



University of California
San Francisco

Information on Diabetes

Introduction to Diabetes

Glucose is a form of sugar that is in most of the foods we eat. Sometimes people call glucose in the blood “blood sugar.” All people need some glucose in the blood because it gives food and energy to other parts of the body. Some people develop a problem keeping their blood glucose at the right level. When the blood glucose level is too high on a regular basis, doctors call this “diabetes.”

Diabetes is a common condition that can range from mild to severe. People with diabetes have high levels of glucose in their blood. Diabetes can be hard to recognize because there are often no clear signs or symptoms in the early stages.

What is the difference between Type I and Type II Diabetes?

If you have type 1 diabetes, your body does not make insulin. Your immune system attacks and destroys the cells in your pancreas that make insulin. Type 1 diabetes usually starts when people children and young adults. But it can happen at any age. People with type 1 diabetes need to take insulin every day to stay alive.

If you have type 2 diabetes, your body does not use insulin well. Eventually, your body may stop making insulin at all. This type of diabetes most often starts in people who are middle-aged or older. But it can also can develop at any age, even during childhood. Type 2 is the most common type of diabetes.

Most of the information in this information sheet is for Type 2 diabetes. Talk with your doctor for more information on Type 1 Diabetes.

Who gets diabetes?

Your chances of developing diabetes depend on a combination of your genes and lifestyle. You are more likely to develop diabetes if you are:

- overweight or obese
- over the age of 45
- have a family history of diabetes
- are African American, Alaskan Native, American Indian, Asian American, Hispanic, Native Hawaiian or Pacific Islander
- are not physically active

- have high blood pressure
- have low levels of HDL (“good”) cholesterol or high levels of triglycerides (a form of “bad” cholesterol)
- have a history of heart disease or stroke
- have depression

What are some complications of high blood sugar?

High glucose levels can cause damage to parts of the body like the heart, brain, kidneys, eyes, nerves, and blood vessels.

- Heart Disease
 - Poor control of diabetes increases your risk of having a heart attack or stroke.
 - People with diabetes tend to develop heart disease at a younger age than people without diabetes.
- Kidney disease
 - People with diabetes are more likely to have kidney damage. High blood glucose can damage the blood vessels in your kidneys, making it harder for them to function normally.
 - Many people with diabetes also develop high blood pressure because of the damage to the kidneys.
- Diabetic neuropathy
 - Over time, the high levels of sugar in the blood can damage the nerves.
 - Symptoms can range from pain and numbness in your feet to problems with functions of your internal organs such as your heart and bladder.
- Vision problems
 - Diabetes can cause vision problems such as cataracts, glaucoma and blindness.
 - It is important to have your eyes checked regularly.

What are some complications of low blood sugar?

- One uncommon, but serious complication of diabetes that you may experience is called a hypoglycemic event, or low blood sugar.

- Hypoglycemia can be particularly harmful if the brain does not get the energy it needs to function. Hypoglycemia may happen you take too much medicine including insulin or certain diabetes pills. It may also happen if you don't eat as much food as usual after taking your diabetes medication, or if you exercise more than you normally would.
- Symptoms of hypoglycemia include:
 - Sweating or trembling
 - Feeling hungry
 - Feeling tired

How You and Your Doctor Can Monitor Your Diabetes with Blood Tests

The most common blood tests used to monitor diabetes are the hemoglobin A1c test and the blood sugar (glucose) test.

Hemoglobin A1c

- The hemoglobin (A1c) test is done at a lab. This test measures the amount of glucose that is attached to the hemoglobin in your blood. Hemoglobin is a part of your blood that carries oxygen to the cells.
- The result is given in a percentage. It indicates your average blood glucose level for the past two to three months. The higher the percentage, the higher your blood glucose has been.
- A normal A1c level is below 5.7 percent. Your doctor may have a personalized goal for your diabetes.
- The A1c test can also be used to monitor how well you are responding to medicines.

Blood sugar test:

The blood sugar test can be done at a lab or at home using a home glucometer. The result indicates the amount of glucose in your blood at the exact moment when the blood sample is taken out of your body.

How to Control Your Diabetes

There are things you, your family, and your doctor can do to help control your diabetes. New activities or medications may help you.

- Some people can manage their diabetes by making healthy food choices and being more physically active.
 - Healthy eating
 - Contrary to popular belief, there is no specific diabetes diet.
 - However, it is important that you eat a lot of high-fiber foods. High fiber foods include fruits, vegetables, and whole grains.
 - You also need to eat fewer animal products, refined (processed) carbohydrates, and sweets.
 - Physical activity
 - Regular exercise that fits your lifestyle and ability is also important.
 - Different kinds of physical activity include aerobic exercise, stretching, and strengthening.
- But healthy eating and physical activity are not always enough to control diabetes.
- When diabetes cannot be controlled by lifestyle changes a doctor may prescribe medicines.
- People with a type of diabetes called type 1 diabetes always need to take medicine.
- Diabetes and medicines
 - Many people need more than one type of diabetes medicine to control their diabetes.
 - Diabetes medicines may include pills or medicines you inject under your skin, such as insulin.
 - Even if you do not take insulin, you may need it at special times, such as during pregnancy or if you are in the hospital.

Names of Common Diabetes Medicines

There are different kinds of diabetes medicines your doctor may prescribe to control your blood glucose:

Oral Medicines

Biguanides

- Metformin (Glucophage®, Fortamet®, Glumetza®)

Sulfonylureas

- Chlorpropamide (Diabinese®)
- Glimepiride (Amaryl®)
- Glipizide (Glucotrol®)
- Glyburide (Glynase®, DiaBeta®, Glycron®)
- Tolazamide (Tolinase®)
- Tolbutamide (Orinase®)

Thiazolidinediones

- Pioglitazone (Actos®)
- Rosiglitazone (Avandia®)

DPP-4 Inhibitors (Gliptins)

- Alogliptin (Nesina®)
- Linagliptin (Tradjenta®)
- Saxagliptin (Onglyza®)
- Sitagliptin (Januvia®)

SGLT-2 Inhibitors (Giflozins)

- Dapagliflozin (Farxiga®)
- Canagliflozin (Invokana®)
- Empagliflozin (Jardiance®)

Glinides

- Repaglinide (Prandin®)
- Nateglinide (Starlix®)

Alpha Glucosidase Inhibitors

- Acarbose
- Miglitol

Injectable Medicines

Types of Insulin

1. Rapid Acting

- Lispro (Humalog® or Lispro-PFC®)
- Aspart (NovoLOG® or NovoLOG FlexPen® or NovoLOG PenFill®)
- Glulisine (Apidra®)

2. Short Acting

- Regular (NovoLIN R®, HumuLIN R®, HumuLIN R U-100®)

3. Intermediate Acting

- NPH (NovoLIN N®, HumuLIN N®)

4. Long Acting

- Glargine (Lantus®, Lantus SoloStar®, Toujeo®, Basaglar®)
- Degludec (Tresiba®)
- Detemir (Levemir®, Levemir FlexPen®, Levemir FlexTouch®)

5. Premixed

- 70% insulin degludec/30% insulin aspart (Ryzodeg 70/30®)
- 75% lispro protamine suspension/25% lispro solution (Humalog Mix 75/25®)
- 50% lispro protamine suspension/50% lispro solution (Humalog Mix 50/50®)
- 70% aspart protamine suspension/30% aspart solution (NovoLOG Mix 70/30®, NovoLOG Mix 70/30 FlexPen®)
- 70% NPH/30% regular (NovoLIN 70/30®, HumuLIN 70/30®)

GLP Agonists

- Albiglutide (Tanzeum®)
- Dulaglutide (Trulicity®)
- Exenatide (Byetta®)
- Liraglutide (Victoza®)
- Lixisenatide (Adlyxin®)

Potential Side Effects of Diabetes Medicines

- Side effects can be different for different kinds of diabetes medicines.
- Most people do not experience side effects when they take medicines for diabetes.
- You should talk to your doctor about the possible side effects of the diabetes medicines you take or might take in the future.
- You and your doctor can decide which medicine or medicines are best for you after considering many factors, including potential side effects and other aspects of your health.
- Pharmacists are other good sources of information on diabetes medicines and their potential side effects.

Vitamins, Foods, and Other Supplements

We recognize that some people with diabetes take vitamins, special foods, or other dietary supplements. Talk with your doctor about the holistic supplements you are taking. Your doctor can make sure these supplements are safe to take with your prescription medicines.

Questions You Can Ask Your Doctor

Some people have questions for their doctor like the ones below. You may want to ask your doctor these questions:

- What is my hemoglobin A1c target?



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- Do I need to test my blood sugar at home, and what should I do if it is too high or too low?
- Do I need to take my medicines even on days that I feel fine?
- Are there medicines (or new medicines) that I should use to help manage my diabetes?
- Does having diabetes mean I have to stop eating the foods I like best?
- How can exercise make a difference in my diabetes?
- Should I see other doctors regularly, like an eye doctor or foot doctor?
- What are the warning signs or symptoms that my blood sugars are too high? What do I do if my blood sugars are too high?
- What are the warning signs or symptoms that my blood sugars are too low? What do I do if my blood sugars are too low?

Trusted Places to Find More Information

There is a lot of health information on the internet or other places that is not accurate. It is important that you get information about your diabetes from trusted sources that contain accurate information. Trusted sources generally include academic institutions, governmental health institutions, or not-for-profit organizations that partner with health professionals. Look for information from these sources when you are searching for health information on the internet or other places.

Below are some trusted websites where you can find additional information on diabetes. This is not an exhaustive list. It is meant to get you started with a few sites to explore.

- <https://www.niddk.nih.gov/health-information/diabetes/overview/what-is-diabetes>
- <https://www.niddk.nih.gov/health-information/diabetes/overview/managing-diabetes>
- <https://www.cdc.gov/diabetes/basics/diabetes.html>
- <https://www.mayoclinic.org/diseases-conditions/diabetes/symptoms-causes/syc-20371444>

Information Provided as Part of a UCSF Study



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