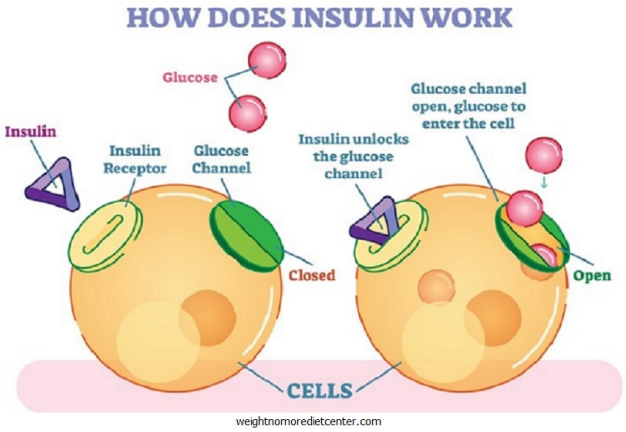
INSIGHT INTO INSULIN

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. Insulin 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?

Everything we eat is digested, but only carbohydrates are broken down and released into the blood stream as sugars (blood glucose). Glucose is the simplest sugar and the only one that the body uses for energy. Every single cell in the body needs glucose to function. In fact, the brain relies mainly on glucose.



After we eat, digest and absorb carbohydrates, the blood glucose (or "blood sugar") level normally rises. The brain senses the rise in glucose and sends a signal to the pancreas to respond by releasing the hormone *insulin*. Insulin will then do two things:

(1) Move the glucose from the blood into cells that need the glucose for its source of energy to survive; and,

(2) Carry glucose into fat cells to be stored for your body's later energy needs.

Note: Some sugar is also moved to the liver and muscles to be stored there in case it's needed; when moved so, the glucose is converted into *glycogen*. Think of this as a "storage carbohydrate"—it is essential to holding normal blood sugar levels during fasting periods such as sleep or while engaging in heavy activity where more than usual amounts of energy might be called upon.

Normally, after it's done its job of moving glucose into cells, insulin levels quickly drop back down to a low baseline.

Ideally, insulin should gently roll up and down all day long without having any dramatically high spikes. This low insulin pattern promotes fat loss. On the other hand, if you have more glucose in your body than your cells need (too many carbohydrates at one time, or after eating a food very high in carbohydrates), insulin takes extra blood

glucose and transports it to fat tissue; this *will* lower the blood sugar to normal, but you now have more stored fat! Additionally, **not only is extra blood glucose stored as fat, but excess insulin** (produced to transport the excess glucose) **in the blood is also stored as fat!**

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

As stated above, if your body makes too much insulin in response to food (too many carbohydrates at one time, or after eating a food very high in carbohydrates), 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 (carbohydrates). Satisfying these cravings causes another surge of glucose in the blood, which produces another insulin spike. For every glucose surge, an insulin spike follows. Then, as soon as you give in, the whole cycle starts over. Excess fat storage also occurs all day long because of the high insulin productions.

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, faster, while you eat 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 your waist 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***. Finally, when the pancreas is consistently overstimulated over a long period of time, and the cells burn out and they can't supply enough insulin to meet demand . . . this is called ***diabetes***.

The Common Triggers of Excess Insulin (*insulin resistance*) . . . for Both Men and Women:

- 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
- 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:

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

> **Note to PCOS**: The fatter you get, the more insulin is produced. 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 your waist and deep inside the abdomen (visceral fat), similar to males (known as "male pattern obesity").

Insulin resistance causes a host of body-wrecking effects:

- 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 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 cancer
- Growth of other cancers

How to go forward?

The key to regulating blood sugar and insulin levels is to choose "good" (slowly digested) carbohydrates over "bad" (instantly digested) carbohydrates and, in general, to slow down the digestion of all carbohydrates. **The slower the absorption of the carbohydrate, the slower the sugars are released into the blood. Then, the pancreas doesn't have to work so hard and, therefore, releases less insulin**.

- **Eating breakfast every day is a must**. After not eating all night, the body is in a fasting metabolic state. In this state, the body will conserve and store more fat. By eating first thing in the morning or very soon after rising, we break a fasting state and allow the body to start burning fat more efficiently.
- The metabolism becomes more efficient the more frequently we eat. You should try to eat every three to four hours—three main meals and snacks in between. Skipping a meal or snack will slow the metabolism and result in a sugar drop.

- Cereals, breads, crackers and rice should be labeled "whole grains" or "100% stone ground whole grains" whenever possible, or as often as possible. ("Whole grain" means it hasn't been refined and that in turn means it has higher fiber, will take longer to digest, and the carbohydrates will be more slowly and steadily absorbed into the blood.)

- Eat only lean meats (10% fat or less), and only skinless poultry. (A tip: Lean beef has the words *loin* or *round* in the name—such as top round, sirloin, eye round.)

- Have fish in your diet 3x a week.

- Incorporate beans and eggs into your diet. Both are low in calories, and beans are an excellent source of fiber. Fiber not only slows down the absorption of sugar, but it's vital for healthy, regular bowel movement. Dairy

items should consist mainly of low-fat or fat-free cheeses and cottage cheese, and no-sugar-added or sugar-free yogurt or ice cream products.

- The acid in lemon and lime juice and other citrus fruits, as well as in vinegars, slows down the absorption of carbohydrates. Try to incorporate these items into your diet in salad dressings; with fish, chicken and meat; with grilled and roasted vegetables; in sauces; and in fruit salads.

- Have a salad or cooked vegetables at both lunch and dinner.

- **Finally, and very importantly**: As often as possible, your snacks and meals should consist of a protein or dairy "linked with" a fruit, vegetable or whole grain. Examples: a yogurt with an apple; a piece of cheese with a fruit or vegetable; tuna salad spread on celery sticks; an omelet with spinach; whole grain cereal with milk or yogurt. By eating this way you will "complement" a carbohydrate with a slower-acting protein, thereby slowing the digestion of the carbohydrates, the absorption of sugars into the blood, and, in the end, enhance your body's ability to burn fat while satisfying your appetite far better and longer.

A final thought . . .

Glucose and oxygen are critical fuels for the brain's survival and, 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 the 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!

Weight★No★More℠ Diet Center, LLC is not responsible for clients who make food selections that do not comply with medical conditions or prescribed protocols or medications. Any medical protocol prescribed by your physician takes precedence over anything we would suggest. Please consult with your physician. *3/21/23*