

Insulin Resistance & Diabetes

What is insulin, insulin resistance, & diabetes?

Insulin is a hormone that carries glucose (sugar) from your blood into your cells so that it can be burned for energy. Insulin is produced by the pancreas.

Insulin resistance is a state in which your cells are not responding to insulin appropriately, so the sugar in your blood cannot get into your cells. To compensate, your pancreas pumps out more insulin to try to get the sugar out of your blood and into your cells. The hyperinsulinemia (high blood insulin) that results is able to maintain normal blood sugar levels and delay the onset of diabetes.

Diabetes is diagnosed when your fasting blood sugar level is ≥ 126 mg/dL. Type 1 diabetes is usually diagnosed in childhood and occurs when the pancreas stops producing insulin. Insulin injections are required for life. Type 2 diabetes is usually diagnosed in adulthood. It occurs when the cells stop responding to insulin (often due to insulin resistance), and the pancreas is unable to keep compensating by producing more and more insulin to maintain normal blood sugar levels.

Is it bad to have high blood insulin levels?

Yes! High insulin levels are not a good thing to have. For one, hyperinsulinemia is an independent risk factor for heart disease. Second, your pancreas eventually wears out and can't continue to produce excess insulin to maintain normal blood sugar levels. When this happens, blood sugar rises and diabetes develops. Third, insulin can contribute to increased appetite (especially for carbohydrates and sugary foods), which can lead to increased calorie intake and weight gain. Insulin also makes it easier for you to store (vs. burn) body fat, thus worsening the weight gain problem and making weight loss more difficult.

What causes insulin resistance?

It is estimated that 1 in 4 people (without diabetes) has a genetic predisposition for insulin resistance. Whether or not the insulin resistance develops depends (in large part) on your eating and exercise habits. Not being physically active is a huge reason why insulin resistance develops. In addition, gaining weight/body fat (especially around the middle) is a common trigger. And once you have insulin resistance, it's more difficult to lose weight. So, obesity and insulin resistance is really a vicious cycle--obesity contributes to insulin resistance, and insulin resistance contributes to weight gain! People who maintain a healthy weight and enjoy regular physical activity rarely develop insulin resistance, even if they have an underlying genetic predisposition.

NOTE: Some medications (like Depakote, an anti-seizure medication) and some disease states (like Polycystic Ovarian Syndrome, or PCOS) have also been associated with insulin resistance and weight gain. It's always important to rule-out these non-diet/non-exercise related problems with your clinician.

What can I do to improve my insulin sensitivity?

There are many healthy lifestyle choices that you can make to improve your insulin sensitivity. These healthy choices are important whether or not you have diabetes and whether or not you are also taking medication for your condition. See the back of this page for six healthy choices you can make for improved insulin sensitivity.

1) **Enjoy exercise!** -- Regular physical activity (both aerobics and strength training) increases your cells' sensitivity to insulin. Aim for 20-60 minutes of aerobic activity (e.g. brisk walking, jogging, swimming, or cycling) 3-5 days per week. In addition, aim for 30 minutes of strength training (with free weights, machines, resistance bands, or your own body's resistance) 2-3 times per week. Gradually work up to these exercise goals, and discover a variety of different activities that you enjoy and can fit into your busy life.

2) **Lose weight, if necessary!** -- Even as little as a 10% reduction in weight can help improve your cells' insulin sensitivity. To lose weight safely and effectively, reduce your total calorie intake by about 500 calories each day (that's equal to about one candy bar and one 16 oz. glass of juice or soda). Aim for a 1-2 pound weight loss per week.

NOTE: Restrictive dieting (< 1200-1500 calories per day for women and < 1500-1800 calories per day for men) and rapid weight loss (> 2 pounds per week) are NOT recommended. Both can contribute to nutrient deficiencies, excessive loss of lean body mass vs. fat, reduced metabolic rate, food preoccupation, depression, fatigue, irritability, binge eating, and rapid weight re-gain.

3) **Eat a moderate carbohydrate diet (about 45% of total calories)!** -- Carbohydrates (especially low fiber, refined white grains and sugary foods/beverages) stimulate the most insulin secretion after you eat them. Your insulin levels are already high, so eating a diet that further increases insulin is not desirable.

- Choose a diet rich in mostly nonstarchy vegetables (leafy greens, broccoli, cabbage, cauliflower, zucchini, etc.). Aim for about 3 cups of chopped veggies per day (6 servings per day).
- Choose a diet with whole fruits instead of juices, most of the time. Aim for about 2 to 3 small pieces of fruit per day (2-3 servings per day).
- Choose mostly high fiber, whole grains and legumes (brown rice, whole wheat pasta, beans, whole wheat bread, whole grain cereals), and keep portion sizes moderate. Aim for about 4-6 servings per day. One serving equals one slice of bread, one 6" tortilla, $\frac{1}{2}$ cup grains, legumes, or starchy vegetables, or $\frac{1}{2}$ small bagel.
- If you enjoy sweet desserts on occasion, just balance them out by eating fewer amounts of other carbohydrate-rich foods (like bread, pasta, and rice) at that meal. For example, if you choose a grilled chicken breast salad (with light oil and vinegar dressing) for dinner, it's okay to enjoy a small slice of cake or a couple of cookies for dessert.

4) **Replace excess carbs with more heart healthy monounsaturated fats!** (nuts, peanut butter, olive/canola oil, avocados) These fats don't affect your insulin levels, and they are good for your heart! But, like all foods high in fat, they have a lot of calories, so be sensible about your serving sizes. For instance, enjoy 1/4 cup of nuts for a snack instead of "bread" things. Enjoy 1-2 Tbsp. oil/vinegar dressings on your salads. Add a couple slices of avocado to sandwiches/salads.

5) **Consume adequate protein with meals!** Protein-rich foods (like tofu, fish, chicken, lean meat, low fat cottage cheese, and eggs) will help promote satiety so you don't feel hungry all the time.

6) **Manage stress, and get enough sleep!** Stress and inadequate sleep increase stress hormones (like cortisol), which increase insulin levels. Again, your goal is to lessen your already high insulin levels, so be sure to practice daily relaxation exercises and get to bed at a reasonable hour.