

Before Diabetes Starts: Insulin Resistance and Glucose Intolerance

There are two types of diabetes:

Type I: generally onset at a young age [which means before the age of 16] and causes patients to require insulin injections. This type includes patients who are at risk for going into a diabetic ketoacidotic coma, which requires hospitalization for management, and

Type II (also called Adult Onset Diabetes), which typically develops in later life (by which I mean over the age of 35, often over the age of 55). These patients may come to require insulin injections, but often can be treated with diet modification and pills to control sugar.

Type I diabetes is complicated to discuss, but the initial problem these patients have is the destruction of the pancreatic cells that manufacture insulin, with resulting inadequate production of insulin. This is usually caused by immune system destruction of the cells in the pancreas that manufacture insulin, and that's why these patients require insulin injections.

Type II diabetes is a result of a sequence of events, finally leading to the “defined state” of diabetes, which means the spilling of sugar into the urine. It is never normal for anyone to spill sugar into their urine, no matter how much sugar they may consume.

There are 4 steps in the development of Type II diabetes in any individual patient:

1. Having too many fat cells in your body.
2. Having the fat cells stop responding to the insulin that you produce, so instead of manufacturing fat from the excess sugar in your blood they just leave that sugar in your blood, raising your “blood sugar” tests.
3. Having the liver cells convert this extra sugar in your blood into glycogen, which is an storage product that fills the liver cells and causes a condition called “fatty liver” which can cause abnormalities in your “liver enzyme” blood tests.
4. Having your liver cells saturated with glycogen and fat, so that the extra sugar just stays in your blood, finally raising the “blood sugar” level over 225, at which level it spills over into your urine, just as the water in a pond spills over the dam once it reaches a high enough level. This was the original definition of diabetes. The formal definition of Diabetes is now having a fasting blood sugar of 125 or greater. Having a fasting blood sugar of between 110 and 125 is often called Glucose Intolerance.

People can get a tendency toward diabetes several ways:

1. They have a family history of diabetes
2. They are significantly overweight: more than 20% over their “ideal body weight”
3. They are consuming too much sugar: 5 spoonfuls of sugar in a cup of coffee is asking to overload your body's capacity to cope with it's sugar load: believe it or not, I have a patient who does this.
4. They are getting little or no exercise, which mobilizes glycogen and uses up some of that stored fat within the liver and within the “blubber” of the body.

Because patients with Type II diabetes do manufacture insulin, they often do not require insulin injections. What they need is:

1. to stop “straining” their physiological system with high levels of sugar intake
2. to get their body cells to be more responsive to the insulin they are manufacturing, and sometimes
3. to “squeeze” more insulin out of their pancreas.

Thus, there are three different modes of treatment:

1. a “diabetic diet” to reduce the total number of carbohydrates they eat, with or without an enzyme blocker to slow down their digestion of carbohydrates, so their load of sugar molecules entering their blood stream per minute is slowed down and spread out over a longer period of time, along with a program of regular exercise to burn up some of the stored glycogen that is congesting the liver and not leaving any room for any more to be made
2. medicine to slow down the digestion of sugar you eat, to “unload” the system
3. medicine to enhance the responsiveness of the body cells to insulin molecules
4. medicine to enhance the production of insulin molecules

Only when all of these managements have failed is it necessary to add insulin.

The Physiology of Exercise: *How does it make you feel better; What hormonal changes does exercise evoke to achieve this beneficial feeling? These are questions to which we don't have the answers (yet), but anyone who gets exercise regularly will confirm that exercise does make them feel better. How this altered physiology alters the physiology of a person's metabolism with respect to the physiology of “glucose intolerance” and “diabetes” is not known, but research has shown that exercise does change the status of their diabetes.*

So what are the take-home messages??

1. Control your weight.
2. Get regular exercise... routine walking around the parking lot during your breaks and at the end of you lunch will be a start.
3. Don't let your mouth overload your liver: remember that blubber is for whales trying to conserve body heat so they can live as mammals in a cold ocean and brown fat is for bears preparing to stop eating for five months!!!