Shivani Sonawane

Understanding Diabetes

What is Diabetes?

Diabetes is a serious condition that causes higher than normal blood sugar levels. Diabetes occurs when your body cannot make or effectively use its own insulin, a hormone made by special cells in the pancreas called islets (eye-lets). Insulin serves as a “key” to open your cells, to allow the sugar (glucose) from the food you eat to enter. Then, your body uses that glucose for energy.

But with diabetes, several major things can go wrong to cause diabetes. Type 1 and type 2 diabetes are the most common forms of the disease.

Type 1 Diabetes:

Type 1 diabetes is the most severe form of the disease. In type 1 diabetes, the body’s immune system attacks the insulin-producing islet cells in the pancreas. The islet cells sense glucose in the blood and produce the right amount of insulin to normalize blood sugars. This attack on the body's own cells is known as autoimmune disease. Scientists are not sure why the autoimmune attack happens.

But once the insulin-producing cells are destroyed, a person can no longer produce their own insulin. Without insulin, there is no “key.” So, the sugar stays in the blood and builds up. As a result, the body’s cells starve. And, if left untreated, high blood sugar levels can damage eyes, kidneys, nerves, and the heart, and can also lead to coma and death. So type 1 diabetes must be treated through a daily regimen of insulin therapy.

Causes:

Doctors don’t know exactly what causes type 1 diabetes. For some reason, the immune system mistakenly attacks and destroys insulin-producing beta cells in the pancreas. Genes may play a role in some people. It’s also possible that a virus sets off the immune system attack.

Treatment:

Type 1 diabetes is treated by taking insulin injections or using an insulin pump or other device. This outside source of insulin now serves as the “key” -- bringing glucose to the body’s cells. The challenge with taking insulin is that it’s tough to know precisely how much insulin to take. The amount is based on many factors, including:

- Food
- Exercise
- Stress
- Emotions and general health

These factors change a lot throughout every day. So, deciding on what dose of insulin to take is a complicated balancing act. If you take too much insulin, then your blood sugar can drop to a dangerously low level. This is called *hypo*glycemia and it can be life-threatening.

If you take too little insulin, your blood sugar can rise to a dangerously high level. Your cells are not getting the sugar, or energy, they need. This is called *hyper*glycemia. As mentioned above, high blood sugar levels can lead to long-term complications and can also be life-threatening.

Type 2 Diabetes:

The most common form of diabetes is called type 2 diabetes, or non-insulin dependent diabetes. About 90% of people with diabetes have type 2. Type 2 diabetes is also called adult onset diabetes, since it typically develops after age 35. However, a growing number of younger people are now developing type 2 diabetes.

People with type 2 diabetes are able to produce some of their own insulin. Often, it’s not enough. And sometimes, the insulin will try to serve as the “key” to open the body’s cells, to allow the glucose to enter. But the key won’t work. The cells won’t open. This is called insulin resistance. Type 2 diabetes is typically tied to people who are overweight with a sedentary lifestyle.

Causes:

Type 2 diabetes stems from a combination of genetics and lifestyle factors. Being overweight or obese increases your risk too. Carrying extra weight, especially in your belly, makes your cells more resistant to the effects of insulin on your blood sugar. This condition runs in families. Family members share genes that make them more likely to get type 2 diabetes and to be overweight.

Treatment:

Treatment for type 2 diabetes focuses on improving ways to better use the insulin the body already produces to normalize blood sugar levels. Treatment programs for type 2 diabetes focus

on diet, exercise and weight loss. If blood sugar levels are still high, medications are used to help the body use its own insulin more efficiently. In some cases, insulin injections are necessary.

Prediabetes:

Occurs when blood sugar is higher than normal, but it's not high enough for a diagnosis of type 2 diabetes.

Gestational Diabetes:

It is high blood sugar during pregnancy. Insulin-blocking hormones produced by the placenta cause this type of diabetes.

Symptoms of Diabetes:

Type 1	Type 2
➔ Increased thirst & hunger ➔ Dry mouth ➔ Frequent urination ➔ Unexplained weight loss ➔ Fatigue ➔ Blurred vision ➔ Labored, heavy breathing ➔ Loss of consciousness	➔ Same as type 1. Other symptoms include: ➔ Slow healing sores and cuts ➔ Itching of the skin ➔ Yeast infections ➔ Recent weight gain ➔ Numbness or tingling of the hands and feet ➔ Impotence or erectile dysfunction

Diabetes Complications:

High blood sugar damages organs and tissues throughout your body. The higher your blood sugar is and the longer you live with it, the greater your risk for complications.

Complications associated with diabetes include:

- ➔ heart disease, heart attack, and stroke
- ➔ neuropathy

- nephropathy
- retinopathy and vision loss
- hearing loss
- foot damage such as infections and sores that don't heal
- skin conditions such as bacterial and fungal infections
- depression
- dementia

How is Diabetes managed?

At the present time, diabetes can't be cured, but it can be managed and controlled. The goals of managing diabetes are to:

- Keep blood sugar levels as near to normal as possible by balancing food intake with medication and activity.
- Maintain blood cholesterol and triglyceride (lipid) levels as near their normal ranges as possible by avoiding added sugars and processed starches and by reducing saturated fat and cholesterol.
- Control blood pressure. Blood pressure should not go over 130/80.
- Slow or possibly prevent the development of diabetes-related health problems.
- Planning what to eat and following a balanced meal plan
- Exercising regularly
- Taking medication as prescribed
- Monitoring blood sugar and blood pressure levels at home

Knowing your ABCs

1. **A for the A1C test:**
    a. The A1C test shows your average blood glucose level over the past 3 months. The A1C goal for many people with diabetes is below 7 percent. Ask your health care team what your goal should be.
2. **B for Blood Pressure:**
    a. The blood pressure goal for most people with diabetes is below 140/90 mm Hg. Ask what your goal should be.
3. **C for Cholesterol:**
    a. There are two kinds of cholesterol in blood: LDL and HDL. LDL or "bad" cholesterol can build up and clog blood vessels. Too much bad cholesterol can cause a heart attack or stroke. HDL or "good" cholesterol helps remove the "bad" cholesterol from blood vessels.
4. **S for Stop Smoking**
    a. Not smoking is especially important for people with diabetes because both smoking and diabetes narrow blood vessels. Blood vessel narrowing makes your heart work harder.

How do Diabetics track their condition?

Regular monitoring of blood sugar levels is important to get the condition on track and prevent long-term health problems.

To self monitor, patients usually use:

- ➔ Lancet – a very thin needle used to collect a tiny amount of blood
- ➔ Test strips – small pieces of special paper that you put the blood on
- ➔ Meter (also known as a glucometer) – a small device that reads the test strip and reports your blood sugar level
- ➔ Log book – to record the numbers from your meter to share with their doctor

Technological devices to help with monitoring include:

- ➔ CGM or Continuous Glucose Monitor: A device that uses a tiny sensor just under the skin to track glucose readings in interstitial fluid.
- ➔ Glucose Meter: Above mentioned instructions followed to get reading

How do the devices work?

Glucose Meter:

Before you test your blood glucose, you must read and understand the instructions for your meter. In general, you prick your finger with a lancet to get a drop of blood. Then you place the blood on a disposable "test strip" that is inserted in your meter. The test strip contains chemicals that react with glucose. Some meters measure the amount of electricity that passes through the test strip. Others measure how much light reflects from it.

CGM:

A CGM works through a tiny sensor inserted under your skin, usually on your belly or arm. The sensor measures your interstitial glucose level, which is the glucose found in the fluid between the cells. The sensor tests glucose every few minutes. A transmitter wirelessly sends the information to a monitor. The monitor may be part of an insulin pump or a separate device, which you might carry in a pocket or purse. Some CGMs send information directly to a smartphone or tablet.

Treatment of Diabetes

Type 1 Diabetes:

Insulin is the main treatment for type 1 diabetes. It replaces the hormone your body isn't able to produce.
There are four types of insulin that are most commonly used. They're differentiated by how quickly they start to work, and how long their effects last:

- Rapid-acting insulin starts to work within 15 minutes and its effects last for 3 to 4 hours.
- Short-acting insulin starts to work within 30 minutes and lasts 6 to 8 hours.
- Intermediate-acting insulin starts to work within 1 to 2 hours and lasts 12 to 18 hours.
- Long-acting insulin starts to work a few hours after injection and lasts 24 hours or longer.

Type 2 Diabetes:

Diet and exercise can help some people manage type 2 diabetes. If lifestyle changes aren't enough to lower your blood sugar, you'll need to take medication.

These drugs lower your blood sugar in a variety of ways:

Types of drug	How they work	Example(s)
Alpha-glucosidase inhibitors	Slow your body's breakdown of sugars and starchy foods	Acarbose (Precose) and miglitol (Glyset)
Biguanides	Reduce the amount of glucose your liver makes	Metformin (Glucophage)
DPP-4 inhibitors	Improve your blood sugar without making it drop too low	Linagliptin (Tradjenta), saxagliptin (Onglyza), and sitagliptin (Januvia)
Glucagon-like peptides	Change the way your body produces insulin	Dulaglutide (Trulicity), exenatide (Byetta), and liraglutide (Victoza)
Meglitinides	Stimulate your pancreas to release more insulin	Nateglinide (Starlix) and repaglinide (Prandin)

SGLT2 inhibitors	Release more glucose into the urine	Canagliflozin (Invokana) and dapagliflozin (Farxiga)
Sulfonylureas	Stimulate your pancreas to release more insulin	Glyburide (DiaBeta, Glynase), glipizide (Glucotrol), and glimepiride (Amaryl)
Thiazolidinediones	Help insulin work better	Pioglitazone (Actos) and rosiglitazone (Avandia)

Diabetes in India

- ➔ It is estimated that 61.3 million people aged 20-79 years live with diabetes in India (2011 estimates). This number is expected to increase to 101.2 million by 2030.
- ➔ And, 77.2 million people in India are said to have pre-diabetes.
- ➔ About 1 million people died from diabetes in India in 2012.
- ➔ A most disturbing trend is the shift in age of onset of diabetes to a younger age.
- ➔ According to the WHO, if one adult in a low-income family has diabetes, “as much as 25% of family income may be devoted to diabetes care.”

Sources:

- ❏ https://www.niddk.nih.gov/health-information/diabetes/overview/managing-diabetes/continuous-glucose-monitoring
- ❏ https://www.fda.gov/medical-devices/vitro-diagnostics/blood-glucose-monitoring-devices
- ❏ https://www.webmd.com/diabetes/guidelines-for-buying-and-using-diabetes-supplies#4
- ❏ https://www.diabeteseducator.org/living-with-diabetes/aade7-self-care-behaviors/aade7-self-care-behaviors-monitoring
- ❏ https://www.webmd.com/diabetes/guide/diabetes-basics#4
- ❏ https://familydoctor.org/condition/diabetes/?adfree=true
- ❏ https://www.niddk.nih.gov/health-information/diabetes/overview/managing-diabetes
- ❏ https://medlineplus.gov/diabetes.html
- ❏ https://www.diabetesresearch.org/what-is-diabetes
- ❏ https://www.webmd.com/diabetes/default.htm
- ❏ https://www.healthline.com/health/diabetes#treatment
- ❏ http://www.arogyaworld.org/wp-content/uploads/2010/10/ArogyaWorld_IndiaDiabetes_FactSheets_CGI2013_web.pdf