

Diabetes module

INSULIN AND DIABETES

The Key to Diabetes

Within the pancreas are islet cells. They make up only about 1% of the pancreas, and only certain islet cells (called beta cells) produce the insulin hormone. Still, the hormone normally controls blood glucose very efficiently.

What does insulin do?

Insulin functions like a gatekeeper that controls the storage and movement of energy (fuel) from food: it helps the body use energy from digested food properly. Insulin is not only important to the body's use of glucose, but of protein and fat as well.

Insulin allows glucose in the blood to move into body cells so it can be used for energy. If there isn't enough insulin, or if the insulin doesn't work properly, glucose builds up in the blood. When this happens, the body cells are deprived of energy. Also, when the level of glucose in the blood becomes abnormally elevated, glucose "spills" into the urine. Glucose in the urine causes increased urination—often one of the first symptoms of diabetes.

The body uses two types of fuel: glucose and fat. Carbohydrate is the most readily available source of glucose. If the body needs energy, then glucose is used immediately. If glucose is not needed for energy immediately, it will be stored in the liver and muscles as glycogen to be used later if fuel is needed for increased physical activity, because a meal was skipped, or for some other reason. Glucose, if not needed for immediate energy or for replacement of glycogen in the liver and muscle, will be converted to fat and stored. Insulin is required for all these processes.

If the body doesn't receive enough glucose for fuel, the liver can change protein (amino acids) into glucose. Insulin is needed for this glucose to be used. Insulin also allows amino acids to be used for building, replacing, and repairing muscle and body tissues. Finally, insulin affects what happens to the fat we eat, especially when we eat more than we need for energy. Insulin allows fat (triglycerides) to go directly into fat cells, where it is stored for future energy needs.

How does insulin work?

Much research has been dedicated to figuring out how insulin works. What we know is that insulin acts like a key, binding to special places (called receptors) on the surface of cells that are like locks. After a cascade of signals inside the cell, glucose enters the cell where it can be used to make energy or be converted to glycogen or fat for storage and future use. As the glucose enters the cell, blood glucose levels fall.

Different Types of Diabetes

Diabetes occurs in several forms, depending on whether the pancreas is unable to make insulin or insulin is produced but does not function well. We used to think of the two major forms as insulin-dependent and noninsulin-dependent diabetes, but these terms are not really accurate. We now prefer to call them type 1 and type 2 diabetes. Another type of diabetes that occurs only during pregnancy is called gestational diabetes. Gestational diabetes usually goes away after the baby is born, but women who have been diagnosed with gestational diabetes are at higher risk for developing type 2 diabetes in the future.

As mentioned previously, type 2 diabetes usually occurs after age 40—but not always. Similarly, type 1 diabetes usually occurs in younger people, but it can occur in people of all ages, just like type 2 diabetes.

People whose blood glucose levels are above normal but not high enough for them to be diagnosed as having diabetes are said to have prediabetes. People with these conditions should change their eating and exercising habits and lose weight, if needed, to prevent or delay the development of diabetes.

The chart below describes the differences between type 1 and type 2 diabetes. How does this information compare to your experience?

In type 1 diabetes, the insulin-producing islet cells have been destroyed, causing the lack of insulin. In type 2 diabetes, the beta cells produce some insulin but not enough (sometimes extraordinary levels), and the insulin typically does not seem to work properly. In other words, the body is “resistant” to its own insulin. This type of diabetes is often associated with obesity and usually becomes worse as the degree of obesity increases. One of the best ways to reduce the body’s resistance to insulin and help the cells use glucose properly is to lose weight and exercise.

Type 2 diabetes is a serious disease, but it can be managed. And with the help of our trained staff, you can do it.

Types of Diabetes		
	Type 1	Type 2
Who develops it?	Usually children or young adults.	Usually overweight adults.
What is the cause?	Pancreas is unable to make insulin.	Body is unable to use insulin as it should and the body is unable to make enough insulin.
How does a person feel?	May be very thirsty, hungry, and tired and need to urinate often. May lose weight. May have stomach pain and become very ill if diabetes is not treated right away.	May not notice anything unusual, or may be tired and thirsty and need to urinate often.
What is done to control diabetes?	Healthy diet, exercise, and daily insulin injections.	Healthy diet, exercise, and sometimes oral medication or insulin injections .

Developed in cooperation with the International Diabetes Center, Minneapolis, Minnesota.