Diabetes and pre-diabetes are serious conditions in which people have high levels of sugar or glucose in their blood. The World Health Organization (WHO) reports that more than 420 million people worldwide live with diabetes. In the US, according to the US Centers for Disease Control and Prevention (CDC), over 30 million people have diabetes and 84 million adults have pre-diabetes (blood sugar levels are higher than normal, but not high enough to be diagnosed with type 2 diabetes). Diabetes is a major cause of blindness, amputation, kidney failure, and cardiovascular disease.

Glucose is a type of sugar that is used as fuel by the body. When you eat, your body converts food...
into glucose. The glucose then goes into your bloodstream and is carried throughout the body to provide energy to all of your cells. In order for glucose to move from your bloodstream into your cells, you need insulin. Insulin carries the glucose, or sugar, in your bloodstream into your cells. Insulin is a hormone made by the pancreas, an organ in the upper part of your abdomen (belly).

If your body has a problem making or using insulin, the glucose in your bloodstream cannot get into your cells. As a result, glucose stays in the blood (high blood sugar) and the cells do not get enough glucose. A diagnosis of pre-diabetes or diabetes is made when glucose stays at higher than normal levels (also called hyperglycemia).

There are several types of diabetes:

**Type 1 Diabetes (Insulin Dependent)**
- The pancreas does not make any insulin
- You must take insulin every day to survive
- Usually begins in childhood or adolescence

**Type 2 Diabetes (Non-insulin Dependent)**
- Your pancreas makes some insulin (but usually not enough), and/or the body does not respond normally to the insulin your body does make (sometimes referred to as ‘insulin resistance’)  
- Some people with type 2 diabetes are able to control it with diet and exercise; many others need diabetes medication, and some need insulin
- Most common form of diabetes

**Gestational Diabetes**
- Diabetes that starts during pregnancy [2] due to hormones that prevent insulin from doing its job
- Most women with gestational diabetes are able to control their diabetes and prevent harm to themselves and their babies; women with gestational diabetes tend to have large babies
- Most often, blood sugar levels return to normal after delivery

**Pre-diabetes**
- Blood glucose levels are higher than normal but not high enough for a diagnosis of diabetes
- Having pre-diabetes puts you at increased risk for developing type 2 diabetes
- Type 2 diabetes can often be prevented or delayed by making changes to your diet [3] and increasing physical exercise [4]

**Metabolic Syndrome**
Metabolic syndrome is not a type of diabetes, but a cluster, or group, of conditions usually associated with being overweight or obese. Metabolic syndrome is also called Syndrome X, insulin resistance syndrome, and dysmetabolic syndrome. This group of characteristics, or traits, puts people at risk for heart disease and type 2 diabetes. A person has metabolic syndrome if they have three of the following five traits:

- High blood pressure (hypertension)
- High blood glucose (high blood sugar)
- High triglycerides (fats) in the blood
- High cholesterol
- Large waist (larger than 35 inches for women and larger than 40 inches for men)
Symptoms of Diabetes

Symptoms of diabetes include:

- Extreme thirst
- Need to urinate frequently
- Unexplained weight loss
- Hunger
- Blurry vision
- Irritability
- Tingling or numbness in the hands or feet
- Difficulty healing
- Extreme fatigue

Symptoms typically occur when glucose levels have gotten very high. If you are diagnosed while diabetes is in its early stages, you may not have any symptoms.

Glucose (Blood Sugar) Tests

Since diabetes does not always have obvious symptoms, it is important to have regular lab tests to check your blood sugar or glucose levels. The most common glucose tests are:

- Fasting glucose test: measures the glucose in a blood sample taken when you have not had anything to eat or drink (except water) for at least eight hours
- Hemoglobin A$_1C$ test: measures your average blood sugar or blood glucose over the last two to three months. This test does not require fasting. It is used to monitor diabetes control as well as to help diagnose it.

To find out if you have diabetes or pre-diabetes, you will usually have a fasting glucose test. A glucose tolerance test may be ordered to help diagnose diabetes and as a follow-up to a high fasting glucose level. A glucose tolerance test looks for abnormalities in the way your body handles glucose after eating.

A diagnosis of diabetes can be made based on either of the following test results, confirmed by retesting on a different day:

- A fasting blood glucose level of 126 milligrams per deciliter (mg/dL) or higher
- An A$_1C$ of 6.5 percent or more (an A$_1C$ of 5.7 - 6.4 suggests pre-diabetes)

Who Is at Risk for Diabetes?

Anyone can get diabetes. However, certain factors may increase your risk:

- Taking certain protease inhibitors (PIs)
- Being over 40 years old
- Being overweight or obese
- A family history of the disease
- A poor diet [3]
- Not being physically active [4]
- Smoking or using tobacco [5]
- A lot of fat around the belly (sometimes called 'central obesity,' having an apple-shaped body)
- Hepatitis C [6] or liver damage
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- High cholesterol level
- High blood pressure
- Having had gestational diabetes while pregnant
- Taking certain HIV drugs (see below)

**HIV and Diabetes**

High glucose levels can be a side effect [7] of HIV drugs. Specifically, certain protease inhibitors (PIs) and nucleoside reverse transcriptase inhibitors (NRTIs) can make it difficult for insulin to get glucose into the cells. This is called insulin resistance. It can lead to pre-diabetes and diabetes.

The PIs that can cause diabetes include:

- Crixivan (indinavir)
- Kaletra (lopinavir + ritonavir)

The NRTIs that can cause diabetes include:

- Retrovir (zidovudine; retrovir is one of the drugs in Combivir and Trizivir)
- Videx (didanosine)
- Zerit (stavudine)

Some studies show that women living with HIV who take PIs are three times more likely to develop diabetes than women living with HIV on non-PI drug combinations or HIV-negative women. In fact, up to six percent of all people on PIs have diabetes. Recently, scientists have shown that PIs increase the chances of women getting diabetes if they have certain genes that make them more likely to develop diabetes. This research may lead to more personalized HIV drug treatment that takes into account a person's genetic makeup.

If you need to take PIs for your HIV treatment, be aware of this possible side effect [7]. Get your blood sugar checked at regular medical appointments. If you have high glucose levels, your health care provider may recommend that you change your HIV drugs. Some studies have shown that switching to a combination that does not include a PI can help bring these levels under control. Switching is not an option for everyone, and you should speak to your health care provider before stopping any HIV drugs.

Many women, whether or not they are living with HIV, develop gestational diabetes during pregnancy [2]. This is of particular concern to women living with HIV who must take PIs to prevent transmitting HIV [8] to their babies. Women who take PIs during pregnancy should have their glucose levels followed very closely.

Some people living with HIV experience changes in the location of their body fat (lipodystrophy [9]). Lipodystrophy syndrome sometimes comes with a number of health problems, including high glucose levels, unwanted changes in body fat, and increases in fat (cholesterol and triglyceride) levels [10] in the blood. These conditions have been linked to diabetes, heart disease, and strokes.

**What Problems Can Diabetes Cause?**

Diabetes can lead to serious illness and even death. It is a major cause of heart disease and stroke, and the seventh leading cause of death in the US. Worldwide, the World Health Organization (WHO) estimates that diabetes was the seventh leading cause of death in 2016. Some of the serious complications of diabetes are:

- Blindness
- Kidney failure
Blood vessel disease that requires an amputation
Nerve damage (neuropathy [11])
Cardiovascular disease (damage to your heart [12] and/or blood vessels)

How Are Diabetes and Pre-diabetes Treated?

Although diabetes can be a very serious disease, it can be treated. It is important to manage diabetes by checking your blood glucose regularly and keeping it under control. Many people control their glucose levels by maintaining a healthy weight, changing their diet, and increasing exercise.

A healthy diet for people with diabetes involves reducing sugar and starchy foods (carbohydrates), such as bread, potatoes, rice, and corn. If possible, see a registered dietitian to help you plan your meals. Many AIDS service organizations have registered dietitians on staff who will see you free of charge.

Sometimes, despite eating well and being physically active, blood sugar levels cannot be controlled without the help of medications and/or insulin. There are a number of medications available that lower blood glucose levels. Because these medications act in different ways, they may often be used together.

Some of the diabetes medications may interact with HIV drugs. To reduce the chance of drug interactions [13], make sure your health care provider knows about all medications you take.

Pre-diabetes

People with pre-diabetes are likely to develop type 2 diabetes unless they take action. The good news is that if you have pre-diabetes, you can do a lot to prevent or delay diabetes.

Studies have shown that people can lower their risk of developing diabetes by losing weight through diet and increased physical activity. One study found that diet and exercise leading to five to seven percent weight loss (about ten to 14 pounds in a person who weighs 200 pounds) lowered the chances of getting type 2 diabetes by nearly 60 percent. Study participants lost weight by cutting fat and calories in their diet and by exercising (mostly walking) at least 30 minutes a day, five days a week.

Taking Care of Yourself

While diabetes is a serious condition, people living with HIV and diabetes can make lifestyle changes and work with their health care providers to control their diabetes and prevent many of its complications.

Steps to staying healthy:

- Regular medical check-ups and lab work that includes glucose tests
- Control blood pressure and fat levels in your blood [10] to lower the risk for heart disease [12] and stroke
- Eat a healthy diet (see our fact sheet on Nutrition [3])
- Get regular physical activity (see our fact sheet on Exercise [4])
- Stop smoking (see our fact sheet on Smoking [5])

Diabetes is a common disease. Many people with diabetes live full, active, healthy lives. There is also a lot of ongoing research about the best way to prevent diabetes. If you start by taking these steps, you may be on your way to living well with diabetes.
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Tags:

- diabetes [14]
- Type 1 diabetes [15]
- Type 2 diabetes [16]
- Gestational diabetes [17]
- blood glucose level [18]
- insulin [19]
- fasting glucose test [20]
- glucose tolerance test [21]
- extreme thirst [22]
- blurry vision [23]
- diabetes women [24]
- diabetes hiv women [25]
- diabetes HIV+ [26]
- diabetes protease [27]
- diabetes protease inhibitors [28]

Additional Resources

Select the links below for additional materials related to diabetes.

- Women (American Diabetes Association) [29]
- Diabetes (US Office on Women's Health) [31]
- Type 2 Diabetes and HIV (aidsmap) [32]
- Glucose Test (Lab Tests Online) [33]
- Insulin Resistance & Prediabetes (US National Institute of Diabetes and Digestive and Kidney Diseases) [34]
- Metabolic Syndrome (Cleveland Clinic) [35]
- Protease Inhibitor Therapy Increases Underlying Genetic Risk of Diabetes for Women with HIV (aidsmap) [36]
- Women & Diabetes (DiabetesSisters) [37]
- Women and Diabetes (US Food and Drug Administration) [38]

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[8] https://www.thewellproject.org/hiv-information/hiv-transmission
[12] https://www.thewellproject.org/hiv-information/caring-your-heart
[16] https://www.thewellproject.org/tags/type-2-diabetes
[18] https://www.thewellproject.org/tags/blood-glucose-level
[19] https://www.thewellproject.org/tags/insulin
[21] https://www.thewellproject.org/tags/glucose-tolerance-test
[22] https://www.thewellproject.org/tags/extreme-thirst
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[26] https://www.thewellproject.org/tags/diabetes-hiv
[27] https://www.thewellproject.org/tags/diabetes-protease
[34] https://www.niddk.nih.gov/health-information/diabetes/overview/what-is-diabetes/prediabetes-insulin-resistance
[37] https://diabetessisters.org/women-diabetes
[38] http://www.fda.gov/ForConsumers/ByAudience/ForWomen/WomensHealthTopics/ucm117969.htm