



**WEIGHT ★ NO ★ MORE
DIET CENTER™**

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“WHAT IS INSULIN, WHAT DOES IT DO ... AND WHY SHOULD I CARE?”

Insulin is a major *anabolic* (tissue-building) hormone of metabolism and has many roles in the body. Unlike the anabolic effects of testosterone that builds muscle and bone, insulin is an anabolic hormone that *builds fat*. Excess insulin is a serious problem ... it tells the kidneys to hold onto more salt, and more salt means high blood pressure. Insulin also stimulates cell growth, and, in the case of cancer cells ... *that* can mean growing into tumors.

How Does Insulin Work?

As you eat, food is converted to glucose, and the level of glucose in the blood rises. The brain senses the rise in glucose and sends a rapid signal to the pancreas to release insulin. Insulin will then do two things: Move the glucose from the blood into cells that need the glucose for its source of energy to survive; carry glucose into fat cells to be stored for your body's later energy needs.

Normally, after it has done its job of moving glucose into cells, insulin levels quickly drop back down to a low baseline. The glucose that was moved into cells is used for immediate fuel (energy), and there isn't any excess fat stored. Thus ... insulin's main job is to ferry the rising glucose out of the bloodstream and into muscle cells where it can be burned for immediate energy; or to move the glucose into fat cells where it is used to store more body fat.

Let's now talk about *abnormal* conditions ...

If your body makes too much insulin in response to food, then insulin stays too high after eating and causes more food to be stored as body fat instead of being burned for energy. In addition, as we gain more body fat, cells become distorted in shape and this impairs insulin response. When this happens, glucose levels in the blood remain high after you eat because even though the insulin is present, it isn't working well. Your brain sensors detect the continuing high glucose levels and signals the pancreas to release even *more* insulin to bring glucose down. Your bloodstream and cells become *flooded* with insulin. Then, suddenly, when all this insulin does start working, the glucose rushes into the cells and your blood glucose level plummets. (This is called *reactive hypoglycemia* or 'low blood sugar.')

A falling blood sugar causes you to feel any or all of ravenously hungry, shaky, sweaty, nauseous, lightheaded, and causes fuzzy thinking, heart palpitations and a racing pulse. It also causes intense food cravings, especially for sweets. Then, as soon as you give in, the whole cycle starts over.

When insulin is not working properly to deliver a steady supply of glucose to working muscle cells, the effect is the same as not getting enough food. The cells are not getting their fuel, so you get hunger signals and eat more, even though plenty of fuel (glucose) is circulating in the bloodstream. What's worse is that your fat cells are also screaming for more food. It's like you have a leak in your car's gas line. Even though you keep filling the tank (eating), the fuel never gets to the engine (your cells) so it can work. The excess insulin makes your body store more fat, and less effective at burning fat stores for energy. Each day this pattern repeats. You get fatter, and fatter and fatter while you eat less and less and less.

The fatter you get, the more insulin is produced. And, in women, the higher insulin levels then stimulate more *androgen* (male hormones) production in the ovary. This is a major cause of the marked weight gain in young women with PCOS. A milder form of this imbalance occurs in perimenopausal women who are losing estradiol (*the* most powerful of the 3 estrogens) and "unmasking" the effects of their androgens (again, referring to the 3 male hormones that all women produce: testosterone, DHEA and androstenedione). As women shift toward more androgens and lower estradiol, more body fat builds around their waists and deep inside the abdomen (visceral fat), similar to males (known as "male pattern obesity").

The whole pattern——high levels of both insulin *and* glucose in the bloodstream which causes glucose to be stored as fat instead of being burned for immediate energy——is called ***insulin resistance***.

What triggers excess insulin (*insulin resistance*)?

- Weight gain, especially around the waist and upper body
- Constant dieting with the wrong kind of foods, especially high carbohydrate foods
- Consuming most of your calories late in the day, especially if high carbohydrate foods
- Increased stress with high cortisol
- Disrupted sleep and/or altered sleep-wake cycles, such as getting up at noon and staying up until 3:00 am
- Sedentary lifestyle, without regular aerobic exercise
- Medications that cause weight gain or decrease insulin sensitivity

... and, as pertains specifically to women, additional triggers are::

Pregnancy; PCOS; declining thyroid function; low estradiol; higher androgens (male hormones)

What are some of the effects of insulin resistance?

- Impaired immune function making you more susceptible to infections
- Increased build-up of the smooth muscle in artery walls that narrows the passage for blood flow, leading to Both HBP and reduced blood flow to critical organs
Plaque build-up in the arteries also *reduces* blood flow, leading to strokes and heart attacks (even in younger women, as is often seen in PCOS)
- More platelet stickiness, leading to increased risk of clots
- Increased risk of diabetes and heart attack
- Later, increased risk of breast, endometrial, colon, liver and pancreatic cancers
- Growth of other cancers

One final “fuel” for thought ...

Glucose and oxygen are critical fuels for the brain's survival so the body keeps tight control on levels of both. Glucose changes can have severe consequences so the body has ways to keep glucose from “swinging” to dangerous extremes, both high or low. *Insulin* and *glucagon* are the two major regulators of glucose to keep it in healthy ranges. They act in opposite ways, much like a see-saw, and so they are called the “counter-regulatory hormones.” When these two hormones work normally, insulin keeps blood glucose levels from rising too high (*hyperglycemia*), and glucagon prevents blood glucose from dropping too low (*hypoglycemia*). It isn't just the actual high or low blood glucose levels that cause symptoms. The rate of rise and fall in glucose is a crucial factor that can also lead to the symptoms of hypoglycemia, and trigger insulin and glucagon release.

As we get fatter, however, insulin and glucagon don't work as well, so our body has difficulty keeping blood sugar in the healthy range. That is when we develop problems like hypoglycemia (low blood sugar), glucose intolerance (rapid rises and abrupt falls), insulin resistance (excess insulin and decreased sensitivity to insulin) and Diabetes Mellitus (sustained high blood glucose). Think of all of these “conditions” as actually a series of steps along a path from being “normal” ... to becoming diabetic!

Excerpted from the many books of Dr. Elizabeth Lee Vliet, Medical Director of HER Place: Health Enhancement and Renewal for Women, Inc.: [Screaming to Be Heard: Women, Weight and Hormones](#); [It's My Ovaries, Stupid!](#); [The Savvy Woman's Guide to PCOS](#). Website: www.herplace.com