

Investigation

3.6B: Diabetes

Now that you know how **diabetes** can prevent patients from effectively receiving treatment for other problems, let's take a look at some big picture concerns we as physicians have about our diabetic patients. Why should we be so concerned? The prevalence of diabetes is growing, not just in the United States, but also around the world. It has been estimated that nearly one in four Americans now have diabetes; and the incidence continues to grow in every part of the world.

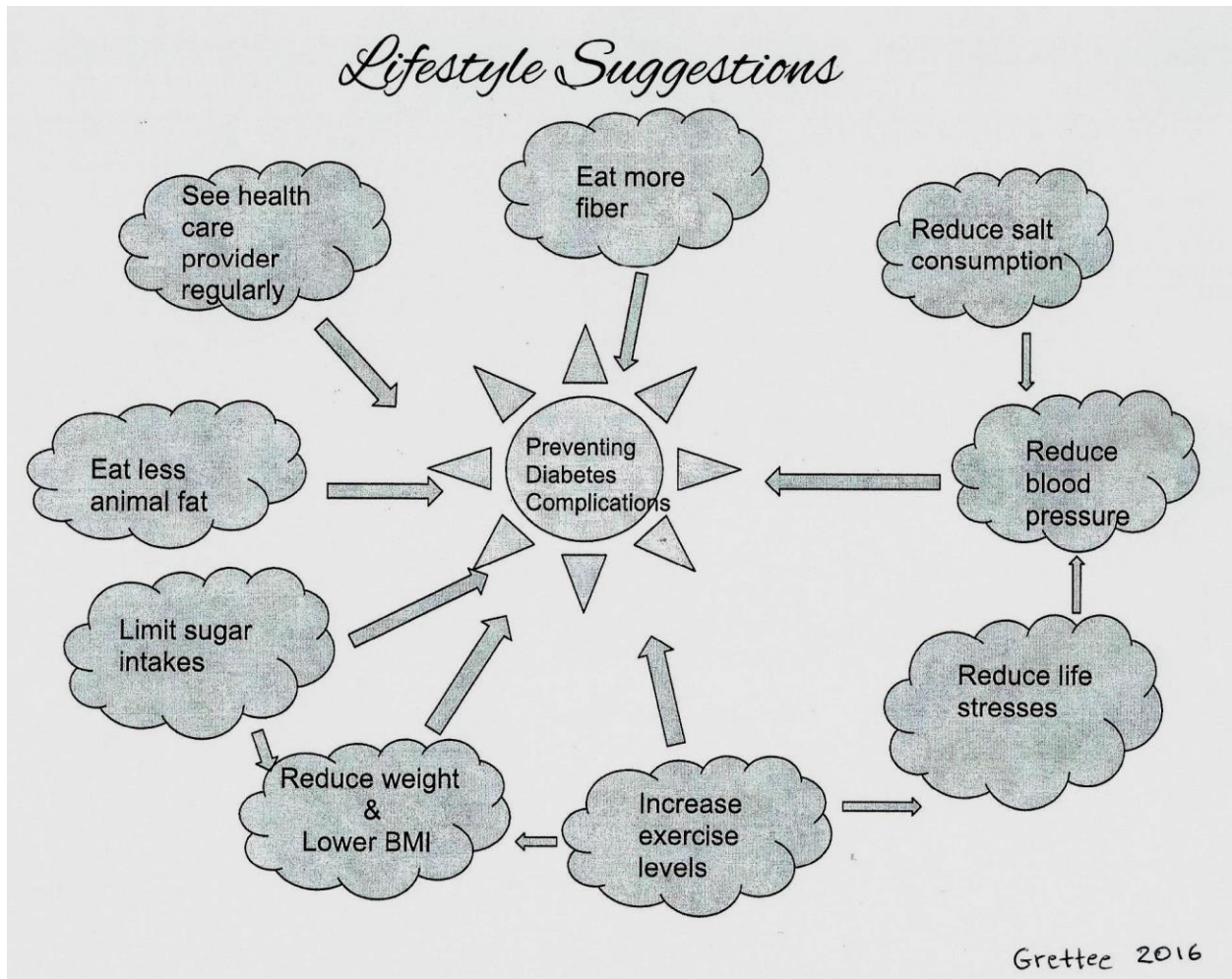
Sadly, **obesity** has increased even faster than diabetes. It has been shown that obesity significantly increases your patient's chances of becoming a Type II Diabetic; that is a person who develops diabetes later in life rather than someone born with a malfunctioning pancreas (Type 1 Diabetes).

America has a very diverse population, with people from many different places and cultures. In case you are wondering which of your patients have the greatest risk of developing diabetes based on their **ethnicity**, studies have shown that about 16% of Native Americans have diabetes, followed by about 13% of blacks and Hispanics, 9% of Asian Americans, and finally around 7.5% of whites.

You understand that Diabetes does not affect all ethnicities equally. Think about some of the factors of different **cultures** that might affect their risk of diabetes.

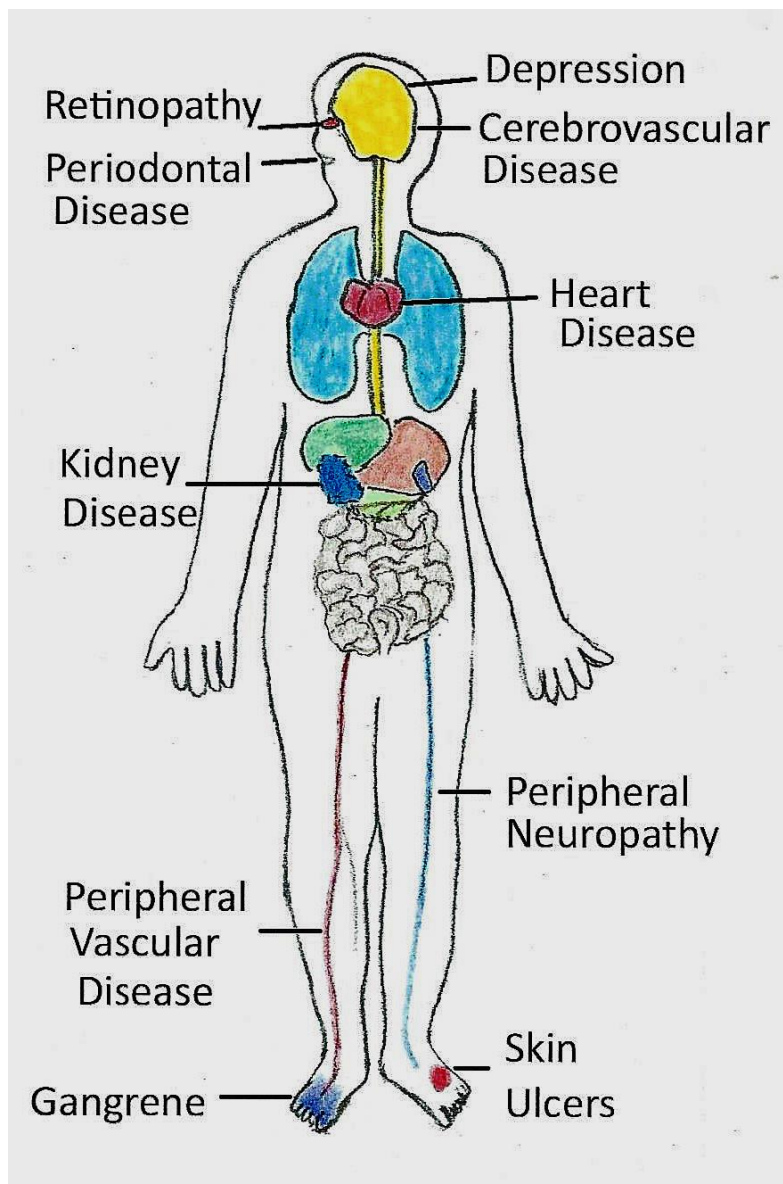
Because **diet** is so important in promoting Type II Diabetes, for most people the disease is entirely **preventable**. When we look at ethnic cultures having high rates of diabetes we can look at their diets and analyze what they eat. We can then compare their dietary differences to cultures suffering less diabetes and similarities to cultures also having higher rates of diabetes. We have learned that certain **dietary practices** influence your patients' chances of coming to your office with the symptoms of diabetes; there are also lifestyle changes you can recommend to help prevent your patients from ever suffering the **complications** of diabetes. Look at the chart below. It demonstrates some healthy lifestyle factors that can prevent the onset of Diabetes.

Prevention of Diabetes Complications



Many of the **preventive measures** listed above relate to diet and regular activity. But you must be prepared for those patients who are not willing to change their habits to a healthier lifestyle. Let's face it; change is difficult. One of the most important roles you will have as a physician is that of an **educator**; yes, you will spend a great deal of time teaching your patients how to live a healthier life. Just like in school, not all of your patients will take your advice. That is the reason you will see many patients suffering the effects of poorly controlled diabetes over many years. Diabetes affects many areas of the body. Look at the chart below to see the many areas that are affected.

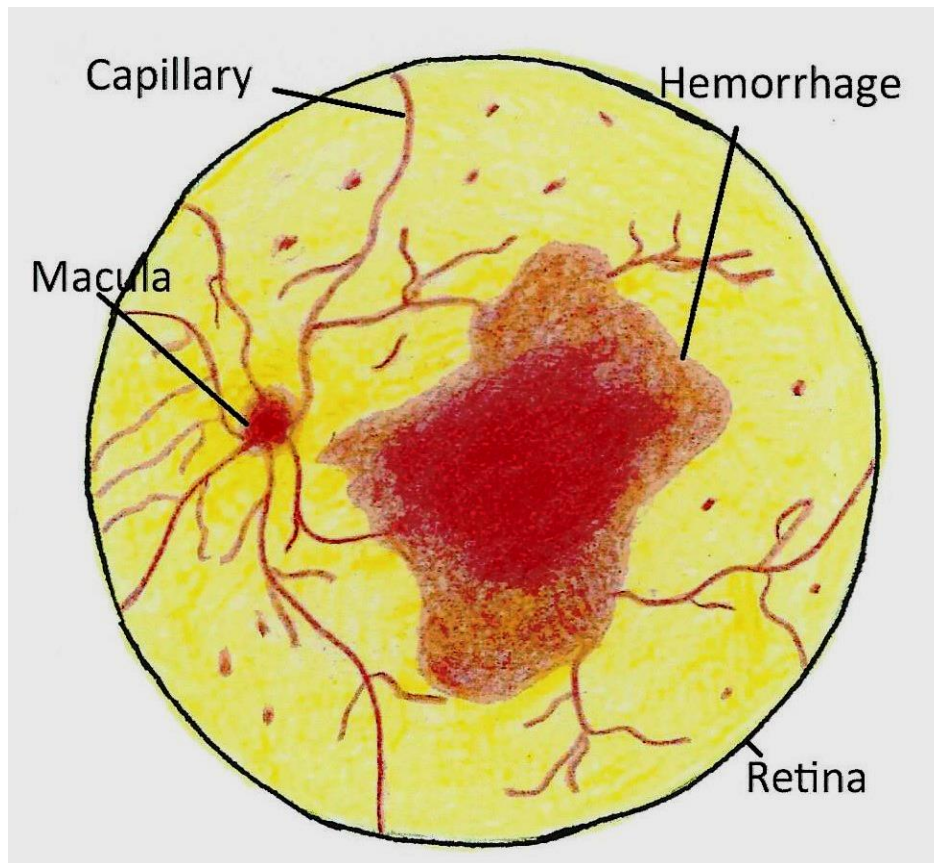
Diabetes Complications



All of these complications are very serious to your patient's health. Your diabetic patients will spend more time in the hospital and live shorter, less fulfilling lives than most of your other patients. Heart disease makes the heart become less efficient at pumping blood to the rest of the body and eventually wear out. Extra **glucose** in the blood

injures the kidneys and damages the **capillary** blood flow to the small vessels and nerves, causing **neuropathy**, **retinopathy**, and **gangrene**.

Diabetic Retinopathy of the Eye

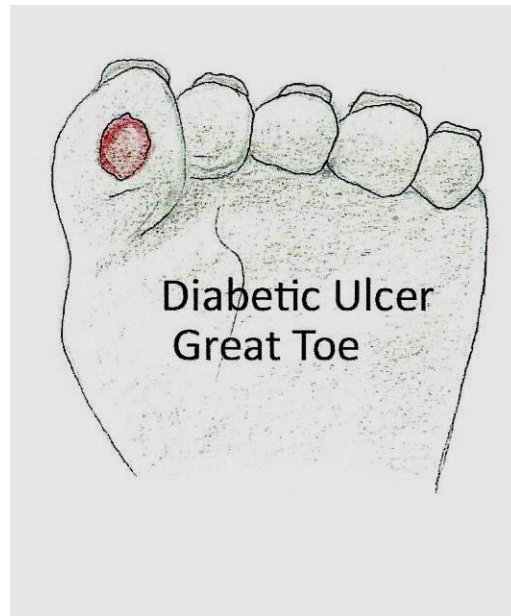


The **retina** is the area of the eye that acts like a movie screen. Diabetes over time injures the walls of the small blood vessels in the eye and they become prone to rupture and bleeding. When blood **hemorrhages** from the small vessels of the retina, it's like watching a movie with a large ink spot on the screen; you can't see anything in that area. Patients may gradually lose their ability to read or watch TV. The damage to the retina from bleeding can be seen by looking in your patient's eyes using an **ophthalmoscope**, as seen in the drawing of the retina.

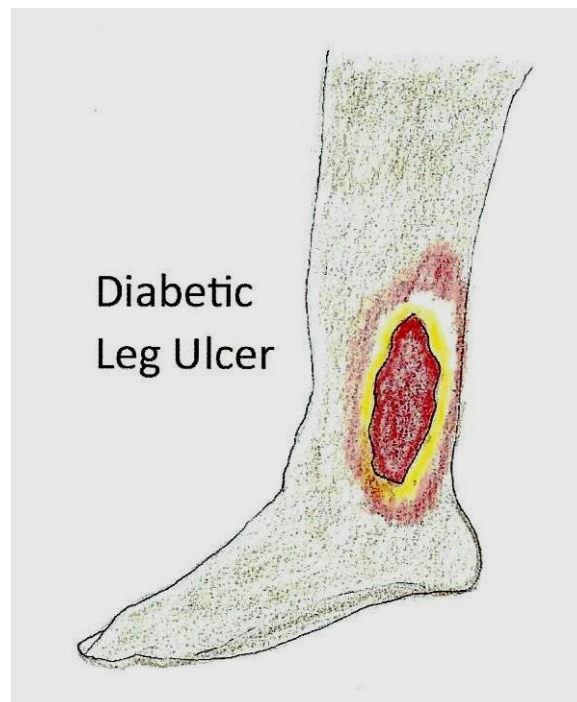
Diabetes similarly damages small blood vessels elsewhere, especially the feet, where gravity tends to make the pressure inside vessels higher than other parts of the body. The Diabetic patient may develop ulcers and even gangrene as shown below. Gangrene occurs when the tissues (skin and muscle) die. The dead tissue must be removed, even if it's an entire toe, or worse yet, an entire lower half of the leg.

Diabetic Foot Complications

Diabetic patients have very fragile skin caused by poor circulation and lack of nerve sensation. Ulcers may occur on a toe.



Diabetic skin ulcers also can occur on the leg, or any place on the body subject to pressure on the skin.

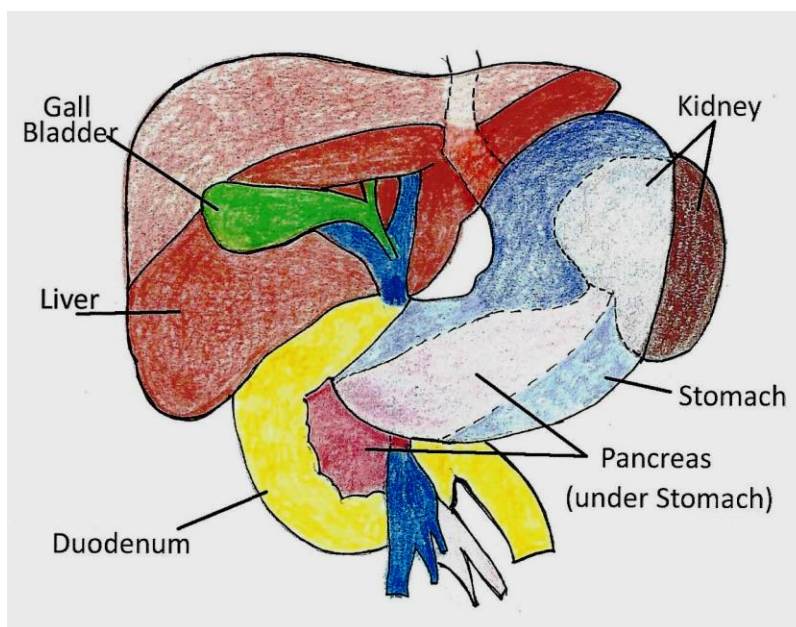


Should the blood circulation to an area restrict the blood supply such that tissue cannot survive, gangrene (cell death) occurs.



Now you understand why it is so important that you stress healthy eating, regular activity, and weight control for your patients? Otherwise, you may spend a lot of time with them treating the complications of their diabetes, even having to visit them too often in the hospital. Let's take a closer look at how our body uses and regulates glucose.

Abdominal Organs near Pancreas



The pancreas is the long, slender yellowish area lying mostly under the stomach. Its job is to keep the amount of glucose, the form of sugar our body utilizes, within a controlled range. The accepted normal range for glucose in our blood is between 80 and 120 mg/dL (milligrams per deciliter). The level is usually lowest in the morning before breakfast and highest after eating.

The pancreas has two types of specialized cells located in an area called The **Islets of Langerhans**, named after the scientist who discovered them. **Beta cells** release **insulin** when the blood sugar gets too high; insulin increases absorption of glucose into all the cells in the body and thus lowers blood sugar to the normal range. On the other hand, if the blood sugar gets too low, the **Alpha cells** give off **glucagon**, which tells the liver to convert stored glycogen into glucose and release it to raise the blood sugar. So basically, insulin lowers blood sugar and glucagon raises blood sugar. Medical technology may evolve to make pancreatic transplants to treat diabetes. Alternatively researchers may develop artificial systems that will replace the function of the pancreas. For now, it is important to treat your pancreas with respect by eating a good diet, exercising, and controlling your weight; without proper regulation of glucose by insulin and glucagon our bodies seem to fall apart rather quickly.