What Is Diabetes?

A brief introduction to its inner workings

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YOU DON'T HAVE TO GO TO MEDICAL school to know enough about diabetes to take care of yourself. Eventually, by working hard at self-management, you will become an expert in your own condition. Still, it helps to know the basics of how diabetes works in the human body.

Anatomically Speaking

In the simplest terms, diabetes means having too much of a kind of sugar in your blood. But being physiologically "sweeter" is, unfortunately, less desirable than it sounds: As that sugar, called glucose, accumulates in the veins, it can cause all sorts of problems—the "complications" that you and your medical team are trying so hard to avoid.

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In diabetes, the accumulation of glucose occurs because its traffic cop, insulin, isn't doing its job. Insulin is a hormone, one of those little chemical messengers that can cause big changes in the workings of the body. Once hormones are released by glands, they travel through the blood to work their magic at some other location in the body. Usually, hormones are released in response to some stimulus. Insulin regulates metabolism, the body's processing of energy, and is released in reaction to the torrent of glucose that inundates the blood after a meal.

Where did all this glucose come from and where is it headed? Most of the food people eat gets converted into glucose, the body's energy currency of choice. Then, the circulatory system shuttles the glucose around, so hungry cells in the muscles, liver, and elsewhere can snatch it out of the blood as it passes by. The liver cells are in fact the hungriest for that glucose, because the liver is the body's between-meal glucose storage facility. Hours after a meal, when the blood glucose level and insulin levels begin to dwindle, the liver can tap into its glucose reserves to maintain a healthy blood glucose level.

The body's cells aren't smart enough to eat on their own, however. It is insulin, like a dinner bell, that tells cells it's time to extract glucose from the blood. After a meal is digested, and the blood is flush

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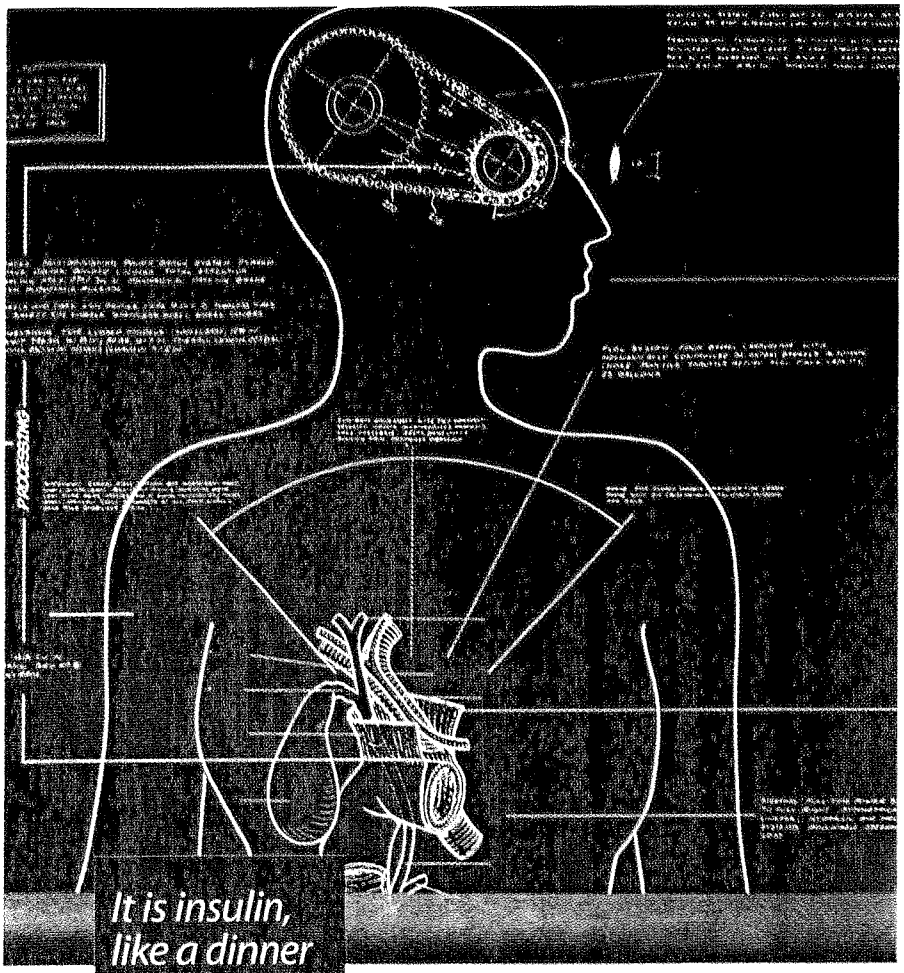

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with glucose, specialized cells in the pancreas, called beta cells, sense the glucose level in the blood and spring into action by releasing a dose of insulin.

Insulin receptors protrude from most cells in the body like fishing poles. When these receptors snare their insulin prey, they loudly boast of their catch to the inside of the cell. With that information, the cell knows it is chow time and sends glucose transporters to the surface. Cells vigilantly protect their insides with a very selective membrane coat, so these transporters are necessary to usher glucose into the cell's inner sanctum. As a result of this insulin-induced cellular feeding frenzy, blood glucose returns to normal, which, in one of the body's elegant feedback mechanisms, stops the flow of insulin from the beta cells until the next meal.

In diabetes, the above scenario doesn't go so smoothly. The insulin signaling scheme can go wrong in different ways, depending on the type of diabetes.

Different Strokes

Type 1 diabetes is an autoimmune disorder, which means it's caused by a person's own immune system treating some part of the body as a foreign object. The victims of this onslaught in type 1 diabetes are the pancreatic beta cells, which become the target of a massive immune invasion, and boom! No more insulin. Without insulin, the cells of the body don't eat. This is why type 1 diabetes is sometimes called "starvation in the midst of plenty": Even with veins full of glucose, the cells go hungry. Most people develop type 1 as children or teenagers, but a minority will acquire it in adulthood.

People with type 2 diabetes still produce at least some insulin. But what has happened is that, over time, cells begin to ignore insulin's request for glucose transporters. This is referred to as insulin resistance. For a time, the beta cells respond to this cellular insubordination by pumping out more and more insulin. But eventually the beta cells get fed up with the overtime and quit overproducing insulin. Without enough insulin around to compensate for the stubbornness of resistant cells, it's goodbye blood glucose control and hello type 2 diabetes.

Gestational diabetes is a third type, which develops in pregnant women. It is like type 2 in that insulin is still being produced, but the body has become resistant due to the hormonal changes of pregnancy. And while most of the time it recedes after the pregnancy is over, gestational diabetes is a risk factor for developing type 2 later.

No matter which type of diabetes you have, it's important to learn as much as you can so that you can understand your treatment and make good choices along the way. Having a basic idea about what's going on inside your body is a terrific first step.