

## Why Resistance Training Will Provide Immediate Benefits For People with Diabetes - How to Spot Individuals With High or Low Blood Sugar and How to Help

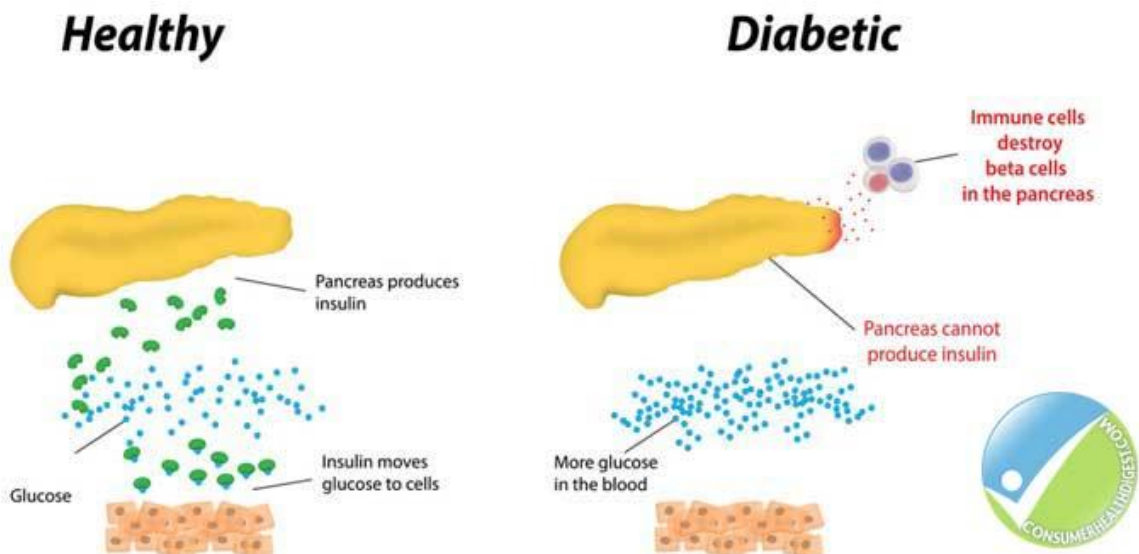
### First Off, Let's Look At What Exactly Diabetes Is

There are two types of diabetes. Type 1 and Type 2

#### Type 1 Diabetes.

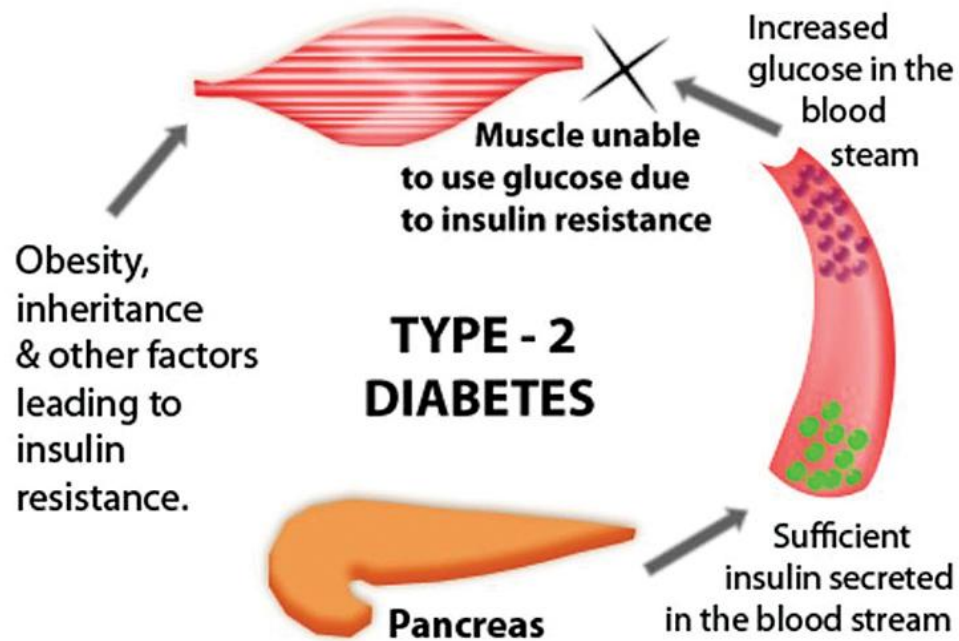
**Type 1** Diabetes is considered a genetic condition where your own body's immune system destroys the cells in your pancreas that produce insulin called the beta cells. Because of this Type 1 diabetics produce little to no insulin.

## **Type 1 Diabetes**



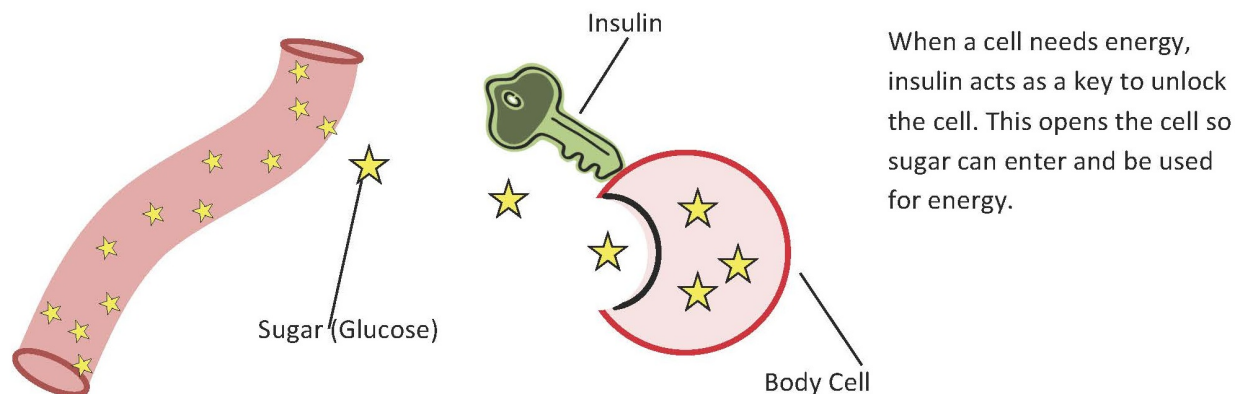
#### Type 2 Diabetes

**Type 2** Diabetes is also referred to as insulin resistance and it occurs from your body's cells becoming less sensitive and eventually resistant to the effects of insulin over time; causing chronically elevated blood glucose. Also in cases that have persisted for a number of years the pancreas struggles to produce enough insulin or can completely stop. Many things can contribute to getting type 2 diabetes including genetics, environmental factors, being overweight, and inactivity.



### How Does Insulin Work?

Insulin, which is secreted by the pancreas, is required for your body to be able to get sugar (glucose) out of your blood and into your body's cells where it can be used for energy or even stored for later use. This process is activated in both muscle and fat cells. (Activates GLUT 4 transporters in both muscle and fat cells). GLUT 4 is a glucose specific transporter. This means that only the GLUT 4 transporter is only used for glucose to enter cells. GLUT 4 transporters are found in muscle and fat cells.



### **How does Resistance Training Help Someone with Diabetes?**

As mentioned above, we need the Glut-4 transporter to come to the surface of the cell to bind to the glucose in the blood in order to remove the glucose from the blood. We have already established that insulin is what does this, but in diabetes insulin isn't able to do its job and stimulate these receptors. Lucky for us, resistance training will stimulate these same receptors!

This means that even when insulin isn't able to remove glucose (sugar) from the blood, resistance training can! An added benefit of this is that resistance training will only stimulate the uptake of glucose into muscle cells which can then be stored and used for energy. Insulin actually upregulates these receptors on both fat and muscle cells so you will store glucose in both fat and muscle tissue, but with resistance training you are only storing in your muscle cells.

### **Dangers of Diabetes**

If your body is not able to get the sugar out of your blood, your blood sugar can get dangerously high and cause a myriad of problems. High blood sugar dramatically increases your risk of heart disease, stroke, high blood pressure, and atherosclerosis. High blood sugar can also cause nerve damage which in extreme cases can cause amputation, kidney damage, eye damage which in extreme cases can lead to blindness, impaired/slow healing, hearing impairment, some skin conditions, sleep apnea, and even Alzheimer's disease.

The most commonly known way to reduce the effects of diabetes (type 2) is to lose weight, and although that does work, that takes time. Resistance training is something that you can do to immediately improve your blood sugar, and here's how.....

We discussed how Insulin works to get sugar out of the blood and into your body's cells. Well, intense muscle contraction will do a very similar thing. Intense muscle contractions that occur during intense resistance training activate a transporter (Glut 4) inside your muscle cells which will also take sugar out of your blood and bring it into your muscle cells, therefore

reducing blood sugar AND putting that sugar into muscle where it can be stored in the form of glycogen to be used for activity. Another benefit of muscle contraction (Resistance Training) is that it only upregulates this uptake in muscle cells and not fat cells. Anytime we can reduce fuel or substrate from entering fat cells it is a good thing for those of us trying to lower body fat.

To simplify, if you have Type 1 diabetes and you do not secrete insulin, resistance training can help you reduce blood sugar. (You will still need medication) and weight loss will not change your disease.

If you have Type 2 diabetes and your body does not respond to the insulin you secrete due to insulin resistance, you can still get sugar out of your blood through muscle contraction and this is IMMEDIATE unlike weight loss which works by increasing your body's cells sensitivity to insulin over time.

### **Important Info**

With high intensity training it can have an impact on a diabetic very quickly. Diabetes medication is usually very specific and individualized for every person with the disease based on many factors. Because of this, anything that can affect blood sugar (such as high intensity resistance training) needs to be closely monitored. Some people are at risk of their blood sugar dropping too low since they are lowering it through medication and through exercise but because of their new exercising habits they don't actually need the same medicines or amounts anymore. Remember, we are here to change lives and we do that every day, but we also need to be aware of common signs of low, or even high blood sugar.

With proper diet and exercise many people with type 2 diabetes are able to reduce or even completely eliminate medication but there are steps to that.

Type 1 diabetics can benefit from the effect of resistance training just like type 2 diabetics but they will not be able to get off of medication. They will need to take insulin for the rest of their lives due to their body's inability to produce insulin.

### **Signs of High Blood Sugar**

- Increased thirst
- Headaches
- Trouble concentrating
- Blurred vision
- Frequent urination
- Fatigue
- Weight loss
- Blood sugar greater than 180 mg/dL
- Dry Mouth

**Ways to Lower Chronically High Blood Sugar (Like when you get your blood sugar tested in a blood test at the doctor)**

- RESISTANCE TRAINING! ;-)
- Regular exercise
- Control your Carb intake
- Increase Fiber intake
- Stay hydrated
- Choose complex carbs over simple carbs (think oatmeal over bread and minimally processed vs processed)
- Control Stress Levels

**How to Lower Dangerously High Blood Sugar -** This should not be something that us fitness professionals will run into very often. This can occur from a diabetic who may have eaten too many carbohydrates in a sitting and/or forgot to take their medications to help their body absorb some of their blood glucose. It is also possible for a diabetic's body to break down stored carbohydrates when it probably shouldn't (since a lot of their regulatory processes have been altered through their disease and medicine), which will increase their blood sugar fairly high although it is very rare that this would be a dangerous situation. The only way to lower an acute extreme spike in blood glucose is through administering exogenous insulin. All type 1 Diabetics must take insulin so they should have some on them. Many type 2 Diabetics also take insulin and should also carry it with them. This becomes very serious if the person falls into a diabetic coma and we will discuss that at the end,

**Signs of Low Blood Sugar** (More likely for us to see)

- Shakiness or nervousness
- Anxiety
- Fatigue
- Weakness
- Sweating
- Hunger
- Nausea
- Dizziness or lightheadedness
- Difficulty Speaking
- Confusion

**How to Fix Low Blood Sugar -** The quickest way to raise blood sugar in an individual is to give them straight glucose (also known as dextrose) since that is the exact molecule our body will use, and can immediately be absorbed by our body's cells. Anything with added fat or fiber will not be your best choice since both of these slow digestion. Even fruit or fruit juice is not the best option here since it is mostly fructose ( A different type of sugar) but can still help. The most common thing at our clubs that would work best would be Gatorade. Gatorade is a mix of glucose and fructose and will do a good job of quickly raising blood sugar.

### **Diabetic Coma**

Something that we should be aware of is a diabetic coma, although rare, it is important to understand. A diabetic coma can occur from dangerously high or low blood sugar. If someone falls into a diabetic coma they are alive but they cannot awaken or respond purposefully to sights, sounds, or other types of stimulation. Call 911 immediately. If left untreated a diabetic coma can be fatal.