

Nutrition Notes

A Monthly Newsletter About Health and Nutrition

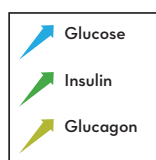
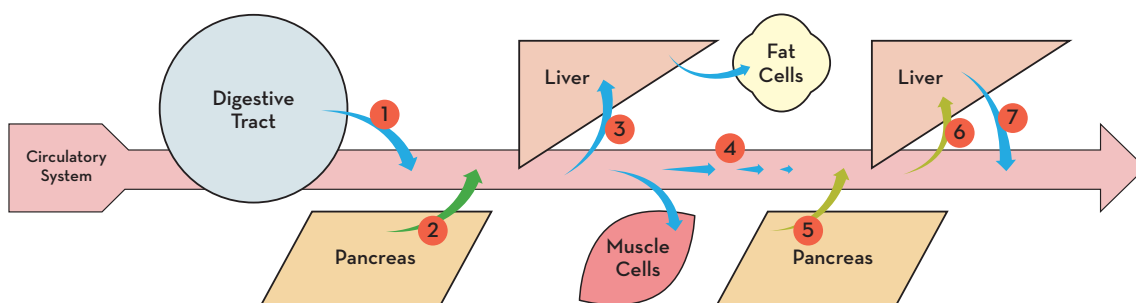


Better Blood Sugar Control

If you have type 2 diabetes, pre-diabetes or hypoglycemia, then you should consider eating to control your blood sugar, or glucose, levels. For those readers who may be unfamiliar with any of these conditions, here are some simplified explanations: hypoglycemia is the state of having low blood sugar; insulin resistance is a pre-diabetic state in which cells in the body are desensitized to the action of insulin, creating a need for extra insulin; and type 2 diabetes is an advanced state of insulin resistance in which the body has difficulty metabolizing carbohydrates. Tightly controlling glucose can subsequently lessen the severity of each of these conditions as well as enhance mood and manage appetite and physical symptoms in the hours following a meal or a snack.

When carbohydrates are eaten by healthy people, they are converted into glucose, (which is a type of sugar, hence the interchangeable term “blood sugar”). Glucose is the body’s primary fuel for normal activity, work, exercise and brain function. When carbohydrates are converted to glucose, our blood sugar level rises and the pancreas secretes a hormone called insulin, which picks up the glucose and delivers it to cells in our muscles, liver, brain and other organs so that they have the energy to function optimally. Most of the cells only take as much glucose as they need, which means that any leftover glucose will be stored as fat and a small amount will be stored as glycogen (a storage form of carbohydrate that can be used as a front-line supply of glucose when people do not eat a sufficient amount of carbohydrates). When insulin has delivered all of the glucose your cells need, blood sugar levels return to normal. If too much glucose is delivered or if you wait too long to eat your next meal, glucose levels can dip too low. If this happens, the pancreas secretes a special hormone called glucagon that helps bring glucose out of glycogen storage and into the blood. See the illustration showing how your body regulates glucose levels for more details.

How the Body Regulates Glucose Levels



- 1 When food is digested, blood glucose level rises.
- 2 Elevated blood glucose stimulates the pancreas to release insulin.
- 3 Insulin stimulates the uptake of glucose into cells and storage as glycogen in the liver and muscle. Insulin also stimulates the conversion of excess glucose into fat for storage.
- 4 As the body's cells use glucose, blood levels fall.
- 5 Low blood glucose levels stimulate the pancreas to release glucagon into the bloodstream.
- 6 Glucagon stimulates liver cells to break down glycogen and release glucose into the blood.
- 7 Blood glucose begins to rise.

bloodstream (hyperglycemia) and the muscles and organs don't get the fuel they need. See the graphic illustration of glucose levels of normal, diabetic and pre-diabetic individuals for more information (see reverse).

These progressive conditions are often the result of being overweight, especially around the middle, or of consistently overeating. People who are apple shaped and have excess fat around their waist also have that fat deeper inside their bodies, surrounding the organs. This “deep” fat produces hormones that interfere with the action of other hormones, such as insulin. Being predisposed to an apple shape, however, does not mean that you are doomed to insulin resistance. Losing excess fat and maintaining a waist that is smaller than your hips (ideally less than 40 inches around for men and less than 35 inches around for women) is an important way to prevent and control these conditions. Also, overeating on a consistent basis forces your pancreas to produce more insulin for a longer period of time, which means that your cells are being bombarded with a lot of extra insulin. Eventually, they start to wear out, in a sense, and become resistant to the action of insulin. So not overeating is part of the blood sugar control solution.

The amount of glucose in everyone's blood rises and falls after a meal, but many people are sensitive to dips in blood sugar (which is called hypoglycemia). People with diabetes, pre-diabetes or insulin resistance, on the other hand, are susceptible to spikes in blood sugar (which is called hyperglycemia). In insulin-resistant and diabetic states, the cells become insensitive to the action of the insulin and do not take up all of the glucose that is being delivered to them. Therefore, a lot of glucose remains in the

Now that you understand how your body uses the food you eat for fuel, you may be able to see how your eating patterns connect to your blood sugar highs and lows. Your dietary choices can positively or negatively affect your glucose levels and the way you feel; they can also help prevent the onset of insulin resistance, hypoglycemia, diabetes and weight gain if you make the right choices. I have always thought that we would all be better off nutritionally and weight-wise if we ate as though we were

continued...

Better Blood Sugar Control continued...

diabetic, meaning we choose carbohydrate-containing foods based on how they affect our blood sugar and combine them with proteins and fats to help balance our blood sugar within a healthy range.

The key is eating balanced meals that contain a slowly digested carbohydrate, a lean protein and some healthful fat. A slowly digested carbohydrate is high in fiber and complex starches, not simple sugars; when combined with some fat, they will work together to slow down the digestion and conversion of carbohydrate into glucose. That way, glucose can enter the blood slowly and steadily over a longer period of time, so the pancreas won't be overwhelmed by insulin production and cells won't be bombarded by insulin. Adding protein to the mix will help stimulate glucagon secretion that will help counter any extra insulin action, so that blood sugar will not get too high or too low.

Up to this point, this handout has been one long science lesson. I want you to understand what goes on in your body so that you can tailor your food choices to meet your body's needs. However, I would like to caution you against converting this lesson into a scientific study of your body -- eating to control blood sugar should not require you to assign values or labels to the foods you choose. A

lot of diet books rank foods according to how they affect blood sugar, but these rankings are really not necessary. Ranking foods in relation to the Glycemic Index or categorizing foods as "good" and "bad" makes eating unnecessarily complicated. Understand that you can only control things up to a certain point and, even if you eat oatmeal for breakfast every day at the same exact time, your blood sugar readings following that meal will not be exactly the same each day (though they may be within a small range of each other). With all of this in mind, here are some important principles to follow when planning your meals:

- **Choose carbohydrate-containing foods that are broken down slowly** so that glucose can be released into your blood at a slow and steady rate. These foods are minimally processed whole grains, such as oats, barley, quinoa, wheatberries, wild rice, millet, brown rice, amaranth, bulgur wheat, kasha and buckwheat groats. Starchy vegetables, including carrots, corn, peas, winter squash, sweet potatoes and baby potatoes also cause a slow release of glucose that requires less insulin and they can be used in place of whole grains (this substitution comes in especially handy when eating at restaurants). Whole grains that are processed into flours, breads, pastas and cereals, especially puff, flake and twig shapes, will have more of an insulin response than the minimally processed whole grains, but slightly less of a response than foods made with refined white flour such as crackers and white breads and mature

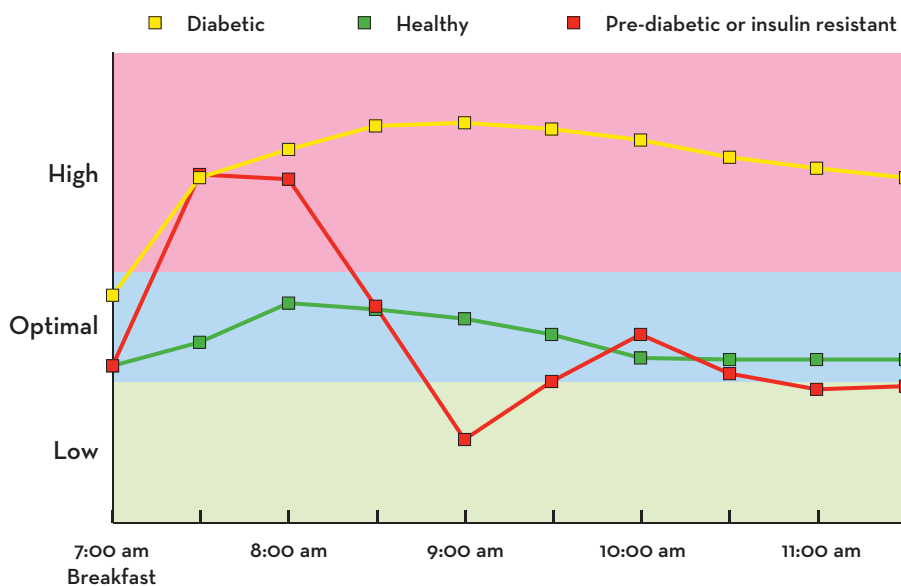
potatoes. Make whole grains in their most natural state and starchy vegetables your main sources of complex carbohydrates.

- **Combine carbohydrates with both lean protein and healthy fats.** Lean protein can come from plant sources such as soy beans, other beans, legumes, nuts and seeds, as well as animal sources like eggs, nonfat milk and yogurt, fish, shellfish, chicken turkey and some cuts of red meat. Healthful fats are found in olive oil, avocado, nuts, seeds and fatty fish. Adding these two important components to your meal or snack will help to moderate blood sugar levels.
- **Avoid alcoholic beverages,** since alcohol contributes extra calories to your diet and stimulates your appetite so that you also take in more

calories from food. This is not helpful when you are trying to lose weight.

- **Try to plan your meals and snacks ahead of time** so that you don't find yourself buying a pastry instead of snacking on a piece of fruit and some walnuts at 4:00 pm. Make time for three meals and two snacks that are evenly spaced throughout the day. If you skip breakfast, you will struggle to get your blood sugar under control all day, so eat a wholesome, minimally processed, balanced meal within one hour of waking up. Strategy goes a long way towards preventing blood sugar highs and lows and it is

Graph of three different individuals' blood sugar reactions following a breakfast of a fat-free muffin



essential if you are going to lose weight.

- **Practice eating slowly** so that you can recognize how it feels when you're getting full. Overeating is hard on your pancreas, liver and cells that take up glucose for fuel. Stop eating when you feel satisfied instead of when you feel full in order to help your body function optimally.
- **Do both aerobic and anaerobic (muscle building) exercises to improve the insulin sensitivity of your cells.** Studies show that 30-60 minutes of continuous moderate intensity exercise (working at 70-75% of maximum heart rate) at least three days a week provides maximum benefit. Invest in a heart rate monitor to ensure that you're working at the right level and be active every day if you can. The more days you are active, the more benefit you will obtain.

Eating to control blood sugar is important for everyone. It can help people with blood sugar control issues manage their conditions better, and it can help prevent the development of these types of conditions in healthy people. Furthermore, minimally processed foods should be everyone's preference because they offer important naturally occurring nutrients and few if any undesirable ingredients, unlike most processed foods. Remember your simple formula: **minimally processed complex carbohydrates + lean protein + healthy fat = better blood sugar control.** Eating healthfully and controlling your blood sugar go hand in hand, so make eating simpler and reap the most complex of rewards: better health.

Our registered dietitian has a Masters in Public Health. However, she is not a doctor and her nutritional recommendations are general in nature and not tailored to specific health problems. Talk to your physician or other qualified health care practitioners concerning particular health issues or before beginning any nutritional program.