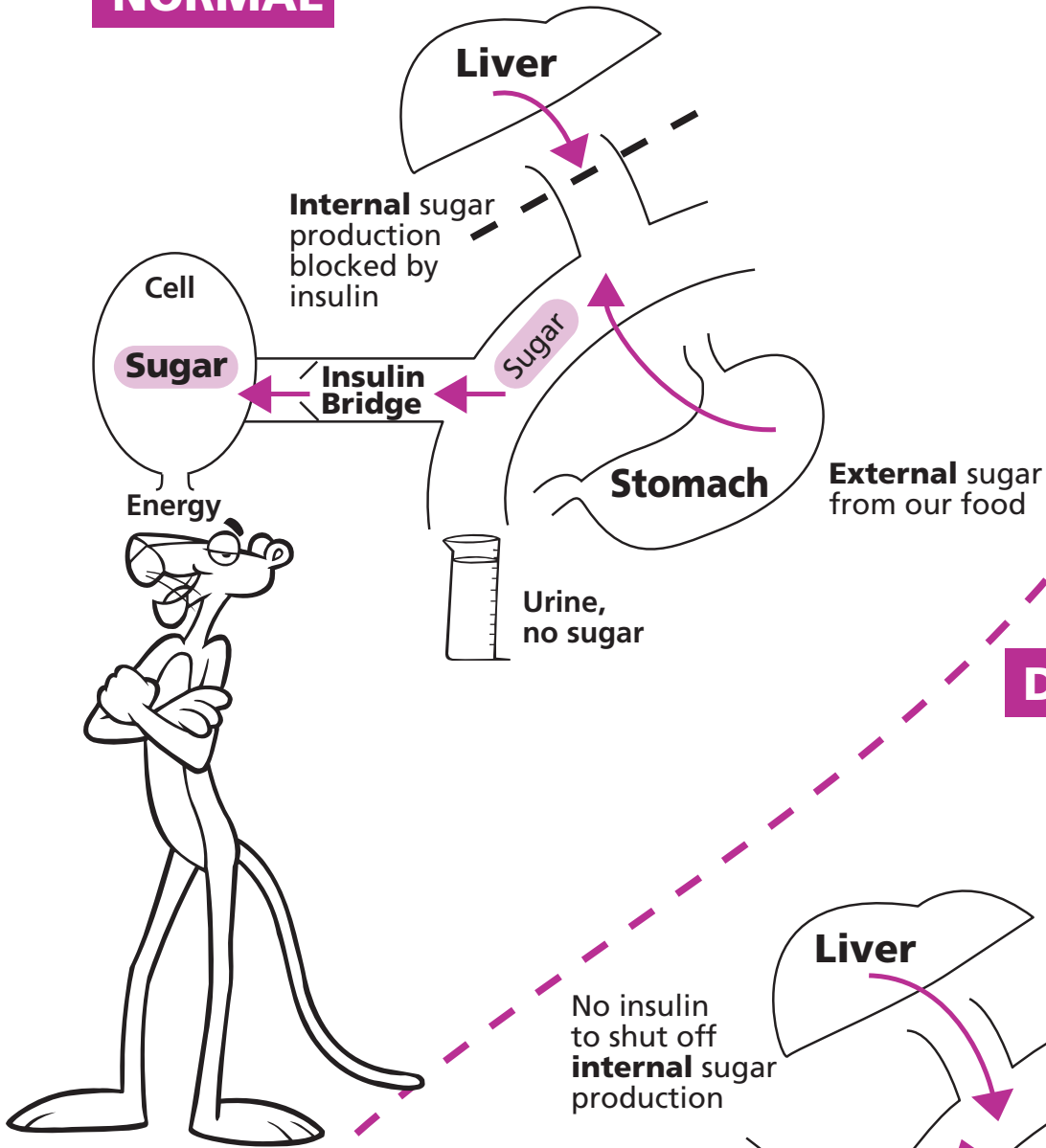
The results are the usual SYMPTOMS of diabetes:

- **Frequent passing of urine:** to carry excess sugar out of the body
- **Frequent drinking of liquids:** to make up for water lost in the urine
- **Frequent eating of food:** because the body can’t use the food it takes in and is hungry for the energy it isn’t getting. This hunger is not always present in children. Sometimes the appetite may even decrease. Ketones (see Chapter 5) can cause an upset stomach and possible vomiting.
- **Weight loss:** when the body can’t get sugar into the cells, it burns its own fat and protein for energy. This causes weight loss.
- **Changes in behavior:** if the person is getting up frequently at night to pass urine, sound sleep will not occur. This can result in behavioral changes.
- **A second function of insulin is to shut off the body’s internal production of sugar** (see Figure in this chapter). This internal sugar mostly comes from the liver. When the insulin level is too low, too much internal sugar is made.

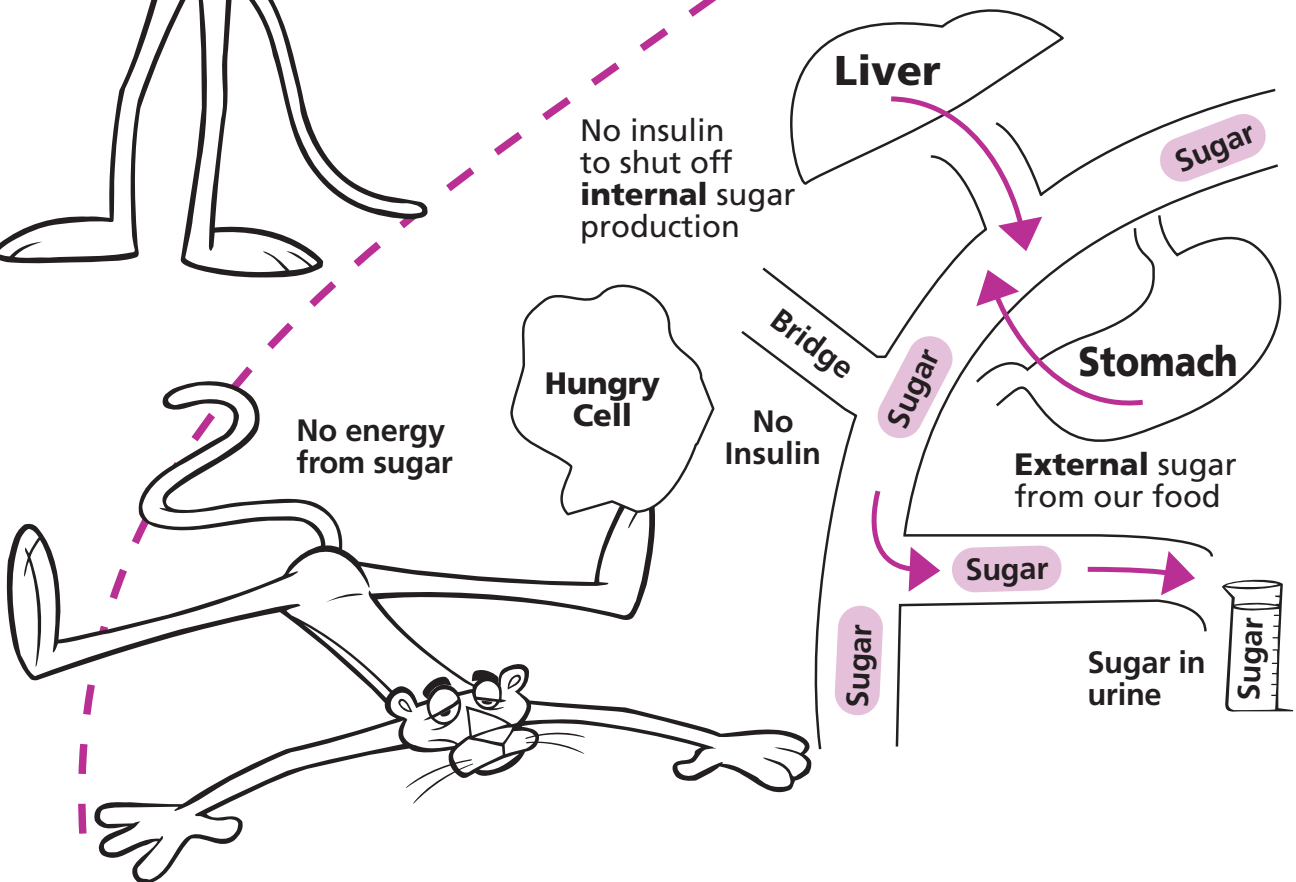
Thus, when there is not enough insulin, the blood sugar level can be high for two reasons:

- Too much internal sugar being made
- The sugar (from internal production and from external food) cannot pass into the cells

NORMAL



DIABETES



HONEYMOON (GRACE) PERIOD

As stated previously, type 1 (insulin-dependent) diabetes does not turn into type 2 (adult) diabetes as children become adults. According to what we now know, people with type 1 diabetes will need insulin injections for the rest of their lives. Often, there is a honeymoon or grace period that may occur a short time after the onset of diabetes. It commonly starts within two to eight weeks, although not all people have this honeymoon period. During the honeymoon, sugar production is turned off in the liver and a fair bit of insulin is still being made in the islet cells in the pancreas. This is a time when people often think they don't have diabetes. They may be attracted to miracle cures. The honeymoon period may last a few weeks to a few years. During this time, the body may not need much extra insulin. After this period, the body will again need more insulin, although small amounts of insulin may still be made by some. We advise our patients to continue their insulin during the grace period, even though the dose may be small. We know from experience that the body will again need more insulin. Usually with growth, illness or stress there may be a need for more insulin. This need may be evident when the morning blood sugars start to be above the desired range. It is usually hard to begin insulin shots again if the shots were discontinued.

The **MOST IMPORTANT RULE** for the patient with diabetes to remember is: **I MUST TAKE MY INSULIN (OR ORAL MEDICINES) EVERY DAY FROM NOW ON. IF I FORGET MY INSULIN/ORAL MEDICINES, MY DIABETES WILL GET OUT OF CONTROL. THERE IS ABSOLUTELY NO WAY I WILL NOT NEED INSULIN EVERY DAY FROM NOW ON IF I HAVE TYPE 1 DIABETES.** Even if I get sick, I still need insulin. I may need more or less insulin, but I must have it every day. **IMPORTANT:** The only known difference about people who develop type 1 diabetes is that their bodies don't make enough insulin. **THE PERSON AND EVERY OTHER PART OF THE BODY ARE OTHERWISE COMPLETELY NORMAL.**

DEFINITIONS

Bladder: The organ (sac) that collects the water from the kidneys and holds it until it is passed as urine (see the drawing).

Bloodstream: The flow of blood within the blood vessels to and from the different parts of the body.

Cells: The very smallest units of the body. You can only see them with a microscope.

Enzymes: Proteins in liver, muscle and intestine that help make sugar. (There are many enzymes that have other functions.)

Esophagus: The swallowing tube (see the drawing).

External sugar: The sugar taken in from food. Insulin allows the external sugar to pass into the body's cells to be used for energy.

Insulin: The substance (hormone) made by the pancreas that allows sugar to pass into cells.

Internal sugar: The sugar made by the body (or sugar released from stored sugar in the liver). Insulin shuts off the excess production of internal sugar.

Intestine: The part of the GI tract (gut) below the stomach where most sugar (and other foods) are actually absorbed into our blood stream (see the drawing).

Islet cells (pronounced eye-let): The groups of cells within the pancreas that make insulin.

Kidneys: The two organs in the body that remove waste products and water from the bloodstream and make urine (see the drawing).

Pancreas: The organ where insulin is normally made (see the drawing). People who have type 1 diabetes cannot make enough insulin and are thus insulin-dependent.

Stomach: Where the food is collected and processed after it is swallowed (see the drawing).

Type 1 diabetes: (Also called juvenile diabetes or childhood diabetes or insulin-dependent diabetes mellitus [IDDM].) The condition that

results when the body cannot make enough insulin. The most common type of diabetes in persons under age 40. Insulin must be taken by shots; pills do not help. Islet cell antibodies are usually present in the blood. This type of diabetes is discussed in detail in Chapter 3.

Type 2 diabetes: (Also called adult-onset diabetes or non-insulin-dependent diabetes mellitus [NIDDM].) The condition in which the body still makes insulin but is unable to use it. This is the most common type in adults over age 40. It also occurs in overweight preteens and teenagers. Pills may be able to stimulate the pancreas to make more insulin or make the person more sensitive to insulin. The pills are not insulin. People with type 2 diabetes do not have islet cell antibodies. This type of diabetes is discussed in detail in Chapter 4.

Urine: Water with wastes passed from the body by the kidneys.

QUESTIONS AND ANSWERS FROM NEWSNOTES

Q When our son was diagnosed with diabetes, he had been vomiting and had kept no food down for over 24 hours. Yet his blood sugar was over 1,000 mg/dl (55 mmol/L). How could that be when he had not eaten any sugar?

A Insulin has several actions in the body. One is to allow all (or any) sugar to pass from the blood stream into cells where it can be burned for energy. A second function is to shut off the body's own production of sugar (primarily from the liver). When insulin is not available, as in your son at the time of diagnosis, the liver production of sugar can be enormous. This likely accounted for the high blood sugar even though no sugar had been eaten.

