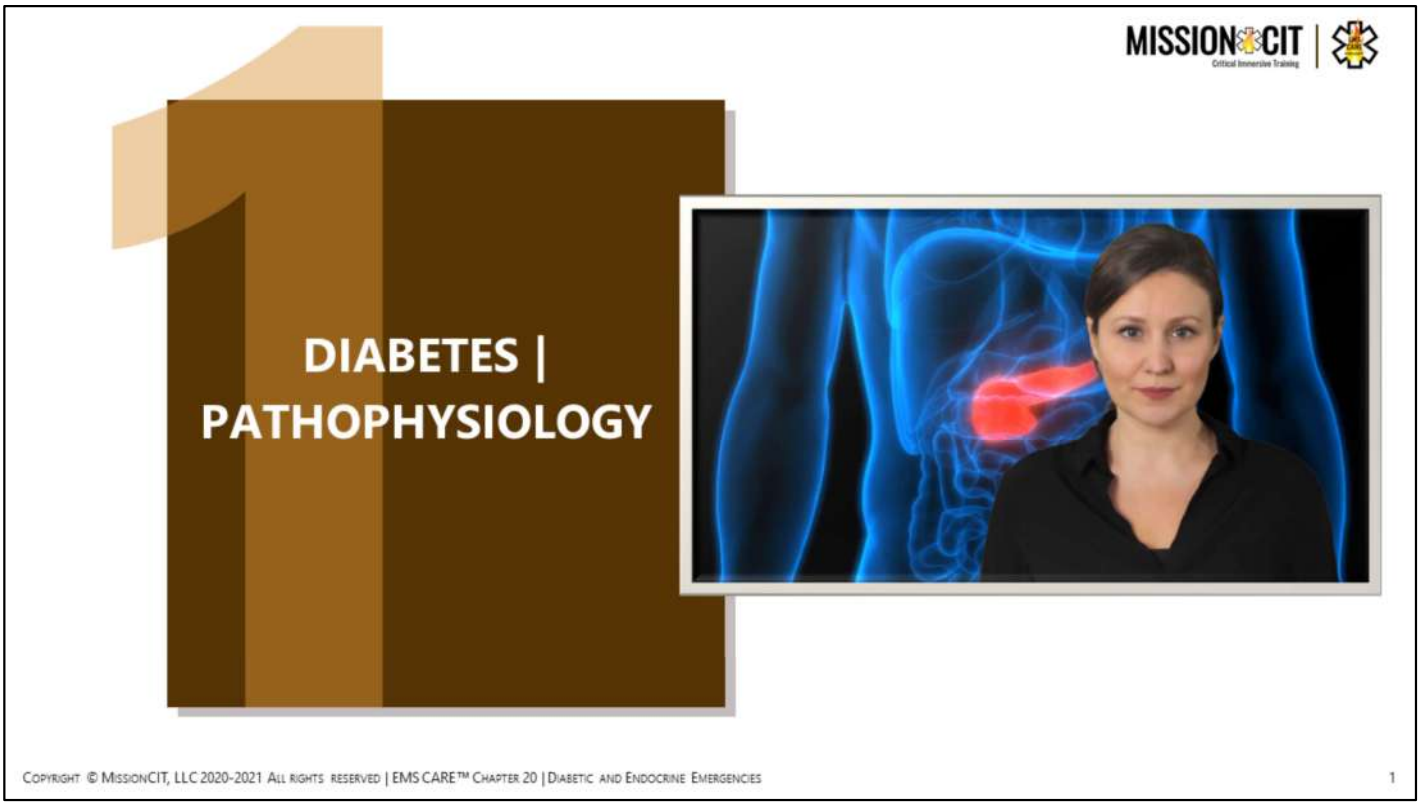
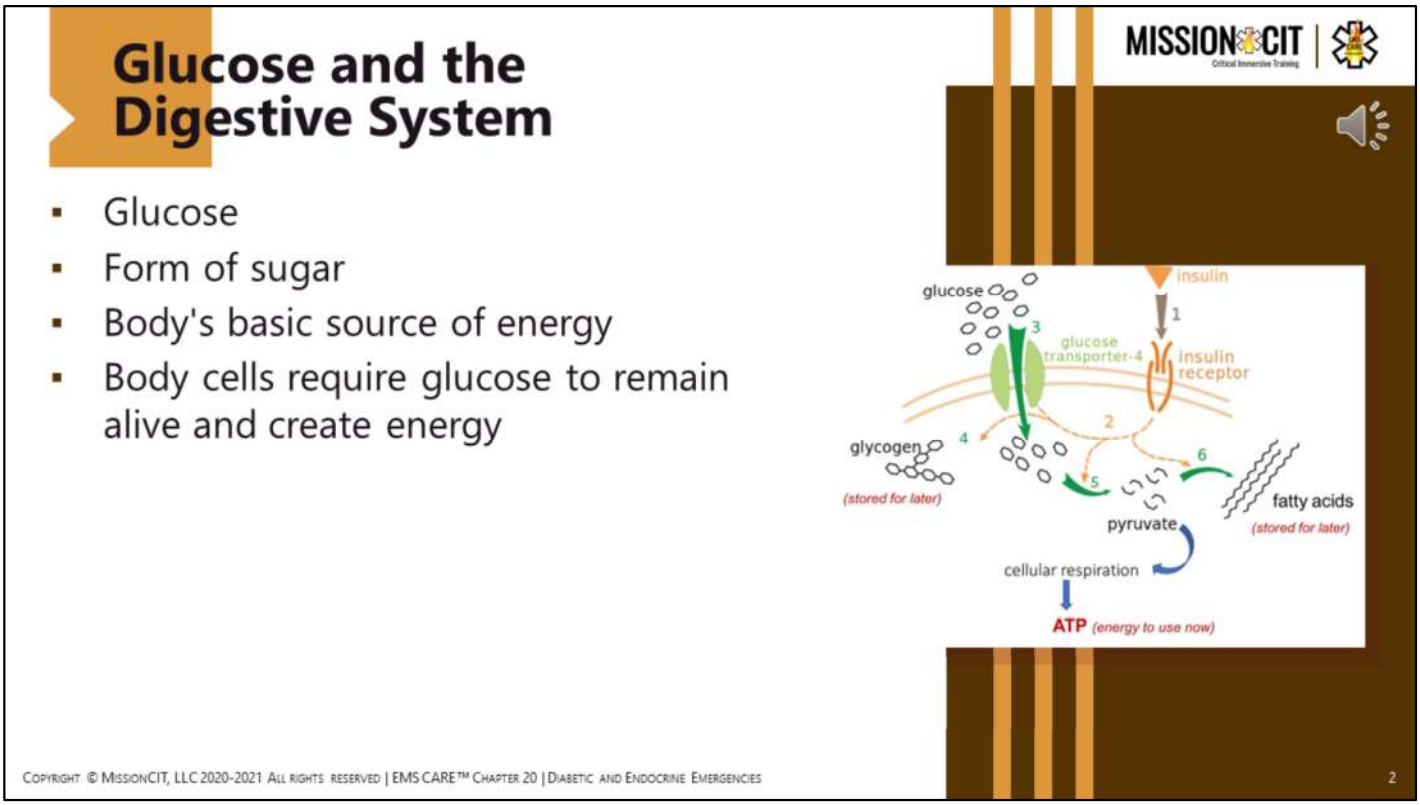


Welcome to the first lesson. As we begin to study diabetes, a sobering statistic is that 10% of the USA population is diabetic and 25% is pre-diabetic. Encountering a patient in the prehospital environment with a medical history of diabetes mellitus is a very common event. So, please pay close attention.

In this lesson, we will cover Pathophysiology. Here we review some of the body's systems and how glucose and insulin work together.

Good Studying.



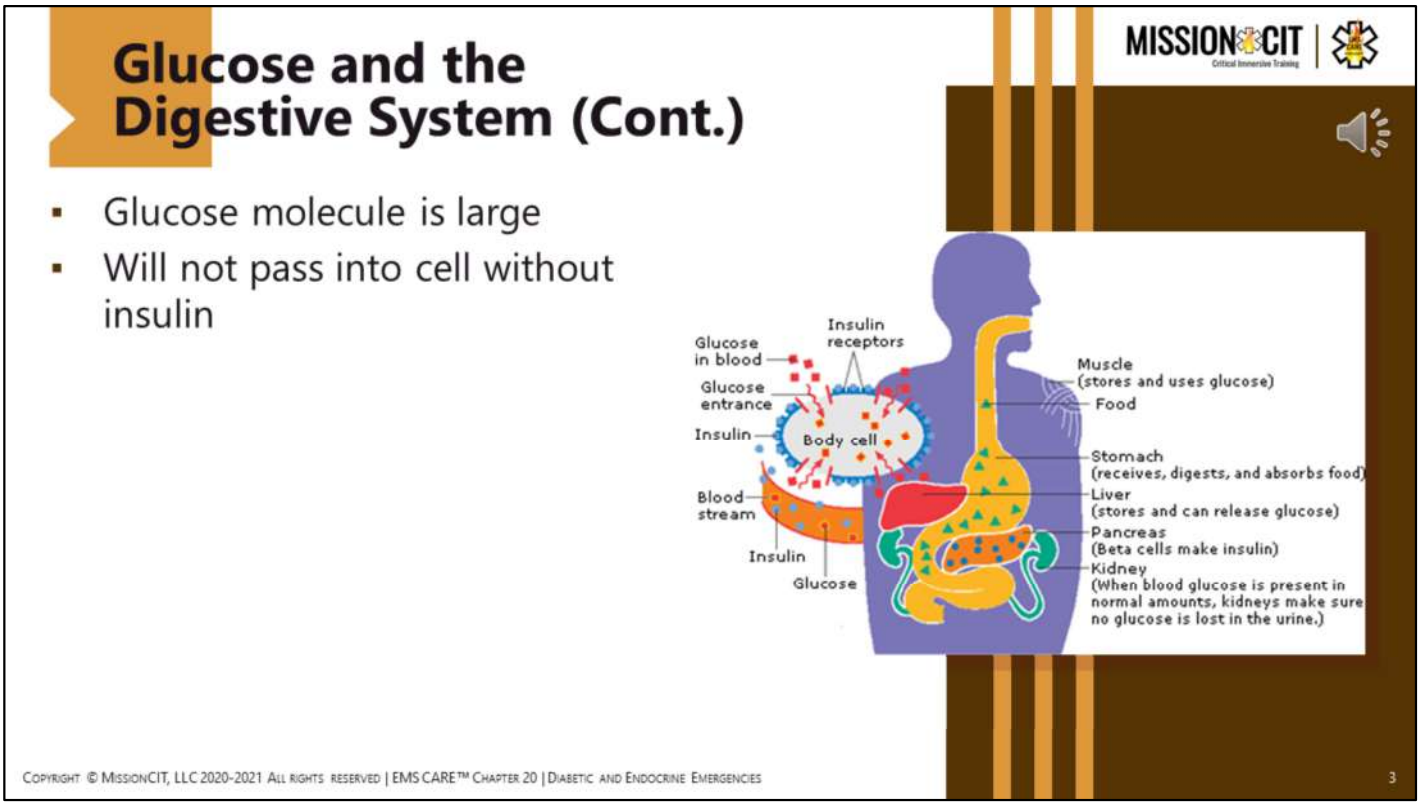
Diabetes is a chronic health condition that affects how your body turns food into energy. Glucose is a form of sugar and is the body's basic source of energy. Body cells require glucose to remain alive and create energy.

The energy needs of the human body must be fulfilled, despite the fluctuations in nutrient availability that the body experiences on a daily basis. How then, do our different cells use fuel molecules, and what factors are involved in this process.

The diagram on this slide shows how insulin binds to its receptors on the cell membrane, triggering glucose transporters to open on the membrane. This allows glucose to enter the cell, where it can be used in several ways.

The diagram also shows several different ways glucose can be used once it enters the cell. If the cell needs energy right away, it can metabolize glucose through cellular respiration, producing ATP, as shown in step 5.

If the cell doesn't need energy right away, glucose can be converted to other forms for storage. If it's a liver or muscle cell, it can be converted to glycogen (step 4). Alternatively, it can be converted to fat and stored in that form (step 6).

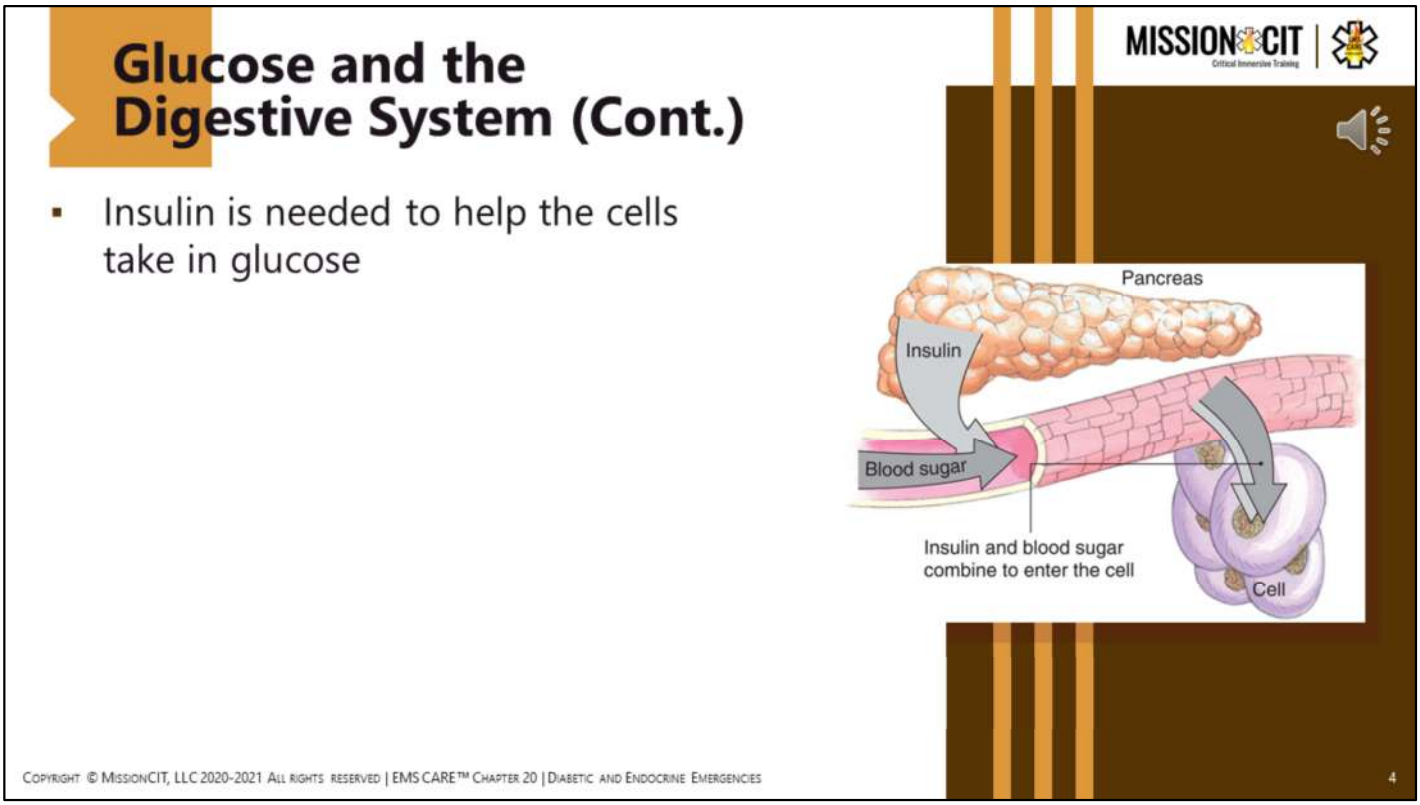


The Glucose molecule is large. Consequently, Glucose will not pass into a cell without insulin.

Insulin is a hormone made by one of the body's organs called the pancreas. Insulin helps your body turn blood sugar (glucose) into energy. It also helps your body store it in your muscles, fat cells, and liver to use later, when your body needs it.

After you eat, your blood sugar (glucose) rises. This rise in glucose triggers your pancreas to release insulin into the bloodstream. Insulin travels through the blood to your body's cells. It tells the cells to open up and let the glucose in. Once inside, the cells convert glucose into energy, or store it to use later.

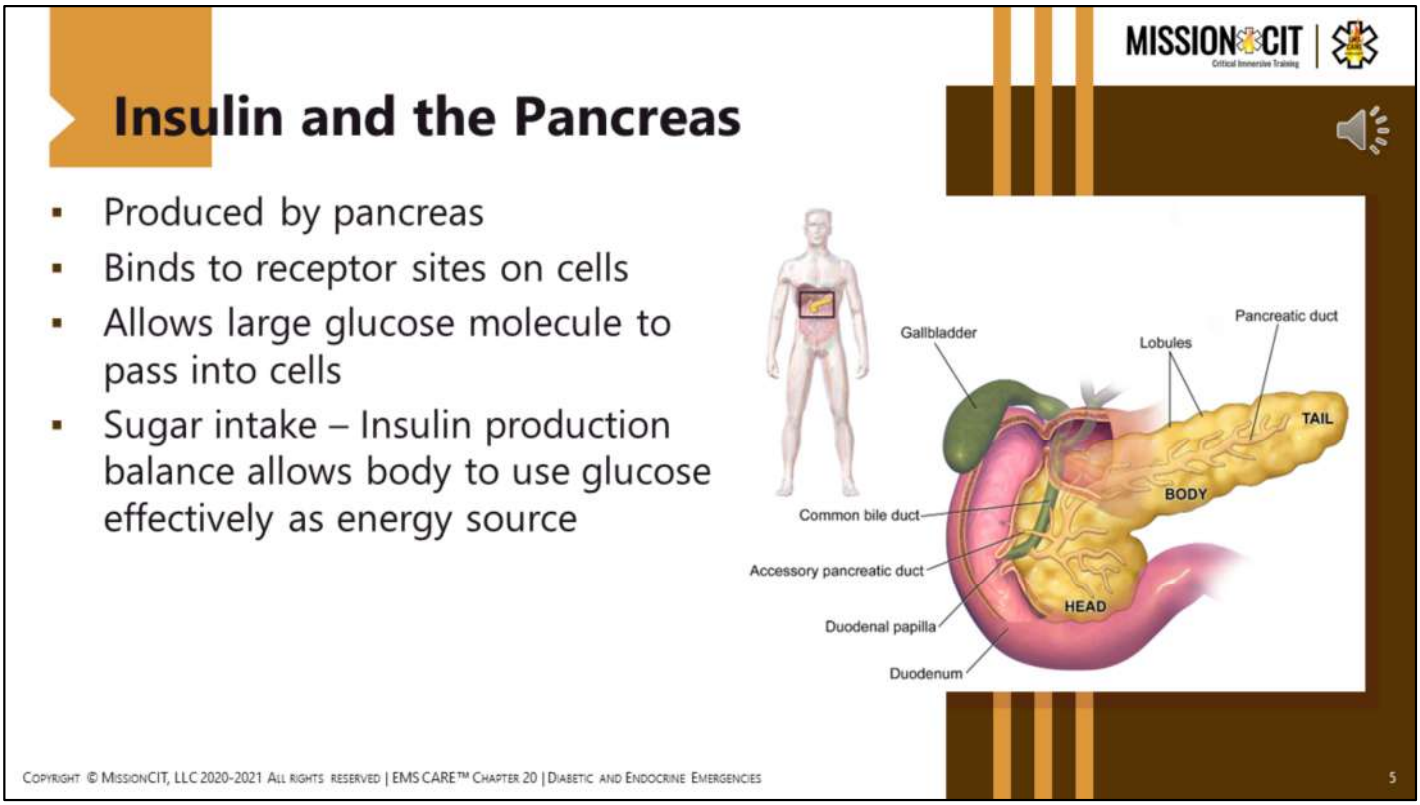
Without insulin, your body can't use or store glucose for energy. Instead, the glucose stays in your blood.



As we just discussed, Insulin is needed to help the cells take in glucose.

The digestive system converts the foods we eat into their simplest forms, like glucose, amino acids that make up protein, or fatty acids that make up fats. The broken-down food is then absorbed into the bloodstream from the small intestine, and the nutrients are carried to each cell in the body.

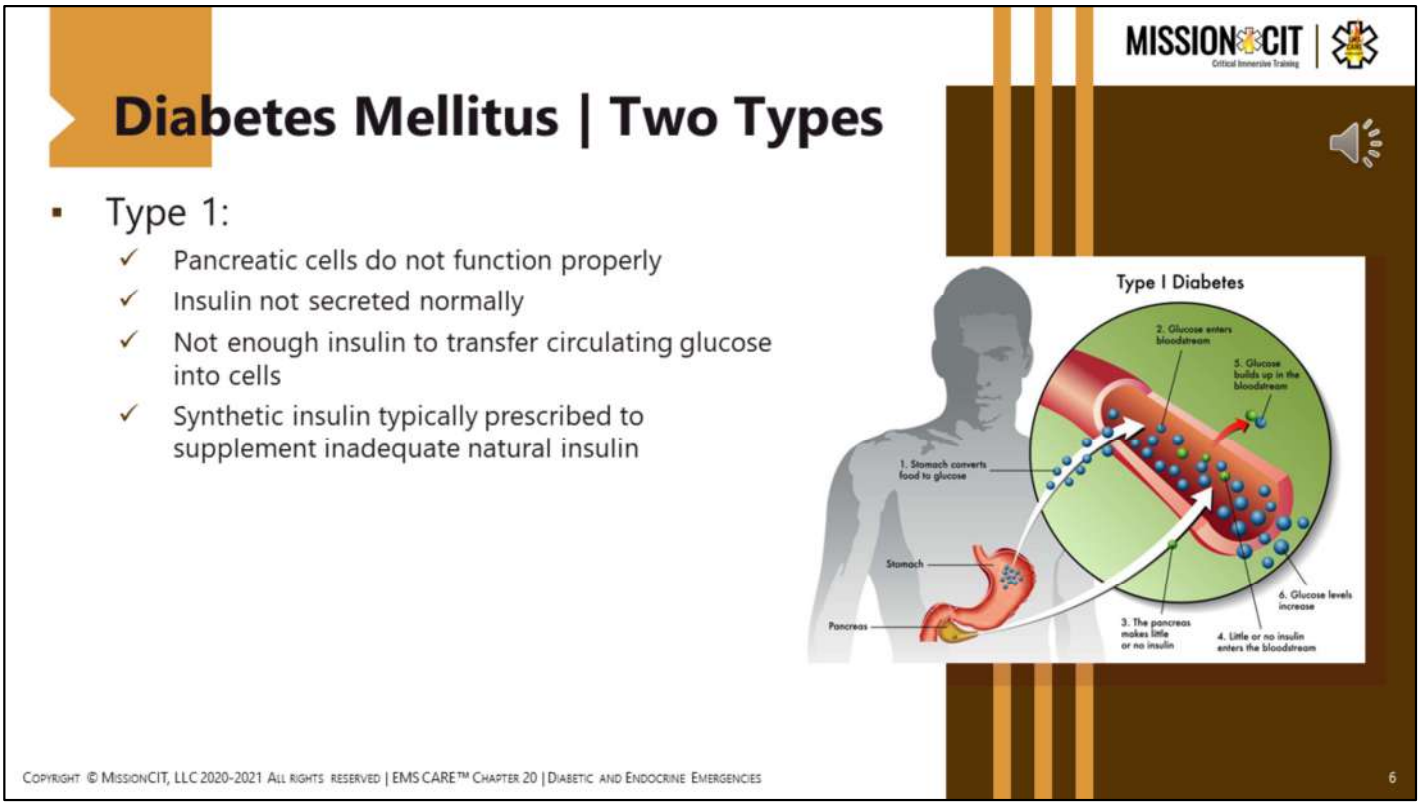
So, repeating this concept again, insulin helps your body turn glucose into energy. It also helps your body store it in your muscles, fat cells, and liver to use later, when your body needs it. Hence, After you eat, your blood sugar rises. This rise in glucose triggers your pancreas to release insulin into the bloodstream.



So, here is yet another diagram to show how insulin transports glucose molecules into the cells. The sugar intake–insulin production balance allows the body to use glucose effectively as an energy source. Health problems occur when this balance becomes too high – hyperglycemia – or too low – hypoglycemia.

Diabetes is a disease that occurs when blood sugar is too high. Over time, having too much glucose in your blood can cause health problems, such as heart disease, nerve damage, eye problems, and kidney disease.

According to the National Institute of Health, an estimated 30.3 million people in the United States, or almost 10 percent of the population, have diabetes. About one in four people with diabetes don't know they have the disease. In addition, an estimated 85 million Americans aged 18 years or older, have prediabetes.



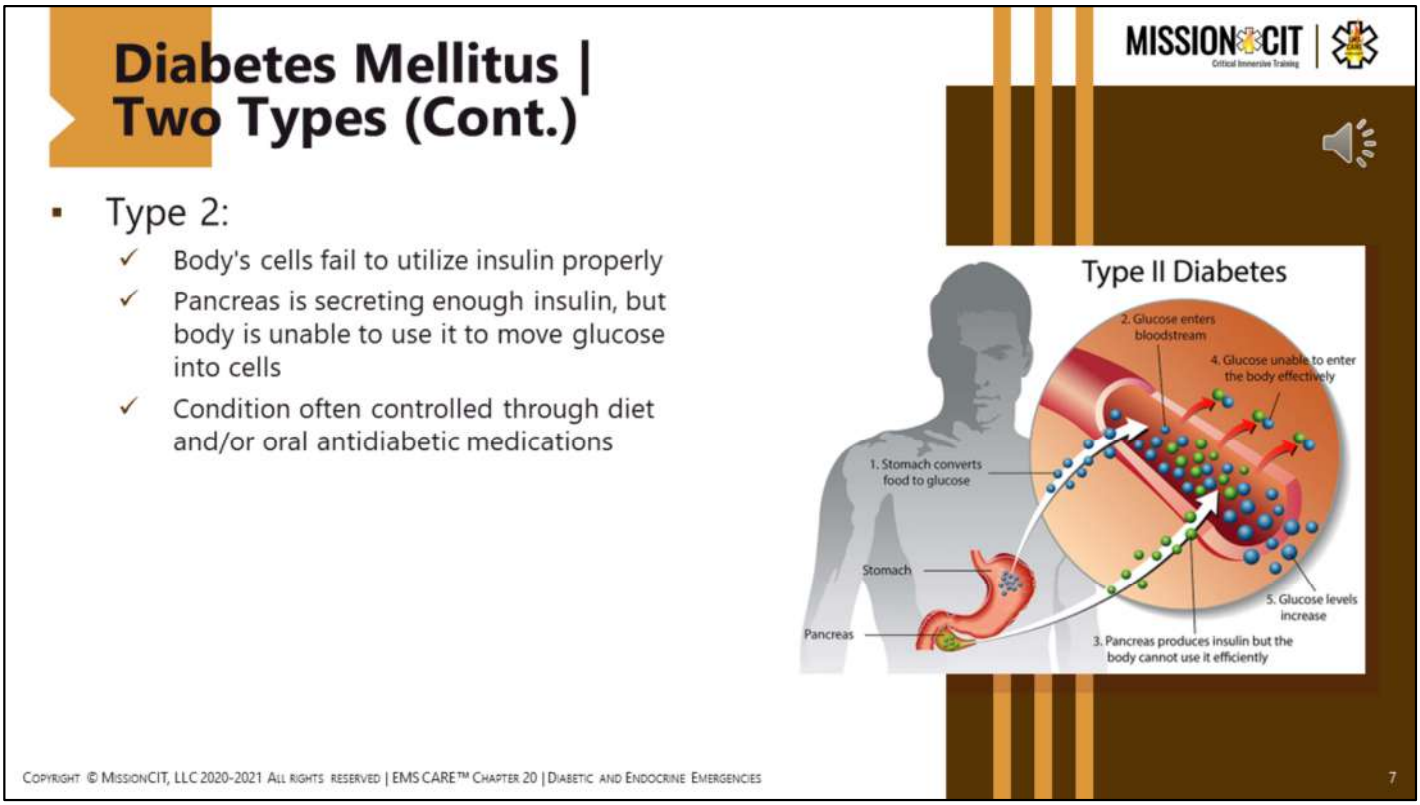
So, the common literature generally cites 2 types of diabetes. Type 1 as shown on this slide and Type 2 discussed on the next slide. But there are other types of diabetes as well.

Another likely type of diabetes you may encounter is Gestational diabetes. This develops in some women when they are pregnant. Most of the time, gestational diabetes goes away after the baby is born. Two Less common types of diabetes include monogenic diabetes, which is an inherited form of diabetes, and cystic fibrosis-related diabetes.

In reference to this slide, type 1 Diabetes is when the Pancreatic cells do not function properly and as a result, Insulin is not secreted normally. Consequently, Not enough insulin is available to transfer circulating glucose into the cells. Doctors then typically prescribe Synthetic insulin, to supplement the inadequate amount of natural insulin.

According to the Mayo Clinic, Type 1 diabetes, once known as juvenile diabetes or insulin-dependent diabetes, is a chronic condition in which the pancreas produces little or no insulin. Different factors, including genetics and some viruses, may contribute to type 1 diabetes. Although type 1 diabetes usually appears during childhood or adolescence, it can develop in adults.

Despite active research, type 1 diabetes has no cure. Treatment focuses on managing blood sugar levels with insulin, diet, and lifestyle to prevent complications.



Type 2 diabetes occurs when the body's cells fail to utilize insulin properly. Although the Pancreas is secreting enough insulin, the body is unable to use it to move glucose into cells.

With type 2 diabetes, your body either resists the effects of insulin — or doesn't produce enough insulin to maintain normal glucose levels. The Condition is often controlled through diet and oral antidiabetic medications.

Type 2 diabetes used to be known as adult-onset diabetes, but today more children are being diagnosed with the disorder, probably due to the rise in childhood obesity. There's no cure for type 2 diabetes, but losing weight, eating well, and exercising can help manage the disease. If diet and exercise aren't enough to manage an individual's blood sugar well, diabetes medications or insulin therapy may be needed.

This brings us to the end of the lesson. Justin will see you again shortly for the next part of this lesson on Diabetic Emergencies.