

# Diabetes

## What is Diabetes?

When we digest food, it puts sugar into our blood. This sugar is called glucose and our bodies use it to get the energy we need. Sweet things turn into glucose but other foods do too, especially starchy foods such as rice, maize, yam, potato, and bread or other foods made from wheat.

Diabetes means having too much sugar in your blood. With diabetes, instead of giving us energy, the sugar builds up in the blood and causes damage to the body.



Hold a piece of white bread in your mouth.  
Can you taste how sweet it is?

The most common type of diabetes is called Type 2 diabetes. Type 2 diabetes is mainly caused by not enough activity, eating unhealthy foods—especially processed, packaged foods—and increased stress and inequality in our lives. Diabetes is a “chronic” disease, which means it can get better or worse, but it never completely goes away.

To live healthier with diabetes, it is very important to control the amount (level) of sugar in your blood. Diabetes is dangerous because high blood sugar can cause problems such as blindness, loss of limbs, loss of ability to have sex, stroke, or even death. When you keep your sugar levels down, these problems can mostly be avoided, and you can have a productive and healthy life. This is called “managing” diabetes.

## Can you be healthy with diabetes?

Medicines and medical care cannot cure diabetes. But people can be healthy with diabetes if they learn about the disease and take care to manage the disease themselves. The most important things to do are to eat healthy food, get exercise, keep your teeth and gums clean, take care of your feet, find ways to reduce stress, and get enough rest. In some cases, medicine is needed too.

Health care workers also treat diabetes by bringing people together in support groups to learn about their illness and to care for themselves (see page 29).

*It was hard to tell my family I needed healthier foods. But now they see how I feel better and understand that changing what we eat will help their health too.*



## Signs of diabetes

Early signs of diabetes are often hard to recognize. Sometimes there may be no signs at all. Many people have diabetes without knowing it.

### SIGNS THAT MAY BE FROM DIABETES

- Thirst
- Frequent urination
- Blurred vision
- Lack of energy or gets tired easily
- Slow-healing wounds
- Feet that feel numb
- Repeated yeast (candida) infections for women

These signs are common to many health problems, so you cannot tell if a person has diabetes from these signs alone. Get a blood test to know for sure (see pages 10 to 12).

**DANGER SIGNS**

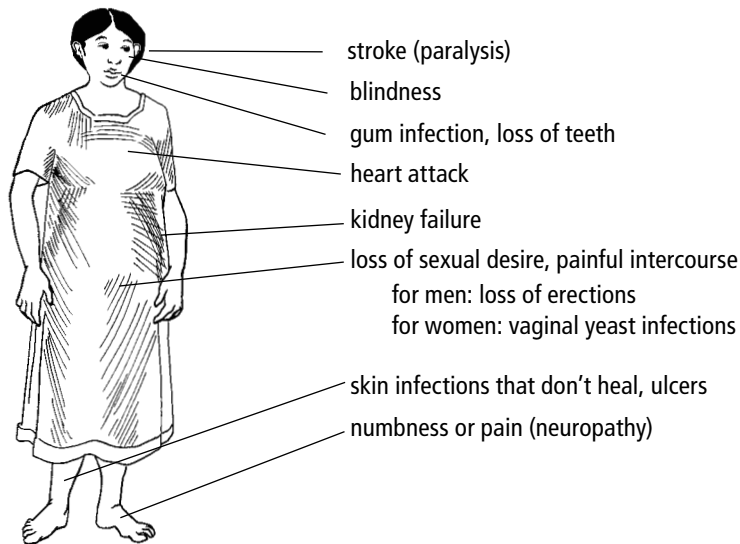
When blood sugar levels get too high, they cause:

- Severe thirst
- Extreme weakness and sleepiness or confusion
- Hunger
- Weight loss even if the person is eating enough

A person with these danger signs should be tested and treated fast. A person can die from very high blood sugar levels if not treated. See High blood sugar (hyperglycemia), page 32.

**Problems caused by unmanaged diabetes**

If diabetes is left untreated over months or years, high sugar levels can damage organs, nerves, and blood vessels. This causes serious problems in the body that can cause permanent harm or even death.



High amounts of sugar in the blood can cause nerve damage. Many people with higher levels start to feel pain in their feet or their feet go numb. Higher levels also cause problems with blood circulation that can make wounds on the skin heal slowly. The person may get tired quickly. High blood sugar levels can damage the eyes and kidneys, causing them to function poorly or stop working at all.

**All these problems are made worse by:**

- High blood pressure (see page 24 and Heart Disease, in development)
- Smoking (see page 24)

Having high blood pressure makes it harder for your heart to work and pump blood, causes damage to other organs, and causes blood sugar levels to be too high. Smoking causes high blood pressure and makes having a stroke or heart attack more likely. It is important for someone with diabetes to stop smoking and lower her blood pressure.

But diabetes does not have to lead to these problems. By eating healthy foods, getting enough exercise, and reducing stress, you can help keep your blood sugar levels under control. Mouth and foot infections can be prevented by learning a few ways to take care of your feet, teeth, and gums (see pages 22 to 25).

## Types of diabetes

There are 3 types of diabetes:

**Type 1 diabetes** usually happens to young people and comes on very fast. The cause of Type 1 is not known. It is much less common than Type 2 (see page 5).

If a child or young adult feels thirsty much of the time, feels weak, or loses weight despite eating well, test him immediately (see page 10). If he has Type 1 diabetes, he needs treatment fast.

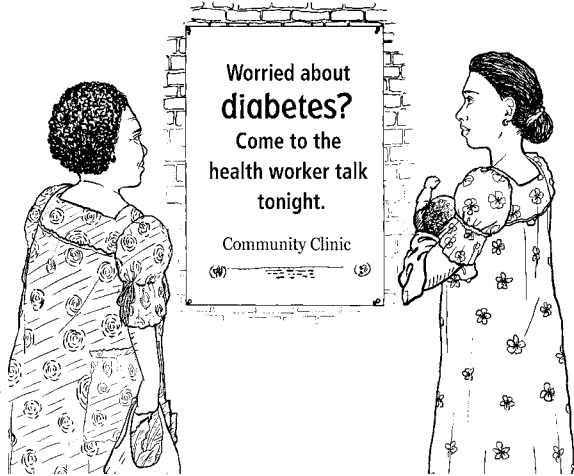
Type 1 diabetes means that this person cannot process sugar well. To live he will need to inject a medicine called insulin every day for the rest of his life. He will need insulin and equipment, and education and support to use it correctly.



The belly is a common place to inject insulin.

**Type 2 diabetes** usually begins in adults and comes on slowly, but young people can get it too. Most people with diabetes have Type 2 and that is mostly what this chapter covers.

People who eat more factory processed, sugary, and starchy foods and have less physical activity are more likely to get Type 2 diabetes. So are people with big bellies, who have family members with diabetes, or have experienced long-term hunger.



Treating Type 2 diabetes starts with healthy eating, increasing physical activity, and reducing stress. People with Type 2 may also benefit from medicines (pages 18 to 21) or plant medicines (page 21).

**Gestational diabetes** is a kind of Type 2 diabetes that happens to some pregnant women. A woman with gestational diabetes will have high blood sugar and so will the baby in her womb. After birth, her blood sugar level may return to normal, or the woman may develop Type 2 diabetes.

Mothers with gestational diabetes may have difficult pregnancies and their babies tend to grow too big in the womb, making birth difficult. A woman with diabetes should give birth in a hospital in case she needs a Caesarean delivery. The baby may be born with low or high blood sugar or breathing problems.

Gestational diabetes is mostly managed with healthy eating and sometimes with medicines or plant medicines.

Most women with diabetes can give birth to healthy babies.



### Planning a pregnancy when you have diabetes

If you have diabetes and want to become pregnant, it is best to control blood sugar levels before starting your pregnancy. Talk with a health worker if you take medicines for your diabetes, because these may need to be changed before you become pregnant. Although mothers do not pass the diabetes to their babies, diabetes can affect your pregnancy and can affect the baby's health, so it is important to take care of yourself.

## What causes Type 2 diabetes?

Unhealthy environments cause most Type 2 diabetes. Many people get sick with diabetes because of too many processed foods coming into their communities and changes in their ways of life that are unhealthy. Causes of diabetes include:

### Unhealthy foods

Sugary drinks, sweet and processed foods, and white flours all put too much sugar into the blood, as well as making the body put on extra fat. Processed and packaged foods can be hard to resist. Sometimes they are cheaper, and in cities are often more available than healthy, fresh foods. But these processed foods cause diabetes and other serious health problems.



### Not moving your body enough

People who are farming, walking, doing physical work or active play will burn up extra sugar in the blood as fuel. People who sit or stand still most of the day do not burn up enough sugar, so it stays in their blood.

### Stress

When people are under a lot of stress all the time, their bodies hold on to sugar instead of using it. This causes blood sugar levels to increase.

### Fat around the belly

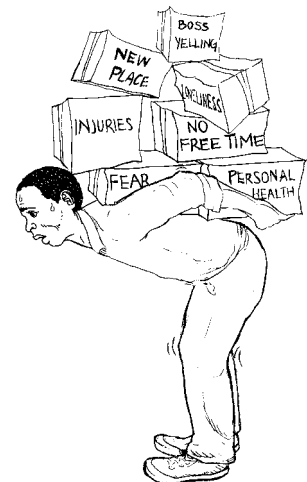
A thick waist seems to make people more likely to get diabetes.

### Family members with diabetes

Diabetes runs in families, so people who have family members with diabetes are more likely to get it.

### Malnutrition

If people do not eat enough food, their bodies will hold on to the sugar they eat. This can start in childhood or even before birth while a baby is in the womb.



When stress piles up, it can affect your health.

## Aging

Older people are more likely to get diabetes.



## Chemicals

Some chemicals affect how our bodies use sugar. Chemicals can reach us in the workplace, through pollution in the community, or because they are added to food or other products we use.

## How chemicals contribute to diabetes

Along with the food we eat and the way we live, some chemicals cause diabetes. Working with, eating, drinking, or breathing any of these chemicals is known to raise the risk of diabetes:

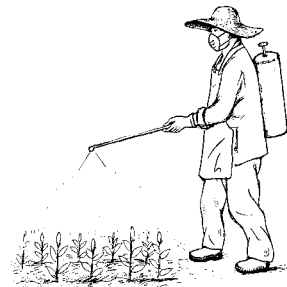
- **Dioxins** are by-products of making pesticides and paper, and from burning plastics.
- **PCBs** are a type of chemical used in industry for insulation and lubrication.
- **Phthalates** are often found in body care creams and oils.
- **Bisphenols** are found in plastic bottles used for bottled water, juice, and soda.
- **Heavy metals** such as lead, mercury, arsenic, and cadmium, are released into the environment by industry, such as oil drilling and refining, mining, and others.
- **Pesticides** are used to kill insects or weeds.

The best way to protect yourself from these chemicals is by not using them. If there are chemicals in your workplace and you cannot convince your boss to change to safer chemicals, try not to breathe them or touch them. Wear a face mask and other protective clothing and wash your hands often so the chemicals don't get on your food or in your mouth.

Chemicals are all around us. Eat foods that have not been sprayed with pesticides. Try to find household cleaners and body care products that have no or few chemicals.

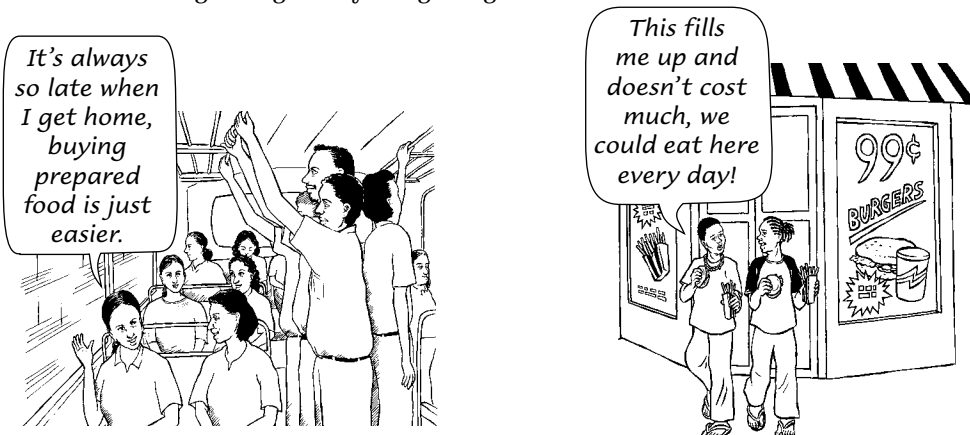
Chemical pollution of water, air, and food by workplaces is a harder problem. It can be solved only when a community pressures owners, and governments enforce rules on industry.

For more on protecting our food, water, land, and air, see *A Community Guide to Environmental Health*.

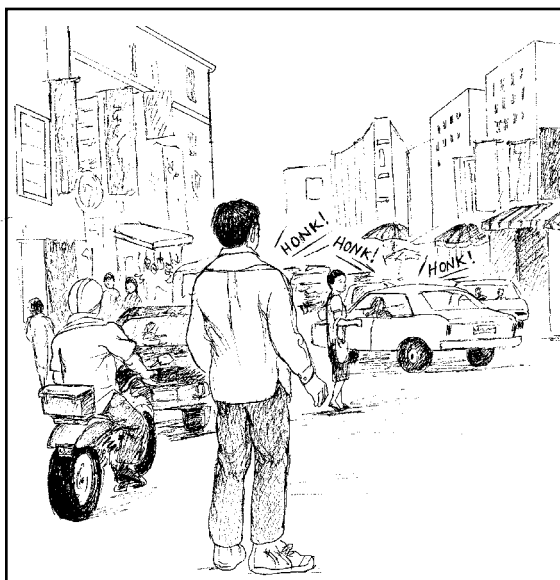


## Why Do More People Have Diabetes?

Diabetes and heart-related problems such as high blood pressure used to mostly affect people in rich countries. Now low-income countries have these problems too. They come when traditional ways of life change and families are broken up. New foods, new chemicals, new jobs, and new ways of life change what people eat and how much exercise they get. Some of these changes seem to make life easier but they also raise the risk for diabetes and other chronic diseases. Each year, more people are getting diabetes and getting it at younger ages.



Often the kinds of jobs people have or city life in general means that people do not walk much. They also might sit most of the day at work, or eat more processed and factory foods.



### New Place, New Problems

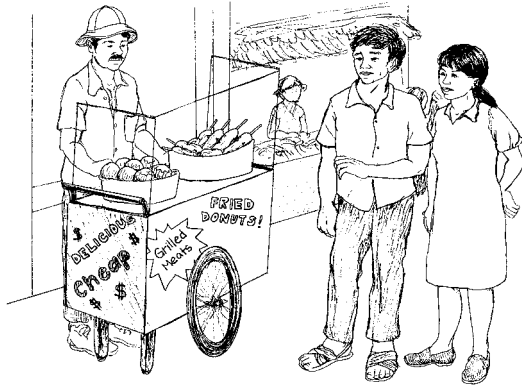
Ten years ago, Amilcar and Serena left their village to find work in the city.

In some ways, life is easier now. Instead of digging and picking all day on the farm, Serena works at a factory. She sits down all day and sews. Amilcar works sweeping floors at the train station.

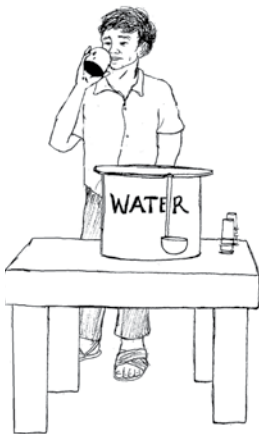


In the village, they walked everywhere. In the city, walking is dangerous so they take the bus. Amilcar used to play football in the evenings. Now he often goes to a local bar and watches sports on TV to relax.

Their food has changed too. Instead of eating food they grow or gather, they now buy prepared food and sweetened drinks from street vendors or packaged food from stores. These foods taste good. They are fast and easy. But many of these processed foods are high in sugar and full of chemicals.



Serena and Amilcar are both gaining weight around their bellies. Their muscles are not as strong as when they worked on the farm. At a diabetes screening, Amilcar's sugar levels were found to be a little high and Serena already has diabetes and nerve pain in her feet.



The health worker at the screening helped Serena make a plan to walk fast around the factory with some coworkers each day at lunch. He advised Amilcar to drink water, which is available at the train station, instead of sweetened drinks.

At home, they will make more meals with fresh vegetables they buy in the market. Hopefully, these changes will help get their diabetes under control.



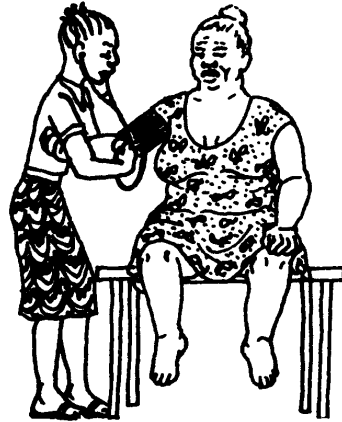
## Testing for Diabetes

Blood sugar levels can be tested by a blood or urine test. Blood tests are more accurate.

### Who should be tested?

A person should be tested for diabetes if she:

- has signs of diabetes (see pages 2 and 3).
- has a family member with diabetes.
- has a big waistline and is older than 40 years.
- has a history of high blood pressure (see page 24).
- had a baby that was very large (over 4 kg or 9 lb).
- is young and has possible signs of Type 1 diabetes (see page 4).

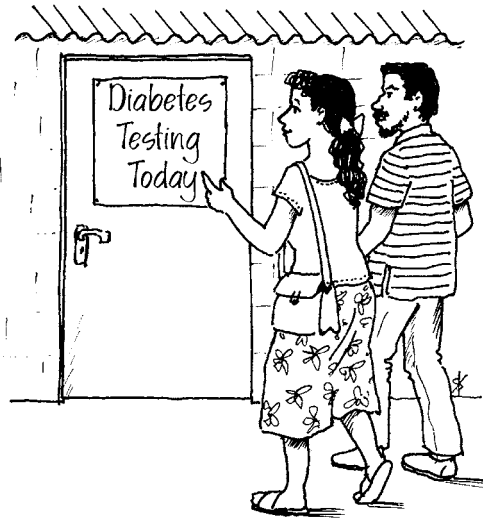


## Blood tests

All types of diabetes can be detected by measuring blood sugar levels. The health worker may do more than one type of test to check for diabetes or may repeat a test. Tests can also be used to manage diabetes by helping you see how the results change in response to changes you make in your diet, activity, or medicine (see pages 18 to 19).

Blood tests measure if a person's blood sugar levels are normal, if they are a little high, or if there is diabetes. If blood sugar levels are high but not yet as high as diabetes, a person can prevent getting diabetes by eating better and healthier foods, and exercising more.

There are 2 common blood tests for diabetes. One is called the Fasting Blood Sugar test and other one is the A1C test.



**Fasting Blood Sugar (FBS or FPG)** is the most common test. This test is done in the morning before the person eats anything. Some clinics test blood sugar levels with a glucometer, a tool that measures the sugar in a drop of blood taken from a fingertip. Or the clinic might take blood with a syringe and send it to a lab. The result of a Fasting Blood Sugar test depends on the measurement system used by your country. If measured in mmol/l (millimols per liter), the results will be a number between 4 and 20. If you have 6.9 mmol/l or more you could have diabetes. If your country measures in mg/dl (milligrams per deciliter), the result will be a number between 80 and 350. On this scale, people with 125 mg/dl or more could have diabetes.

**Less than 5.6 mmol/l or 100 mg/dl:** Your blood sugar level is OK.

**More than 5.6 mmol/l or 100 mg/dl but less than 6.9 mmol/l or 125 mg/dl:** This is a warning—making changes in your life now can prevent you from getting diabetes. If you are close to the higher number, extra effort to eat healthy and get physical activity or exercise is especially important.

**More than 6.9 mmol/l or 125 mg/dl:** You have diabetes and need treatment. The higher the number, the more likely a person is to have an emergency from high blood sugar (page 32) or serious health problems (page 3).

Some tests can be done with a drop of blood from a fingertip (see page 18). For other tests, a vial of blood will be taken from your arm. A skilled health worker in a clinic can do this safely, causing only a little or no pain.



**The A1C test** (glycosylated hemoglobin test, also called HbA1C or HgbA1C) gives an average of a person's blood sugar level for the previous 3 months. A person does not have to be fasting to take this test. A clinic will take a blood sample with a syringe and send it to a lab. The result of an A1C blood test will be a percent (%) usually between 4% and 14%. If the result is close to 6.4%, or is higher, you may have diabetes. If the number is only a little lower than 6.4%, you will want to care for yourself in several ways (see page 13) and be tested again for diabetes in the future.

**Less than 5.7%:** Your blood sugar level is OK.

**More than 5.7% but less than 6.4%:** This is a warning—making changes in your life now can prevent you from getting diabetes. If you are close to 6.4%, extra effort to eat healthy and get physical activity or exercise is especially important.

**More than 6.4%:** You have diabetes and need treatment. The higher the number, the more likely a person will have an emergency from high blood sugar (page 32) or serious health problems (page 3).

## Urine test

Urine tests can show that a person has diabetes. Urine test strips change color if there is sugar in the urine. Test as soon as the person urinates. A person does not need to be fasting for the test.

Urine tests will miss some cases of diabetes because sugar levels have to rise pretty high (10 mmol/l or 180 mg/dl) before sugar gets into the urine. So if the urine test does not show diabetes but there is another reason to think there could be diabetes, get a blood test.

*Though you feel fine now, the diabetes is already doing harm. But even small changes in what you eat can keep you healthy.*



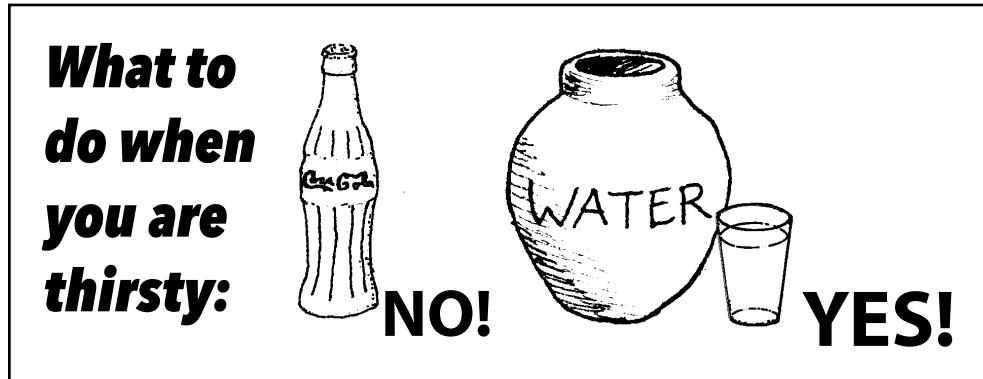
### What if I have diabetes?

Getting diagnosed with diabetes can be worrisome. See page 26 for ways to get support.

Many people have a difficult time accepting they have diabetes. No one wants to believe they have a sickness they will have to manage for the rest of their life. You may not believe there is anything wrong if you do not feel sick. But even if you do not feel it, high blood sugar levels harm your body. That is the bad news. But the good news is you can still live a good, long life by taking care of yourself.

# Staying Healthy with Diabetes

Prevent and manage diabetes by eating healthy foods, being active and moving your body, and reducing stress. These things can help you and your family stay healthy even if you do not have diabetes.



*A sugary drink is like poison for your body — it can cause diabetes.  
Water keeps your body well.*

## Eat healthy foods

The foods our ancestors ate did not cause diabetes. If possible, eat more food you or others grow, gather, raise, or hunt. Avoid packaged and processed foods and other junk foods and drinks. They are harmful and a waste of money. For more on how to eat well with little money, see pages 12 and 13 in *Good Food Makes Good Health*. Make a list of everything the family eats in a week. Go over the list with a health worker to talk about what foods help most or which ones cause most problems, and then talk with your family about how to make changes.



## Replace starchy foods with vegetables

Starchy foods such as rice, maize, wheat, yam, potatoes, plantain, and cassava are often the main foods people eat. But starchy foods turn into sugar in our bodies. A person with diabetes might be able to handle small amounts of starchy foods, but not larger amounts. Replacing some starchy foods with vegetables and leafy greens adds vitamins and nutrients.

The harder your body works, the more starchy foods you can eat without them causing harm to your body. A person who works in the fields all day can eat more than one who sits or stands still most of the day.



This person has a factory job and must sit all day. She should eat only a small amount of starchy foods, for example: 2 tortillas OR 1 cup of beans OR 2 small pieces of fruit OR 1 cup of rice. She can eat more fresh vegetables or protein foods instead.



This person works outside all day and walks a lot, and starchy food in her meals, along with vegetables and protein foods, helps her have enough energy.

## Whole grains are better

Grains are starchy foods that we need for energy. Whole grains with the germ and bran layers still attached, such as brown rice and whole wheat, are healthier. Choose flours made from whole grains.

White rice and flours are processed in factories to remove the nutritious germ and bran so they will last longer on store shelves without spoiling. Without the healthy bran and germ, the processed grains turn into sugar in the body too quickly and can make blood sugar rise to dangerous levels. Try not to eat processed grains.

## Eat foods with fiber

Fiber is the tough parts of plants, such as leaves, stems, roots, and sprouts. Fiber helps slow down how fast sugar gets absorbed into the blood. This helps to manage blood sugar, protect the body, and improve digestion. Foods with fiber include vegetables, beans and other legumes, whole grains, fruits, nuts, and seeds.

To get more fiber:

- After pounding and boiling, it is safe to eat the leaves of cassava (yuca) plants. Although people are used to mainly eating the roots of cassava and taro, the leaves of these plants have a lot of fiber.
- Make flour from beans like soy and fava.
- Eat green vegetables as often as you can.
- Eat brown, red, or black rice or whole grains.

### Eat protein foods

Combined with a good mixture of other healthy foods, protein foods such as fish, eggs, meat, nuts, seeds, tofu, and tempeh do not raise blood sugar and are good for diabetes.

### Eat less packaged food and limit sweet drinks and alcohol

Foods in packages or cans can be tempting. They are easy to store and prepare, and can taste good. But packaged foods usually have too much sugar, salt, and unhealthy ingredients. If you are tired, hungry, or highly stressed, packaged food can be hard to resist. Like drugs or cigarettes, these foods make you feel good for a little while. Then the effect of the sugar passes and you feel worse than before. Everyone in the family will benefit from not eating these foods or at least eating less of them. Many processed foods use palm oil because it is a cheap ingredient but it is less healthy than other vegetable oils.



Food companies know how to sell you their products and will even lie and say food is good for you when it isn't. Their goal is to make money, not to keep you healthy.

Sweetened soft drinks are especially bad for you. They contain a large amount of sugar and raise your blood sugar levels very fast. Even fruit juices contain too much sugar. Drink water or tea without sugar instead. You can get used to less sugar in your tea or coffee by using a little less each week. You can add mint leaves or lemon to water or tea for more flavor. Although all fruits have sugar, eating whole fruit instead of fruit juice is better for your diabetes because the fiber in fruit is good for you. Drinks with alcohol also turn into sugar in the body, so avoiding or limiting alcohol is best.

## How often to eat

Skipping a meal can lead to low blood sugar (see page 31) or make you eat too much at the next meal. Having a very large meal can raise your blood sugar (see page 32). Eating the same amount of food 3 times a day or having smaller meals 4 times a day can help you keep your blood sugar more steady.



*Changing many habits at once is difficult. As a health worker, I help people pick one thing to work on at a time, like less sugary drinks or stopping smoking. Even one thing can make a big difference.*

## Get more physical activity

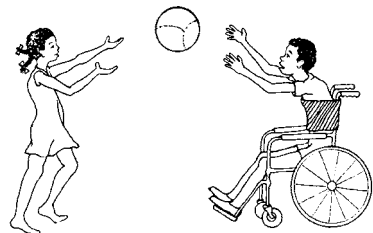
Physical activity is an excellent way to keep blood sugar levels down. Doing at least some movement every day, and not just once in a while, is important. To treat and prevent diabetes, try fast walking, dancing, sports, or any exercise that makes your heart beat faster for 30 minutes or more. The more activity, the better.

In places where daily work is physically hard, you probably get enough physical activity. But if you are sitting or standing in one place all day, you may need to think of ways to move more.

Many people find it easier to be active with others instead of alone. Being active is also easier when it is fun, like walking with friends, playing sports, or dancing.

If you take a medicine such as a sulfonylurea or insulin for your diabetes (see pages 19 to 20), exercising may make your blood sugar levels drop too low. To prevent this, eat food with protein and healthy fats (like an egg or fish) at the meal before you exercise. If you know your blood sugar is dropping during or after exercising, you can drink fruit juice or eat a piece of candy to reverse this. That is why carrying these snacks with you is a good idea.

For signs of blood sugar levels dropping too low, see page 31.





## Weight

People with Type 2 diabetes are often heavy. Losing weight can help them be healthier and feel better. This is why people may tell you to lose weight to manage the diabetes. For many people, losing weight is very hard. Stay focused on controlling your blood sugar, increasing physical activity, eating healthy, and lowering stress.

## Reduce stress

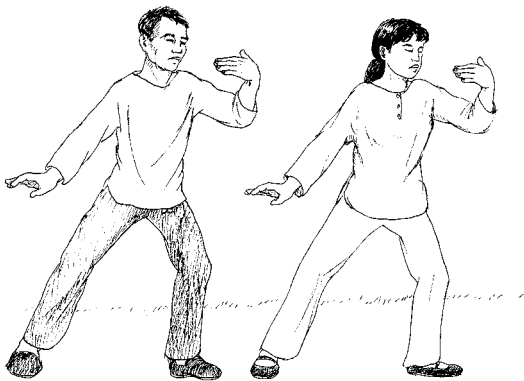
Stress is the feeling of having more problems than you can solve. These problems can be about money, family, housing, safety, racism, or other dangers. Constantly feeling stress causes several physical problems, including raising blood sugar levels.



Talking about what is worrying you with a trusted friend, family member, or support group can help reduce stress, especially when people find ways to help each other. Do not be afraid to ask for help.

Building self-confidence also reduces stress. We often live in fear because others are more powerful than we are. We may feel weak because our health is bad or we do not have enough money. But we can learn to

build upon our own strengths. Some problems may be much bigger than something we can fix by ourselves, and for them we need to work with others (see pages 27 to 29). But there is still much we can do by ourselves. Make plans to try something new to improve your health, like walking more or trying a new food. When you succeed, you will build confidence in your ability to do more.



Meditation, prayer, or exercise such as tai chi and yoga are also good ways to reduce stress.

## Manage Blood Sugar with Medicines

Learn how eating, exercise, and medicines affect your body to prevent your blood sugar from going so high that it makes you feel unwell or becomes an emergency (hyperglycemia, see page 32). Medicines for diabetes (see pages 20 to 21 and 33 to 40) can help lower blood sugar levels even more, but too much insulin or sulfonylaureas can make them go too low and cause low blood sugar (hypoglycemia, see page 31). If you take these medicines, check your blood sugar levels often until you know what makes them go up and down. That way you can know you are managing your diabetes well.

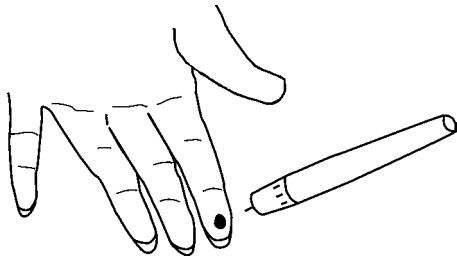
### Testing your blood sugar levels

As discussed on pages 10 to 11, blood tests can be used to diagnose diabetes. People also use blood tests to manage diabetes. Using a blood sugar meter (glucometer) and getting an A1C test are two ways of keeping track of blood sugar levels. They give different information, but both are helpful.

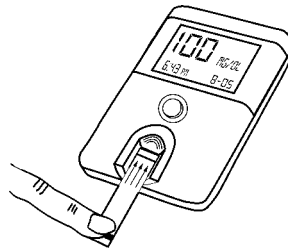
A glucometer is a simple machine that reads the amount of sugar in blood at the moment you test. It is best to test at different times of the day to see how your test results change before and after meals, and from day to day. You can test:

- before a meal. A good range is between 4.4 – 7.2 mmol/l (80 – 130 mg/ dl).
- 2 hours after starting a meal. A good level is less than 10 mmol/l (180 mg/dl).

To test, put a drop of blood from the finger on a test strip and the blood sugar level will show on the glucometer. Depending on the glucometer, instructions may say to put the test strip in the glucometer before adding the drop of blood to the test strip (see below) or the instructions may say to put the drop of blood on the test strip first.

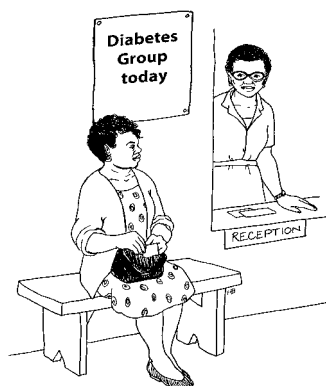


Use a needle or a lancet to get a single drop of blood that goes on the test strip.



For this kind of glucometer, put the test strip in first, then touch the end of the test strip to the drop of blood on your finger.

Some people have glucometers in their home and can test themselves often. Others use a glucometer at a local clinic or with a diabetes support group. Glucometers can be shared among many people safely. But do not share the needles or lancets for drawing blood—they can spread HIV or other illnesses that are carried by blood.



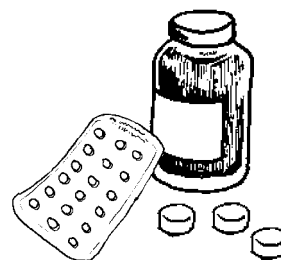
The A1C test (glycosylated hemoglobin test) is only available at a clinic or hospital. This test gives the average blood sugar level for the previous months, so it shows how you are managing your diabetes in general, rather than your level for that day. For most people with diabetes, a good level is less than 8.0%. If this test is available, try to get it done once or twice a year.

Your health worker or diabetes program might use slightly different numbers for your personal situation. The important thing is for you to understand your body, what affects your blood sugar level, and what level makes you feel your best.

## Medicines for diabetes

Medicines cannot cure diabetes. But some medicines can lower blood sugar levels. So can some plant medicines.

Most people start managing Type 2 diabetes without medicines. Healthy eating, exercise, and plant medicines are often enough to lower blood sugar levels so a person stays healthy.



If healthy eating, more exercise, and plant medicines do not help improve a person's signs, medicines can help keep the blood sugar level from getting too high and prevent new problems from beginning. Sometimes a health worker might have you combine two medicines or, after some time, might change the dose or which medicines you use.

Medicines have to be taken regularly and at the right times. Make sure family members also understand the common side effects of your medicines (see pages 33 to 40) and what to do in case of an emergency (see pages 30 to 32). And remember: medicines are only one part of self-care. You still have to eat healthy foods and remain active when taking diabetes medicines.

## Metformin

**Metformin** (see page 33) is a very common diabetes medicine and is the best choice for many people. Metformin is usually taken 2 times a day.

When you start metformin, it may cause stomach upset and diarrhea. This usually goes away in 1 to 2 weeks and can often be avoided by taking metformin with a meal. If the side effects get too bad or do not get better with time, your health worker might stop the medicine or reduce the dose.

People with kidney or liver disease should not use metformin.

## Sulfonylureas

**Sulfonylurea** medicines (see page 34), such as glibenclamide, glipizide, and tolbutamide, are usually taken 1 to 2 times a day before meals.

The danger with sulfonylureas is that they can cause blood sugar levels to drop too low, causing dizziness, weakness, fainting, tremors, sweating, or even death (see page 31). If any of these signs begin, eat something sweet quickly to raise your blood sugar. Make sure family members also know the signs and what to do to help.

To prevent blood sugar getting too low while on sulfonylureas:

- do not miss meals. If you have not eaten, do not take the sulfonylurea medicine.
- eat protein foods or other nutritious foods for breakfast.
- eat extra food when doing physical work, exercise, or sports.
- keep fruit juice, sweets, or sugar with you in case you start to feel weak or dizzy.

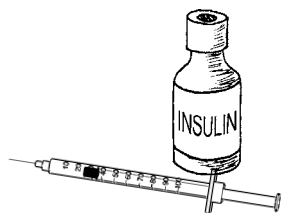
If blood sugar gets low too often, your health worker might stop the medicine or reduce the dose.

Another possible side effect of sulfonylureas is weight gain. You may need to pay more attention to diet and exercise, or switch to metformin or insulin. After a person has taken sulfonylureas for many years they may not work as well to keep sugar levels low enough. If this happens, talk to a health worker.

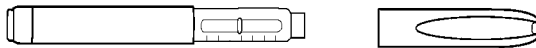
## Insulin

**Insulin** (see page 39) is given by injection. It is the fastest way to lower blood sugar. Injecting insulin can be scary at first, but people learn how to do it and get used to it. People with Type 1 diabetes need insulin to live.

Insulin is a hormone that your body makes to keep blood sugar levels in a good range. People with Type 1 diabetes do not make any insulin. People with Type 2 do not make enough. There are many myths about insulin. Insulin does not cause blindness, does not make diabetes worse, and does not create dependency once you start taking it. Insulin lets you manage your diabetes and live a healthy life.



Most people use a syringe to inject insulin



Insulin also comes in special 'pens' where a needle is attached for each injection. These are easier to use but are more expensive

There are different types of insulin. Long acting insulins are used once or twice a day to keep blood sugar at a good level day and night. Short acting insulins are used before meals so that the food you eat does not raise your blood sugar level too much. See page 39.

One danger of insulin is that it can lower blood sugar levels too much (see page 31). A person can become confused, dizzy, lose consciousness, and can even die from too much insulin. Prevent low sugar levels in the same way as for sulfonylureas by trying not to miss meals and carrying sweets with you for emergencies (see page 20).

If you take insulin, a home blood sugar meter (glucometer) helps you monitor sugar levels to make sure they do not get too low. If you have no meter, it is best to use a lower insulin dose to prevent blood sugar levels from getting dangerously low. Without a way to check, having the blood sugar level be a little too high is safer than too low.

Insulin must be kept cool. If there is no refrigerator, keep it in a bowl of cool water and out of the sun.

## Plant medicines lower blood sugar

All over the world, healers have found foods and plant medicines that can help reduce blood sugar.

Ask local healers what plant medicines are available in your area for lowering blood sugar, the best way to use them, and if they are safe to use while also using insulin or other medicines.

- Bitter melon
- Cinnamon
- Bitter leaf
- Moringa leaf
- Nopal
- Mulberry leaf
- Mate tea
- Fenugreek
- Vinegar
- Berberine
- Turmeric
- Ginger root
- Gymnema



# Prevent and Manage Complications from Diabetes

## Take care of your feet

Good foot care is one of the most important concerns for people with diabetes. Nerve damage caused by diabetes can lead to loss of feeling (numbness) in the feet, making it hard to feel injuries. Diabetes also makes it harder for wounds to heal, easily leading to infection. Fungus on the feet (see Skin problems, in development) can also lead to infection.

A foot infection can spread to the whole leg if not treated. The leg may become so infected that a part of it needs to be removed (amputated). But good foot care and managing your blood sugar levels can prevent amputations.

### Check your feet daily

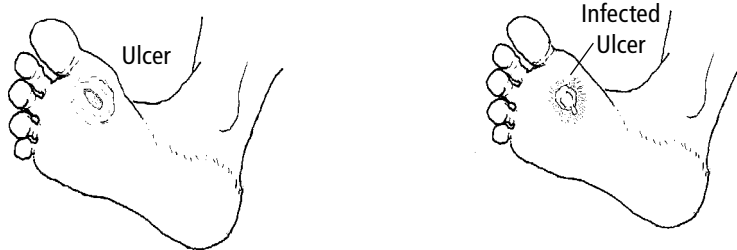
It is hard to notice an injury that you cannot feel. So if you notice parts of your foot are becoming numb, be sure to check your feet by sight and touch every day. If you cannot do it by yourself, have someone help you. Some people use a mirror to see the bottom of their foot. Look for blisters, redness, cuts, or sores. Feel for warm or swollen areas, which can be early signs of infection. Make sure to also check between the toes.

Seek medical care for any wounds that do not heal or areas that stay red, warm, or swollen. It is important to treat wounds early to avoid serious complications.



## Care for foot injuries

Keep injured areas clean and dry. Stay off the foot as much as possible. Use crutches for walking to lessen the pressure on the sores.



Clean sores with clean water or an antiseptic. Remove any dead tissue. (Dead tissue will feel cool to the touch and be darker in color.) Soaking the foot in warm (not hot) water can help remove dead tissue. Apply an antibiotic ointment and cover the sore with gauze or a clean, soft cloth. Put padding over it.

Watch for signs of infection, such as swelling, hardness, heat, or red lines going up from the wound. Treat infections with an antibiotic such as tetracycline, doxycycline, penicillin, or metronidazole (see First aid, antibiotics pages 60, 66 and 69).

If sores do not heal with self-care and rest, get medical help.

## Prevent foot injuries

Wear shoes or sandals, even indoors. You might step on something sharp and not feel it.

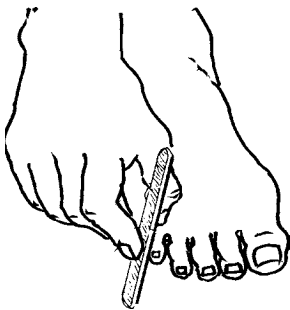
Wash feet daily and pat dry. Always dry between the toes.

Always check inside shoes with your hands to make sure there is nothing sharp or rough inside before putting them on. Anything rough should be padded or clipped away.



## Toenails

An ingrown toenail can cut into the skin and cause infection. If a toenail is becoming ingrown, wedge a piece of wet cotton under the corner of the nail to help lift it out. Trim toenails straight across, being careful not to injure the toe, or use a file to keep them from becoming too long. Cutting them straight across instead of on a curve can help avoid ingrown toenails.



## Check blood pressure

Everyone with diabetes should be checked for high blood pressure and everyone with high blood pressure should be checked for diabetes. Like diabetes, high blood pressure causes damage to the heart, blood vessels, kidneys, and other parts of the body. So if you have both diabetes and high blood pressure, the chances of developing heart disease, stroke, kidney disease, or other serious problems are greater than having either diabetes or high blood pressure alone.



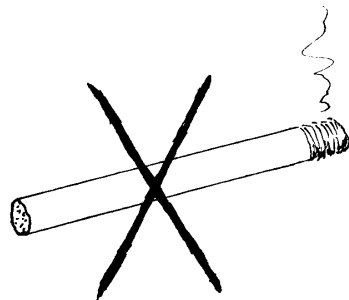
Eating well to manage diabetes will also help prevent high blood pressure. Eating less salt helps keep blood pressure at a good level.

A normal blood pressure is less than 140/90 mmHg (see Heart Disease, in development). If blood pressure is high, try to lower it by increasing physical activity, reducing stress, and eating healthier food. These same changes help both diabetes and high blood pressure.

Medicines called ACE Inhibitors lower blood pressure and may protect against kidney failure. Another group of medicines called statins helps reduce the amount of cholesterol in the blood, to make heart problems or a stroke less likely for people with diabetes. For more on medicines that lower blood pressure and cholesterol medicines, see Heart Disease (in development).

## Stop smoking

People who smoke get diabetes more often, and people with diabetes who smoke have more serious health problems than those who do not smoke. Smoking tobacco damages more parts of the body than just the lungs. It blocks blood flow and raises blood pressure. Smoking is so harmful for people with diabetes that stopping smoking is even more important than lowering the sugar level in your blood. See Drugs, Alcohol, and Tobacco (in development) for help with how to stop smoking.





## Vision

When blood sugar levels go too high, diabetes can cause blurred vision. This will usually clear up when the blood sugars have returned to normal. However, diabetes can also cause more permanent damage to the blood vessels in the eyes, leading to gradual loss of vision or blindness. A person with diabetes should have their eyes tested once a year or more often if they already have some damage to their eyes. If damage to the blood vessels in the eye is detected early, it can be treated by an eye specialist (ophthalmologist) to prevent loss of vision.



## Mouth care

Diabetes worsens gum infections which, in turn, makes diabetes worse. People with diabetes should brush their teeth at least twice a day with a toothbrush and fluoride toothpaste or a chewstick (miswak, neem stick). If toothpicks or floss are available, use them to clean between the teeth. For more on how to prevent gum infections, see Teeth, Gums and Mouth (in development).



A person with diabetes will benefit from seeing a dentist. Always let the dentist know if you have diabetes.

## Vaccines

People with diabetes should get regular vaccines to prevent diseases such as influenza and pneumonia, which can be more severe if you have diabetes.

# Diabetes as a Second Chance

Diabetes is a serious disease but it is manageable. Managing diabetes gives people an opportunity to make positive changes so they can live a healthy, active, and productive life.

Without knowledge of how to take care of your diabetes, life can be very hard. But with support and knowledge, people can become healthier than they were before. Because their health depends on it, they may take on other issues in their lives and communities. They might fight for healthier food, fairer wages, stopping chemical pollution, making it safer to walk, or other things that help them be more active, eat better, and lower the stress in their lives.

## You can live with diabetes

People with diabetes have to change the way they eat and live. Here is some advice to help you make changes:

- **Start with small changes.** For example, instead of stopping sugar drinks all at once, try cutting back over time. Slowly reducing the amount of sugar you eat or increasing the amount of exercise you do is easier to manage and you will be more likely to stick with it.
- **Decide for yourself what you want to change.** Set a goal like walking more, smoking less or not at all, or being able to play with your grandchildren.
- **Find support.** Family, friends, or other people with diabetes can help you make changes. Diabetes groups and classes can connect people with diabetes to support each other.
- **Find help for hard feelings.** It is normal for people with diabetes to fear the future, to be sad about the loss of health, or angry about needed changes. Feelings of sadness, depression, or hopelessness can stop a person with diabetes from making changes he needs or wants to make. It can be helpful to talk about these emotions and learn ways to feel better. For more on depression, see Mental Health (in development).
- **Find your reasons for wanting to be healthier.** What do you want to do and how do you want to feel better? For example, think of your family and why you want to be alive and healthy to help them long into the future. Positive goals help you make changes and keep going.



# Community Action for Diabetes

While individual people get diabetes and can make changes to improve their health, the changes that can prevent more and more people from getting diabetes can only be made at the community level. For example, one person can choose what kinds of foods to put in her mouth, but her choices are limited by what kinds of foods are available and affordable in her community. One person can want to exercise more, but she cannot choose if her neighborhood is safe enough to do so. It is best to bring families and communities together to change the conditions that cause diabetes or make diabetes worse.

## Protect babies and children

To prevent diabetes, feed mothers and children well. Give enough nutritious food to boys and girls. Children malnourished in the womb or in childhood are more likely to get diabetes later. Avoid giving children sugar, sweets, or other junk foods.

## Improve access to healthy foods

To increase the variety, amount, and affordability of healthy foods in your community:

- **Hold cooking classes** to teach about healthy eating. When people see that healthy foods taste good and learn how to prepare them, they will want to eat them.
- **Pass along** the healthy food traditions of your culture. When favorite traditional foods are unhealthy, it is best to limit how much we eat of them. Choose the healthier ones and ask elders in your community to share their recipes.
- **Use schools** to involve children in growing, cooking, and eating healthy foods. Snacks given at schools can be made from local grains, fruits, and vegetables. Stop the sale of junk foods and sugary drinks to children in and near schools.
- **Establish community kitchens** where people without a place to cook can prepare food. Healthy low-cost group meals are another solution.
- **Build a community garden** where people can grow their own food. Even growing a little food can make a difference in how you eat. Some people in cities grow food on rooftops, balconies or in vacant lots.
- **Organize farmers markets or food cooperatives** to ensure people have access to healthy foods and that farmers have a place to sell their crops. For more on community food projects, see *A Community Guide to Environmental Health*.



## Create places to exercise and play

In urban areas, people may not have safe places where they can be active. Communities have come together to build football fields, basketball courts, and playgrounds. These areas often become community gathering places.

## Lead community education

Teach what diabetes is, where it comes from, the severe problems it can cause, and why to take it seriously even if signs are not severe at the beginning. Encourage people to tell their stories about diabetes, share their knowledge, and ask questions. They might plan to eat healthier food or exercise together.



Other topics for discussion and action might include water and air pollution, racism, and the economic or political conditions that create stress in the community.

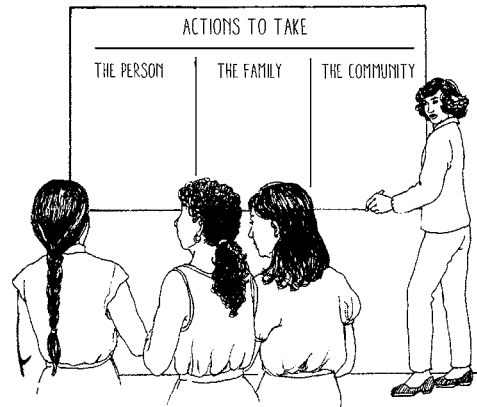
## Organize group testing

Diabetes testing days are a good way for people to find out if they have diabetes, even if they do not have signs. Test people who have the warning signs listed on page 2 or who are older than 40 and have family members with diabetes (see page 10).

For testing large groups of people, urine tests may be easiest. Blood tests are also useful but should be done when the person has not yet eaten that day, ideally in the morning before breakfast. To take a urine test, a person does not have to be fasting, but the tester should write down the time of test and when the person last ate, as sugars go up after eating. For more on testing, see pages 10 to 12.

### How health workers help

A community health worker can help individuals one by one, but also make a big difference by gathering people to learn together, to make health changes together, and to make changes in the community. Through ongoing support groups (see below), community health workers can help people with diabetes and their families share information about the disease, guide people to find help in the health system, and support each other to make changes or take their medicines. Health workers can help people learn more about diabetes and what treatments and programs are available. Health workers can organize testing for diabetes, expose myths and calm fears people may have about diabetes, and prevent diabetes through community action.



### Support groups

A support group is a group of people who meet regularly (like once every week or two) to help each other. A support group can start in a neighborhood, a school, a church, or a workplace—wherever a group of people want to start one. Sometimes a community health worker, clinic worker, or teacher will start and participate in the group. Other groups ask such people to meet with them only sometimes.

People with diabetes meet together to share ways they have learned to care for themselves, discuss things that are difficult, and gain a sense of community. People who just found out they have diabetes can benefit from meeting with people who have been living with diabetes for a while. Support groups can discuss the challenges of cooking and eating together as a family now that one person needs to change what she eats in order to stay healthy. And the group can take on projects to make the community healthier for everyone. A support group can continue and grow for many years if participants find it helpful.



### Other community efforts

- Urge health care officials to offer free testing for people who might have diabetes and to make sure medicines and diabetes testing supplies are available and affordable.
- Fight for safe water in order to spend less on water sold in bottles or beverages that are unhealthy.
- Stop chemical pollution at the source.
- Reduce the use of pesticides.



### Moving Together in Ecuador

In the South American country of Ecuador, the government started a big campaign in 2012 to get everyone moving. The “Exercise Ecuador” organizers decided that any public park, school yard, or community center could be a place for people to come together, have fun, and get moving. The government trained young people and paid them to lead others in dancing and moving together to lively music. Cities and communities



located places where people could go to dance or exercise together at no cost during a lunch break or going to or from work or school. The program makes it easy for people of all ages to participate and helps pregnant woman and disabled people be involved too.

## Diabetic Emergencies

There are 2 kinds of emergencies that can happen to people with diabetes. An emergency from low blood sugar (hypoglycemia) happens to a person who knows he has diabetes and is taking medicine or insulin to treat it. This emergency is caused by either too much medicine or insulin or by eating less than normal. A low blood sugar emergency can happen suddenly without warning, but acting fast can help the person recover.

An emergency from high blood sugar (hyperglycemia) usually happens after the person has been having warning signs even if the person does not know he has diabetes.

If you have diabetes, wear a medical bracelet or carry a card with you to show: "I have diabetes." Put the name of any medicine you take on the card or bracelet too. This will help others to help you if you are unable to help yourself. Teach family members and others about the danger signs and what to do.

If someone is having a problem due to diabetes but you are not sure if the problem is from low blood sugar or high blood sugar, treat as if it is low blood sugar (give a small amount of sugar) on the way to get medical help.

## Low blood sugar (hypoglycemia)

This condition can only happen to a person treating his diabetes with medicines. A person's blood sugar can drop too low if he has taken too much insulin or another diabetes medication, does not eat enough food, does too much physical activity all at once, waits too long between meals, or drinks alcohol. If a person has had problems with low blood sugar, help him find a better way to manage his medicine. Eating more often or more healthy foods can prevent these emergencies.

Someone with low blood sugar may first feel nervous, sweaty, or shaky, then suddenly become clumsy, confused, nervous, or irritable. With the first signs, he must eat right away. If he does not, his condition will worsen. Look for these danger signs:

### DANGER SIGNS

- Difficulty walking
- Feeling weak
- Trouble seeing clearly
- Confusion or acting strangely (you may mistake him for being drunk)
- Loss of consciousness
- Seizures

### TREATMENT

If he is conscious, quickly give him sugar: fruit juice, candy, or a glass of water with several spoons of sugar in it will all work. He should eat a full meal soon after as well. If you can measure blood sugar with a glucometer, you will know if the treatment is working. If he is still confused or does not begin to feel better 15 minutes after you have given sugar, get help.

If he is unconscious, place a pinch of sugar or honey under his tongue. Keep giving small amounts. It takes time for the body to absorb sugar. When he wakes up you can give him more. Have someone stay nearby for 3 or 4 hours to make sure the danger signs do not return.

## High blood sugar (hyperglycemia)

A person with diabetes can have too much sugar in his blood if he eats too much food, is less active than usual, has a serious illness or infection, does not take his diabetes medicine, or gets dehydrated. This can happen even if a person does not yet know he has diabetes. Before there is an emergency from high blood sugar, these signs may mean the person has diabetes or their diabetes needs a different treatment:

### **SIGNS**

- Feeling thirsty and drinking a lot
- Frequent urination
- Blurred vision
- Weight loss

If you do not treat high blood sugar, it can become very dangerous and can lead to coma or even death. You can save a person's life by getting help for these more dangerous signs:

### **DANGER SIGNS**

- Fast heart rate
- Fruity odor on breath
- Dry skin
- Abdominal pain, nausea, vomiting
- Low blood pressure
- Confusion
- Fast, deep breathing
- Loss of consciousness

### **TREATMENT**

Take a person with these danger signs to a medical center immediately. If he is conscious, give him plenty of water to drink, a little at a time.

If you are certain he has high blood sugar, have already tested his blood sugar with a glucometer, and know his insulin dose, give a small amount of insulin on the way to help. But if you are not certain the problem is high blood sugar, do not give insulin. Giving someone insulin when they have low blood sugar can kill them.



# Diabetes: Medicines

## Oral Medicines for Type 2 Diabetes

### Metformin

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Metformin is a diabetes drug that helps the body's insulin work better and decreases sugar production in the liver. It works well for people with Type 2 diabetes who cannot control their diabetes enough with changes in eating and physical activity but is not used for people with Type 1 diabetes. It is less expensive than other diabetes medicines, will not cause blood sugar to drop too low (hypoglycemia), and does not cause weight gain. Metformin is sometimes given along with other diabetes medications (sulfonylureas or insulin).

#### Side effects

Diarrhea, nausea, stomach cramping, gas, and a metallic taste in the mouth. Taking metformin with food will help prevent these side effects. They are usually mild and go away after 1 or 2 weeks after the medicine is started or the dose is increased. If side effects continue, try a lower dose or different medicine.

#### Important!

Someone who is dehydrated or has a severe infection should stop taking metformin until they are better.

People with kidney problems should have a blood test to check kidney function before starting metformin. People with mild kidney disease should be on a low dose of metformin (no more than 1000 mg per day). People with severe kidney disease should not take metformin.

People with severe heart problems, liver disease, or who have more than one alcohol drink most days, should not take metformin.

A person with Type 2 diabetes having surgery or x-rays that use dye might be told to stop taking metformin for 1 day before and 2 days after. This is done to prevent a rare but dangerous condition called lactic acidosis.

#### How to use

For anyone taking diabetes medicines, testing a drop of blood to measure blood sugar (see pages 18 to 19) can show how well the medicine, or a specific dose of the medicine, is working. Usually, a person starts with a low dose and then the dose is increased little by little. So more tests than usual are done when starting a new diabetes drug to help find the dose that works best.

Metformin comes in 500, 850, or 1000 mg tablets, and should be taken with meals.

→ For adults, usually the person starts with 500 mg 1 time a day, with the evening meal. If blood sugar levels are still high, the dose can be increased starting the following week by using a tablet with more medicine or by taking it more than 1 time a day.

For example:

week 1: Take 500 mg OR

Take ½ of a 850 mg tablet every night

week 2: To take 850 mg each day, take ½ of a 850 mg tablet with the morning meal and ½ of a 850 mg tablet with the evening meal OR

To take 1000 mg each day, take 500 mg with the morning meal and 500 mg with the evening meal each day

For most adults, metformin works well when they take 1000 to 2000 mg total each day, half with the morning meal and half with the evening meal.

It is also possible to take metformin 3 times a day (with the morning, midday, and evening meals).

For example: To take a total of 1500 mg in a day, take 500 mg with each meal, 3 times each day

More than 2000 mg per day usually doesn't help.

Never give more than 2550 mg per day.

When metformin is used by a child, a doctor or experienced health worker should determine and monitor the dose.

### **Other medicines that may work**

Sulfonylureas and insulin are medicines that are sometimes used instead of or together with metformin.

## **Sulfonylureas**

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Sulfonylureas are a varied group of drugs for people with Type 2 diabetes. They help the pancreas make more insulin and help the body use insulin better. Short-acting sulfonylureas lower blood sugar quickly but need to be taken two times each day. Long-acting sulfonylureas work more slowly but last longer in the body, so unless you need a higher dose, it is usually taken 1 time each day.

Sulfonylureas can be used alone or combined with other diabetes medications (metformin or insulin) to better control blood sugar levels. They may become less effective when someone has had Type 2 diabetes for a long time.

## Side effects

Sulfonylureas can make the blood sugar go too low too quickly (see Hypoglycemia on page 31), especially if someone does not eat after taking this medicine or is more active than usual. This danger is more likely with long-acting sulfonylureas like glibenclamide (glyburide) and chlorpropamide since they last longer in the body.

- Increased appetite and weight gain are possible side effects. Eating well and getting enough activity can help prevent this.
- Drinking alcohol when using sulfonylureas, especially chlorpropamide, can sometimes cause vomiting.
- For some people, sulfonylureas causes skin rash or increased sensitivity to sun.

## Important!

People with kidney or liver disease, or who have more than one alcohol drink most days, should use sulfonylureas with caution.

For older people (over 65 years old) or people with kidney disease, it is safer to use short-acting sulfonylureas, such as glipizide, and start at the lowest dose, to prevent blood sugars from going too low.

Sulfonylureas cannot be used by people with Type 1 diabetes or by people with allergies to sulfa drugs.

Except for glibenclamide (glyburide), pregnant women should avoid using sulfonylureas unless there is no other diabetes medicine available.

Children with Type 2 diabetes usually are not given sulfonylureas.

## Signs of taking too much

The danger signs of low blood sugar include difficulty walking, feeling weak, difficulty seeing, confusion, loss of consciousness, or seizures. If the person is conscious, give them something sweet quickly and a full meal as soon as possible. If unconscious, place a pinch of sugar or honey under his tongue and keep giving small amounts until he wakes up and can eat by himself (see page 31).

## Interactions with other medicines

Other medicines may not work as well when a person is taking sulfonylureas. And if someone is taking insulin, some sulfonylureas may stop being useful for her. Talk to a health worker about all the medicines you are taking.

## How to use

For anyone taking diabetes medicines, testing a drop of blood to measure blood sugar (see pages 18 to 19) can show how well the medicine, or a specific dose of the medicine, is working. Usually, a person starts with a low dose and then the dose is increased little by little. So more tests than usual are done when starting a new drug to help find the dose that works best.

**Sulfonylureas medicines are used for adults with Type 2 diabetes.**

- Take sulfonylureas 30 minutes before you eat. It is important to always eat after you take this medicine because if you are not taking food, your blood sugar could become dangerously low (see page 31).
- If you are eating well and taking the medicine normally but your blood sugar remains high, talk to your health worker. A change in dose or a different medicine may be needed.
- Sulfonylureas are usually started at the lowest dose and taken 1 time per day before breakfast. The dose is raised very slowly over several weeks if the blood sugar is still high.

Each of the sulfonylurea medicines for adults has different doses. A person starts with a low dose and is tested several days later to see if her blood sugar levels have fallen enough. If she needs a stronger dose, her dose is increased a little. After another week, she is tested again and the dose is adjusted again, if needed. Too high a dose of sulfonylurea is dangerous, so the dose is changed only a small amount each time.

**GLIBENCLAMIDE (GLYBURIDE)**

Glibenclamide is a long-acting sulfonylurea and usually comes in 1.25 mg, 2.5 mg, and 5 mg tablets.

→ The starting dose is usually between 1.25 and 5 mg, 1 time each day, before the morning meal.

If necessary, the dose can be increased. Most people do well with a dose between 2.5 mg and 10 mg each day. If taking 10 mg or more each day, it is common to divide the daily amount in half and take it 2 times a day, once before the morning meal and once before the evening meal. For example:

→ To take 10 mg each day: take a 5 mg tablet before the morning meal and another 5 mg tablet before the evening meal.

→ To take 15 mg, take 3 of the 2.5 mg tablets with breakfast and another 3 of the 2.5 mg tablets before the evening meal.

Do not take more than 20 mg in one day.

**GLIMEPIRIDE**

Glimepiride is a long-acting sulfonylurea and usually comes in 1 mg, 2 mg, and 4 mg tablets.

→ The starting dose is usually between 1 mg and 2 mg, 1 time each day, before the morning meal.

If necessary, the dose can be increased. Most people do well with a dose between 1 mg and 4 mg each day, taken 1 time each day. Do not take more than 8 mg in one day.

## GLIPIZIDE

Glipizide is a short-acting sulfonylurea and usually comes in 5 mg, and 10 mg tablets.

➔ The starting dose is usually 2.5 mg, 1 time each day, before the morning meal. To start with 2.5 mg each day, take 1/2 of a 5 mg tablet.

If necessary, the dose can be increased. Most people do well with a dose between 2.5 mg and 20 mg each day. If taking 10 mg or more each day, it is common to divide the daily amount in half and take it 2 times a day, once before the morning meal and once before the evening meal. For example:

➔ To take 10 mg each day, take a 5 mg tablet before the morning meal and another 5 mg tablet before the evening meal.

Do not take more than 20 mg in one day.

## GLICLAZIDE and GLICLAZIDE MR

Gliclazide comes in 2 forms.

Regular gliclazide usually comes in 80 mg tablets.

➔ The starting dose is usually between 40 mg and 80 mg, 1 time each day, before the morning meal. To start with 40 mg each day, take 1/2 of a 80 mg tablet.

If necessary, the dose can be increased. Most people do well with a dose between 40 mg and 240 mg each day. If taking 160 mg or more per day, then it is common to divide the daily amount in half and take it 2 times a day, once before the morning meal and once before the evening meal. For example:

➔ To take 160 mg each day: take a 80 mg tablet before the morning meal and another 80 mg tablet before the evening meal.

Do not take more than 320 mg in one day.

**Gliclazide MR** (modified release) comes in 30 mg tablets and has a different dose than regular gliclazide. Usually the person starts with 30 mg of gliclazide MR each day.

If necessary, the dose can be increased. Most people do well with a dose between 30 mg and 120 mg each day, 1 time each day, before the morning meal. If using gliclazide MR, do not take more than 120 mg in one day.

## CHLORPROPAMIDE

Chlorpropamide is a long-acting sulfonylurea and usually comes in 100 mg and 250 mg tablets.

➔ The starting dose is usually between 100 mg and 250 mg, 1 time each day, before the morning meal.

If necessary, the dose can be increased. Most people do well with a dose between 100 mg and 500 mg each day, 1 time each day, before the morning meal.

Do not take more than 750 mg in one day.

## TOLAZAMIDE

Tolazamide is a short-acting sulfonylurea and usually comes in 100 mg, 250 mg, and 500 mg tablets.

➔ The starting dose is usually between 100 mg and 250 mg, 1 time each day, before the morning meal.

If necessary, the dose can be increased. Most people do well with a dose between 100 mg and 1000 mg each day. If taking 500 mg or more each day, it is common to divide the daily amount in half and take it 2 times a day, once before the morning meal and once before the evening meal. For example:

➔ To take 500 mg each day: take a 250 mg tablet before the morning meal and another 250 mg tablet before the evening meal.

➔ To take 1000 mg each day: take a 500 mg tablet before the morning meal and another 500 mg tablet before the evening meal.

Do not take more than 1000 mg in one day.

## TOLBUTAMIDE

Tolbutamide is a short-acting sulfonylurea and usually comes in 500 mg tablets.

➔ The starting dose is usually between 1000 mg and 2000 mg. It is common to divide the daily amount in half and take it 2 times a day, once before the morning meal and once before the evening meal. For example:

➔ To take 1000 mg each day: take a 500 mg tablet before the morning meal and another 500 mg tablet before the evening meal.

➔ To take 2000 mg each day: take 2 of the 500 mg tablets before the morning meal and another 2 of the 500 mg tablets before the evening meal.

If necessary, the dose can be increased.

Do not take more than 3000 mg in one day.

# Injectable Medicine for Diabetes

## Insulin

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Insulin is a hormone produced in the pancreas that helps the body process sugar in foods. It is necessary for life, and if the body cannot produce it, a chemical form of insulin must be used instead. All people with Type 1 diabetes will need to take insulin for life. People with Type 2 diabetes may also need to use insulin if their own bodies stop producing it. When this happens, oral medicines such as metformin or sulfonylureas are no longer sufficient and insulin may be the only way to manage blood sugar levels.

Insulin must be injected. It may come in a vial, and you can use a syringe to prepare the correct dose. It can also come in a device that looks like a pen which measures the correct dose and is easier to use.

### There are 3 types of insulin:

- Short-acting: The most common type of short-acting insulin is called “regular” insulin. Lispro and aspart are also short-acting. This type of insulin is used before meals.
- Long-acting: NPH is the most common long-acting insulin. Glargine and detemir are also long-acting. This type of insulin is used 1 or 2 times a day.
- Mixed dose or pre-mixed: The most common combination of long-acting and short-acting insulins is NPH/regular 70/30, which is used 2 times a day. Another common mixed-dose insulin is NPH/regular 50/50.

### Side Effects:



Insulin can make the blood sugar go too low too quickly (see page 31).

Weight gain can be partially prevented by eating well and staying active after starting insulin.

### Important!

The risk with insulin is that it will make the blood sugar go too low, which can become a medical emergency (see page 31). This is more likely to occur if someone skips a meal, has had a lot of exercise, or takes too much insulin by mistake.

It is important that the person using insulin understands how to use it safely and can recognize the danger signs of low blood sugar (page 31). If not, she must have adequate help at home. A person with limited vision will also need extra help to make sure she takes the right dose.

If the person uses both long-acting and short-acting insulin, it is very important that she understands the difference between them and uses them correctly.

## How to use

Insulin should be kept in a cool place, away from extreme hot or cold. It can be stored in a refrigerator but never freeze insulin.

For anyone taking diabetes medicines, testing a drop of blood to measure blood sugar (see pages 18 to 19) can show how well the medicine, or a specific dose of the medicine, is working. Usually, a person starts with a low dose and then the dose is increased little by little. So more tests than usual are done when starting a new medicine to help find the dose that works best.

### FOR TYPE 1 DIABETES

People who have Type 1 diabetes need insulin every day to be healthy. Long-acting insulin is needed to stabilize the person overnight and throughout the day and the person learns how to adjust doses of short-acting insulin depending on meals and when they are active physically. Experienced health workers will help the person and her family determine the types of insulin and the dose that will work best.

### FOR TYPE 2 DIABETES

People with Type 2 diabetes often start taking insulin with a once a day injection of long-acting insulin, either alone or in addition to oral medicines like metformin or sulfonylureas.

First doses of long-acting insulin should be low dose, such as 10 units. If you start with a single injection of NPH, it should be given at night. But because NPH only lasts about 12 hours, many people take it 2 times a day to avoid swings in blood sugar.

Your health worker may have you increase the amount of long-acting insulin very slowly over time until the blood sugars are no longer high. Once the blood sugar is in a good range, you continue to take the same dose every day. It can take many weeks to get to the correct dose.

Blood sugars may be at a good level in the morning, but high after meals. If this happens, the person may also need a short-acting insulin, such as regular insulin, given before meals. Short-acting insulin should also be started at a low dose, around 4 units. It can often be started once a day before the largest meal, but for some people it will need to be used before every meal. Regular insulin should be taken 30 minutes before eating. Frequently measuring your blood sugar at first will help your health worker adjust the dose of short-acting insulin you will need.

Mixed dose insulin is another alternative for people who need more than just long-acting insulin. For example, NPH/Regular 70/30 is given 2 times a day, 30 minutes before breakfast and 30 minutes before dinner.

### Signs of taking too much

The danger signs of low blood sugar include difficulty walking, feeling weak, difficulty seeing, confusion, loss of consciousness or seizures. If the person is conscious, they need something sweet quickly and then a full meal as soon as possible. If the person is unconscious, place a pinch of sugar or honey under his tongue and keep giving small amounts until he wakes up and can take more himself. See page 31.