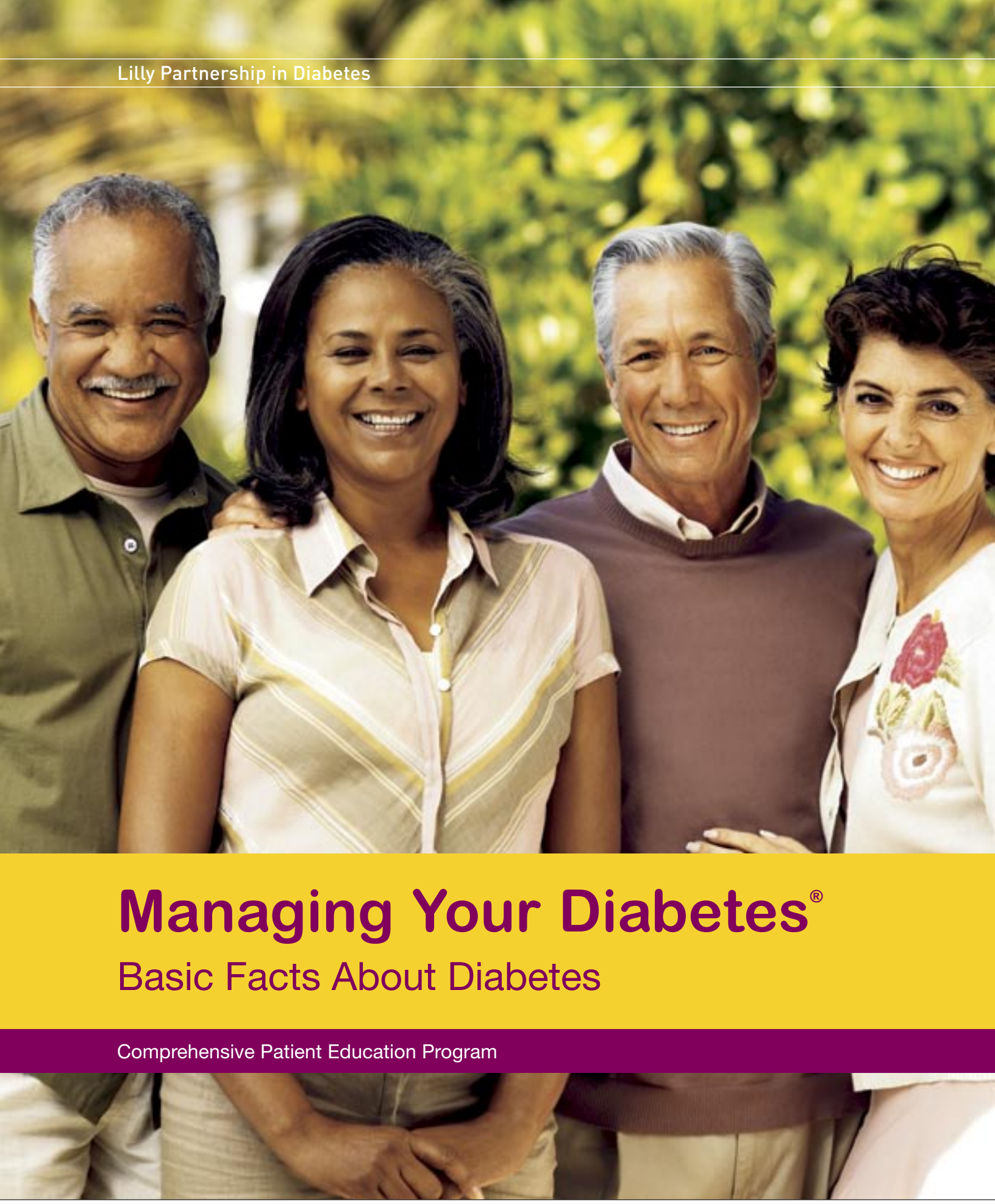


Managing Your Diabetes®

Basic Facts About Diabetes

Comprehensive Patient Education Program

Lilly
Answers That Matter.

Managing Your Diabetes

Basic Facts About Diabetes

Learning you have diabetes can be an overwhelming event. That's why Eli Lilly and Company, the leader in diabetes care for over 80 years, developed this book to help you understand the basics of diabetes. While this book is a great starting place, learning about and living with diabetes is a journey. And, it's a journey best taken with others. We encourage you to work with your healthcare team to learn all you can about the best ways to care for your diabetes. Working together, you will find that living a full and active life while taking care of your diabetes can be a reality!

Lilly

Table of Contents

Section 1

What is diabetes?

Diabetes is not like other health problems you may have had in the past. For one thing, it doesn't go away like a cold or the flu. For another, you are just as responsible as your doctor for treating your diabetes. Because so much of your day to day treatment is in your hands, you must learn as much about diabetes as you can. This book is the first step in that process.

The basic facts about diabetes

Diabetes is:

- **Common.** At least one in every fourteen people has diabetes.[1]
- **Controllable.** Though there is no cure for diabetes, it can be managed by keeping blood sugar close to normal. This is done with proper meal planning, exercise, and possibly medicines.
- **Life-long.** Your blood sugar levels should improve with treatment. However, this does not mean that your diabetes has gone away. It just means your blood sugars are in control.
- **Self-managed.** Your healthcare team will advise and support you, but control depends on you. The choices you make help determine what your blood sugar level will be.
- **Constantly changing.** It is common for your doctor to change your medicine or treatment plan over time because your diabetes changes over time.

1. ADA National Diabetes Fact Sheet, 2005. Available at http://www.diabetes.org/diabetes-statistics/prevalence.jsp. Accessed March 3, 2006.

notes

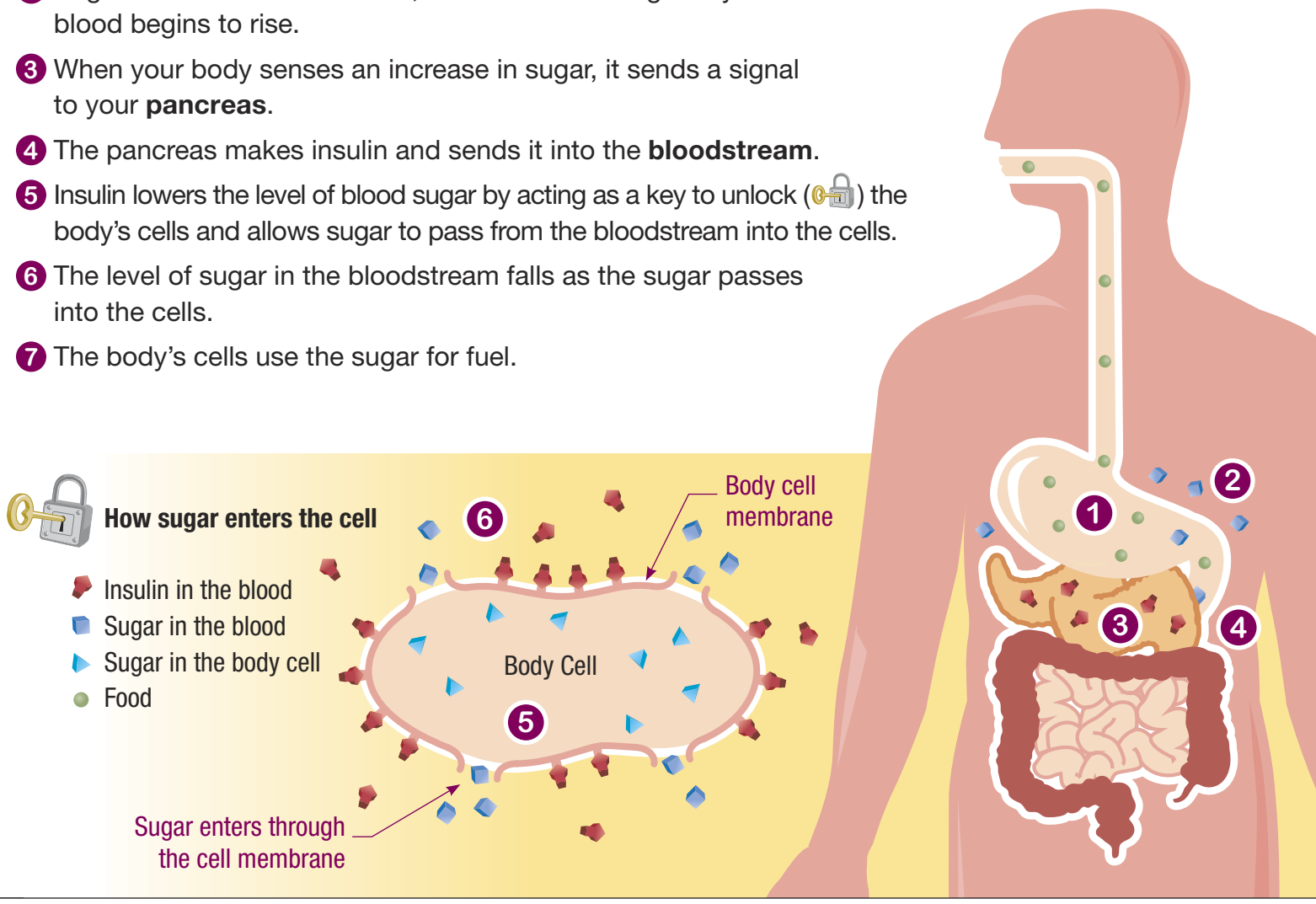
There are two main types of diabetes: type 1 and type 2

When you have diabetes, your body can't properly use the energy from the food you eat. This problem is closely tied to how your body makes and uses insulin. Insulin is a substance made in your pancreas (an organ in your body) that helps to keep your blood sugar in the normal range.

- In type 1 diabetes, your body makes little or no insulin.
- In type 2 diabetes, your body makes insulin but your cells cannot use it well. This is called insulin resistance. Also, your ability to make insulin gradually decreases as time goes by, insulin deficiency.

What happens when you eat

1. Some of the food in the stomach breaks down into sugars — one of these sugars is glucose, the body's main fuel.
2. Sugar enters the bloodstream, and the level of sugar in your blood begins to rise.
3. When your body senses an increase in sugar, it sends a signal to your **pancreas**.
4. The pancreas makes insulin and sends it into the **bloodstream**.
5. Insulin lowers the level of blood sugar by acting as a key to unlock ( ) the body's cells and allows sugar to pass from the bloodstream into the cells.
6. The level of sugar in the bloodstream falls as the sugar passes into the cells.
7. The body's cells use the sugar for fuel.



notes

What happens when you have diabetes?

- In type 1 diabetes, your body doesn't make enough insulin. In type 2 diabetes, your cells cannot use the insulin your body makes.
- In both types of diabetes, sugar builds up in your bloodstream because it cannot enter the cells.
- Without sugar for fuel in the cells, your body lacks energy.
- Sugar stays in your blood and you have high blood sugar levels.
- High blood sugar levels can damage your blood vessels, and over a long period of time can result in serious problems.

Type 1 diabetes

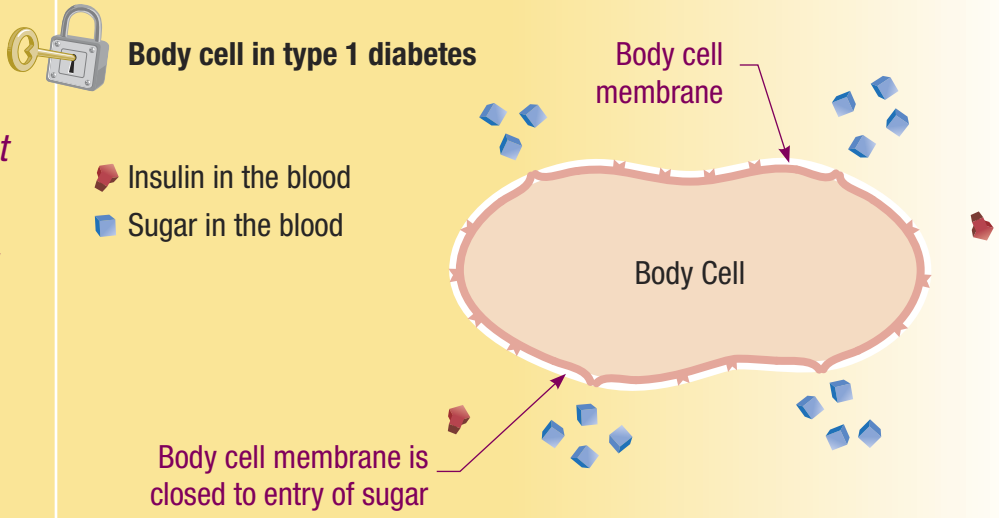
As we discussed before, in type 1 diabetes, the body makes little or no insulin — called insulin deficiency. People with this type of diabetes must take insulin shots to live. That's why you sometimes hear it referred to as "insulin-dependent diabetes." Less than one in ten people with diabetes have type 1. Although it usually begins when people are young, it may occur at any age.

Symptoms

The symptoms of type 1 diabetes usually come on suddenly. They include:

- increased thirst
- increased hunger
- feeling very tired
- increased urination
- sudden weight loss

Little or no insulin is made. When there is not enough insulin in the blood, the sugar cannot enter the cell. Blood sugar rises. The body has no fuel for energy.



notes

Causes of type 1 diabetes

At this time, no one knows the exact cause of type 1 diabetes. But it is related to:

- A possible history of type 1 diabetes in the family.
- A problem with the body's defense (immune) system that causes it to destroy the insulin-making cells in the pancreas.

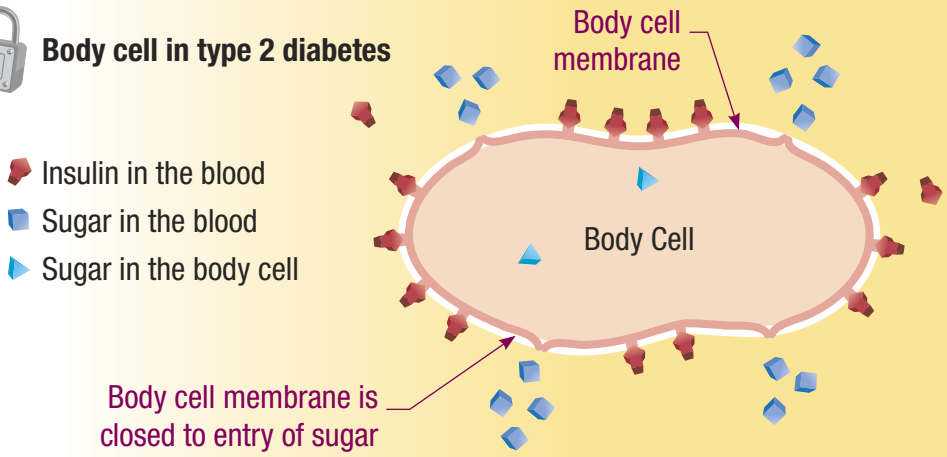
Type 2 diabetes

In type 2 diabetes, your body may still make insulin, but is unable to correctly use the insulin it does make (insulin resistance). Eventually the body doesn't make enough insulin (insulin deficiency). Type 2 used to be called "non-insulin dependent diabetes." People who have it can be treated with proper meal planning, exercise, and medications. Type 2 diabetes is the most common form of diabetes and accounts for at least nine out of ten cases. Although it can occur in younger people, it most often begins when people are over 40 years of age.

The most important thing to remember is that getting diabetes is not your fault.

- The tendency to develop type 2 diabetes is inherited (present at birth).
- It does not always come from being too heavy.
- It is not caused by eating too much sugar.

Body cell in type 2 diabetes



The body makes some insulin but isn't able to correctly use it. If there is a problem with the cell's sugar entrances, little or no sugar can get in. Sugar builds up in the blood. Blood sugar rises.

notes

Symptoms

In its early stages, type 2 diabetes often has no symptoms. When symptoms do occur, they may come on gradually and be very subtle. They include:

- feeling tired
- frequent infections
- blurred vision
- slow healing of cuts or sores
- numbness or tingling in hands or feet
- dry, itchy skin
- increased urination
- problems with sexual function
- increased hunger and thirst

Causes of type 2 diabetes

No one knows the exact cause of type 2 diabetes. We do know that it is more likely to occur in people who:[2]

- are over 40 years of age
- are overweight
- have a family history of diabetes
- have high blood pressure
- have had diabetes during a pregnancy
- have given birth to a baby weighing over 9 pounds
- have the stress of an illness or injury
- are African American, Hispanic/Latino American, American Indian, Asian American or Pacific Islander

Since the tendency to develop type 2 diabetes may be inherited, any member of your family (mother, father, sister, brother, children) who has three or more of the above symptoms should be tested for diabetes. Also, regular exercise and managing your weight may help prevent or delay some cases of type 2 diabetes.

Whether you have type 1 or type 2 diabetes, you have an important role in your own care. Read on for more information on the things you can do to manage your diabetes. It's important to keep learning. The more you know, the better you can manage.

2. ADA National Diabetes Fact Sheet, 2005. Available at http://www.diabetes.org/diabetes-statistics.jsp. Accessed March 3, 2006.

Section 2

Taking control of your diabetes

In Chapter 1, you learned about diabetes, its symptoms, its causes, and what happens in your body. In this chapter, we will examine the tools you can use to manage your diabetes.

Your goal: do your "level" best

One of your main goals of treating diabetes is to control your blood sugar level by keeping it as close to normal as possible. People without diabetes normally have blood sugar levels less than 100 mg/dL (milligrams of sugar for every 100 milliliters of blood).

The American Diabetes Association (ADA) recommends the following blood sugar goals for people with diabetes:[1]

- before meals: 90–130 mg/dL
- 1–2 hours after meals: less than 180 mg/dL

These guidelines apply to many people, but not to everyone. Your goals may be higher or lower than these guidelines. Your healthcare team will help you set the blood sugar target range that is right for you.

1. American Diabetes Association. Standards of medical care in diabetes. *Diabetes Care.* 2006;29 (suppl 1): S4–S42.

Lilly

notes

Now it's up to you

Managing your diabetes is hard work, but it's worth the effort. You feel your best when your blood sugar is normal or close to normal. Controlling your blood sugar may take some time, but if you work at it you will see improvements in your blood sugar levels.

Keeping blood sugars in range

There are two good ways to find out if your diabetes is in control. You should do both.

1. Test your blood sugar.

- Work with your doctor or diabetes educator to learn how to use one of the many types of blood glucose meters that are available for personal use.
- Ask your doctor or diabetes educator what your testing schedule should be. You may be asked to test before meals and at bedtime. Also, research suggests that occasionally testing your blood sugar after meals is a good way to find out how well you are controlling your diabetes.
- Keep track of your results in a diary and take it with you for your office visits so your doctor can check for any trends.

2. Have a glycosylated hemoglobin test (A1C).

- This can give a clearer picture of whether your diabetes is in control, since it shows your "average" blood sugar level over a 2–3 month period.
- Depending on your treatment and level of diabetes control, an A1C test should be done in your doctor's office every 3–6 months.
- The ADA recommends that your A1C be less than 7% *(for patients in general)*.[2] Your healthcare team will set the target that is right for you.

Blood Sugar Control

Test†	Level for people *without* diabetes	Goal for people with diabetes	
		ADA[1]	ACE[2]
Blood sugar	<100 mg/dL	90–130 mg/dL	<110 mg/dL
Blood sugar after meals	<110 mg/dL	<180 mg/dL *(peak)*	<140 mg/dL *(2 hr post meal)*
A1C‡	<6%	<7% *(patients in general)*	≤6.5%

† Do not use these values if you are pregnant. Work with your healthcare provider to determine your target values.

‡ A1C test values may be different for different test labs. The values used in this chart refer to a range of 4-6% for people without diabetes (mean 5%, standard deviation 0.5%).

notes

The benefits of staying in control

- **Maintaining a near normal blood sugar level may help protect you from many of the serious problems that are related to diabetes.** You will learn more about problems linked to diabetes in Chapter 8.
- **You'll feel much better if you keep your blood sugar close to normal.** When your blood sugar is higher or lower than normal, you will probably feel tired, sick, and/or uncomfortable.
- **Controlling your diabetes will keep it from controlling you.** It will have less power to disrupt your life.

1. American Diabetes Association. Standards of medical care in diabetes. *Diabetes Care.* 2006;29 (suppl 1): S4–S42.
2. American College of Endocrinology. Consensus statement on guidelines for glycemic control. *Endocr Pract.* 2002;8 (suppl 1): 5–11.

Lilly

notes

Working with your healthcare team

Although the day-to-day management of your diabetes is very much up to you, controlling diabetes is always a team effort. So you need on-going professional help — such as visits to your doctor and lab tests — to make sure that your treatment plan stays on track. That way, if problems do start, they will be found early. Don't forget that if you have a question or a problem, your healthcare team members are always there to help you.

Your healthcare team includes:

- your doctor and office staff
- diabetes educators, such as a nurse, dietitian or other professional
- pharmacist
- other professionals such as an eye doctor, dentist, podiatrist (foot doctor) or an exercise specialist, depending on your needs
- family, friends and supporters

Learn needed information and skills

This book is a good start in learning what you need to know. Many hospitals and clinics have diabetes education programs where you can learn more. They teach important skills like testing your blood sugar, planning your meals, and how to take your medication. Now let's move on to learn more about the basics of good diabetes control.

Section 3

3 Meal planning

In spite of what you might have heard, having diabetes does not mean you have to give up all the foods you enjoy. However, learning to eat healthy, satisfying meals is an important part of your treatment.

Good diabetes meal planning includes:

- understanding how different foods and the amount eaten affect your blood sugar
- choosing healthy foods
- eating regular meals at the right times

Understanding how different foods and amounts affect blood sugar

Starches and sugars (carbohydrates) have more effect on blood sugar than protein or fat. Carbohydrates include foods such as bread, pasta, cereal, beans, milk, fruit and fruit juices, and sweets. Keeping track of the carbohydrate foods you eat is a key factor in controlling your blood sugar. Carbohydrates have the greatest impact on your blood sugar after meals, and your blood sugar level can go too high when you eat more carbohydrates than your body can use. By keeping track of carbohydrates you eat and spreading them throughout the day, you can help control your blood sugar. Check with your doctor or dietitian for help in learning how your blood sugar is affected by carbohydrate intake.

notes

Choosing healthy foods

MyPyramid is a good basic guide to choosing healthy foods. It shows the kinds of foods everyone needs. The best choices for the rest of the family are also the best choices for people with diabetes. The foods in each section of MyPyramid provide some, but not all, of the nutrients needed for health. It is important to eat servings from every group each day.

Choosing your foods according to MyPyramid will help you follow these guidelines for healthier eating:

- **Eat a variety of foods from the different food groups.**
- **Eat plenty of fruits and vegetables.** All fruits and most vegetables contain carbohydrates, but their high content of vitamins, minerals, and fiber make them great choices.
- **Choose a diet low in fat, saturated fat, and cholesterol.** For best health, these should make up only a small portion of overall food choices. Saturated fats (animal fats and shortenings, for example) tend to raise blood cholesterol levels and are bad for the health of your heart.
- **Use salt (sodium) in moderation.** Most people eat more salt than they really need. For some people, extra salt adds to their risk for high blood pressure. High blood pressure is more common in people with diabetes. Uncontrolled blood pressure (greater than 130/85) greatly increases the risk for health problems. Here are ways to cut down on salt:
  - Choose foods “close to nature.” Less processed foods have less salt.
  - Avoid foods canned, boxed or frozen with extra salt. Try the “no-salt added” varieties.
  - Use herbs, spices, and salt-free seasoning mixes for added flavor, instead of salt.
- **Use sugar in moderation.** High sugar foods should make up only a small part of the diet. However, small amounts of sweet foods can be a part of a healthy diet, even for people who have diabetes. Learn how to fit the sweets you enjoy into your overall plan.
- **Use alcohol in moderation.** Alcohol can dangerously lower blood sugar in people with diabetes who take insulin or diabetes pills. If you choose to drink alcohol, talk to your doctor or dietitian about how to drink safely. Pregnant women should not drink alcoholic beverages.

MyPyramid

The new MyPyramid shows the food group colored bands running from the tip of the pyramid to its base. The different size bands show the proportion of food we should eat from each food group. One pyramid does not fit all of us. So the USDA created 12 pyramids, depending on how many calories you need and how active you are. A fun way to determine which pyramid is right for you is to visit the MyPyramid website (http://www.mypyramid.gov/).[1] By typing in your age and activity level, the "Pyramid Planner" automatically calculates the number of servings from each food group and total number of calories you need each day.

notes

Is your blood sugar often over 180 mg/dL one to two hours after eating? If so, a change in your treatment plan may be needed. Ask your healthcare team how to improve your numbers.

1. United State Department of Agriculture. MyPyramid.gov. Available at: www.mypyramid.gov. Accessed March 3, 2006.

notes

Eat the right amount of food for you at the right times

Several factors affect how much food you need each day. One of them is how much you weigh in relation to how tall you are. Another is how much exercise you get. People who exercise a lot or whose jobs involve heavy labor use more energy than people who are less active. Most people eat better, feel better, and have more energy if they eat regular meals. Spacing food throughout the day also seems to help you stay at a healthy weight and get the vitamins and minerals you need.

If you take insulin or sulfonylurea pills, skipping or delaying meals may lead to low blood sugar.

Section 4

Exercise

Exercise is good for everyone. But it can be especially good for people with diabetes. It can reduce stress, increase your energy, and just make you feel better. When you exercise, movement becomes easier and your muscles are strengthened. It's also a good way to control your blood pressure and blood fats (lipids). If you are insulin resistant, it may even make your insulin work better.

Before you begin

- Have a medical check-up. This is especially important if you are 35 or older. It is also important if you have any health problems besides diabetes.
- Talk with your healthcare team about an exercise plan that is right for you. Since exercise can lower blood sugar, you may need to change food choices, medicine doses or timing.

How to get started

- Look for an activity that you enjoy.
- Make sure it's right for your current level of fitness.
- Walking may be a good way to get started. It is convenient and low in cost. All you need to get started are cotton socks and a pair of supportive shoes that fit well.

notes

A complete exercise plan will address:

- **flexibility:** such as stretching done before walking
- **strengthening:** such as lifting light weights to build calorie-burning muscle mass
- **aerobic activity:** such as walking, dancing, swimming or biking to burn calories and reduce risk of heart problems

How to keep going

- Make walking or your other exercise activities a part of your daily routine.
- Finding someone to walk or exercise with can help make your workout more enjoyable. When exercise is enjoyable and social, it is its own reward. This may help you stay motivated.
- Know that everyone's exercise plans lapse occasionally. Instead of being discouraged, use this time as an opportunity to review your goals. Try to recommit as soon as possible to an enjoyable and healthy level of activity.

Potential calories burned during common activities[1]

Activity	Cal/Min	Cal/Hr
Walking (3 mph), Golf (pulling cart), Cycling (6 mph), Bowling	4–5	240–300
Cycling (8 mph), Volleyball, Tennis (doubles), Golf (carrying clubs)	5–6	300–360
Walking (4 mph), Ice or Roller Skating, Cycling (10 mph)	6–7	360–420
Walking (5 mph), Cycling (11 mph), Water Skiing, Tennis (singles)	7–8	420–480
Jogging (5 mph), Cycling (12 mph), Downhill Skiing	8–10	480–600
Running (5 1/2 mph), Cycling (13 mph), Aerobics	10–11	600–660
Running (6 mph)	11 or more	660 or more

Remember to check with your healthcare team before beginning an exercise routine.

1. Coleman E, Nelson Steen S. Strategies for weight gain. *The Ultimate Sports Nutrition Handbook,* 1996. Reprinted with permission.

Staying safe

- Check with your doctor before beginning to exercise.
- Start slowly. Five or ten minutes a day is a good beginning if you have been inactive.
- Wear comfortable, supportive shoes and cotton socks. Check your feet after exercise for any signs of poor shoe fit or injury.
- Wear diabetes identification jewelry.
- Check your blood sugar before and after exercise. This is especially important for anyone who takes insulin, a sulfonylurea or a meglitinide. These medicines may create risk for low blood sugar.
- Carry something to eat that contains glucose. Use it to prevent or treat low blood sugar if needed.
- Stretch and warm up at the beginning of your activity. This helps prevent injuries.
- Drink more liquids that contain no calories, like water, when exercising.
- If you have leg or chest pains during exercise, stop exercising and call your doctor.
- Avoid exercising if your blood sugar is above 300 mg/dL or under 70 mg/dL.

notes

Section 5

Diabetes Medicines

In Chapter 1, you learned that diabetes is caused by the body's inability to make insulin or to use it properly. You also found that, although diabetes cannot be cured, it can be managed by various treatments including the use of diabetes medications. These include several types of oral medications and the various types of insulin.

People with type 1 diabetes must take insulin shots to live because their bodies cannot produce insulin. Although most people with type 2 diabetes take either diabetes pills, insulin or both, a few can keep their blood sugar in control with careful meal planning and regular activity.

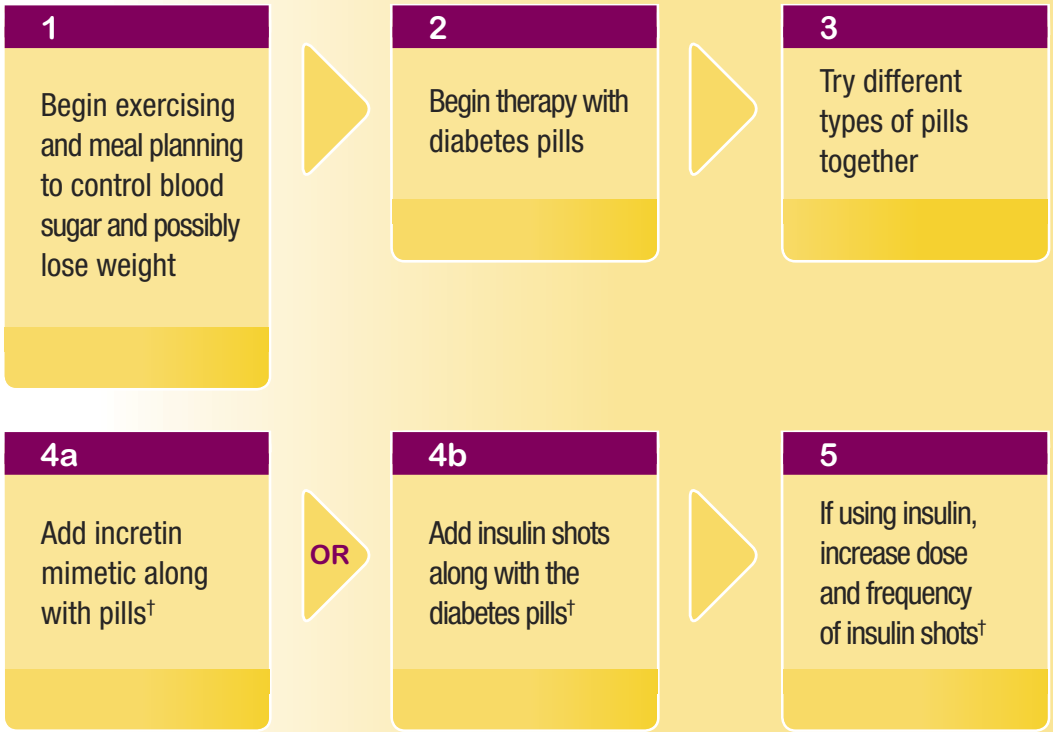
Taking more medicine or different medicine doesn't necessarily mean your diabetes has gotten worse. Remember the key is controlling blood sugar levels, and changing medicines may help you do that.

Common treatment stages for type 2 diabetes

Diabetes is different for each person. Depending on the stage of your diabetes and your body's response to certain therapies, your healthcare provider may prescribe one or more treatments. For example, you may be able to control your diabetes with diabetes pills alone or you may need more than one pill to control your blood sugar. Some people may use pills plus an incretin mimetic (see page 24). For others, it may make more sense to start with insulin shots instead of pills. It's common to change your level of therapy from time to time, depending on the stage of your diabetes.

Meal-planning and exercise are important parts of diabetes management, regardless of the type of medicine used. Always talk with your physician before beginning an exercise program. (see chapter 4)

The steps below are common ways to treat diabetes. Your healthcare team will help you choose the best therapy for you.



Common steps in the treatment of diabetes

† Using the type(s) of medication(s) and dose(s) prescribed by your doctor.

Oral medications

notes

Many people with type 2 diabetes are able to take diabetes pills to keep their blood sugar under control. These pills are not insulin. Instead, these pills rely on the insulin your body makes. That is why diabetes pills can't be used in type 1 diabetes.

Different types of oral medicines lower blood sugar in different ways. The list on the next page shows the type of medications and how they work.

Remember that meal planning and exercise are still very important, in addition to the medicines you take.

Types of oral medication

Check with your doctor to find out how your diabetes pills work.

notes

Sulfonylureas and Meglitinides (such as glyburide, glipizide, glimepiride, repaglinide and nateglinide)
These medications help the pancreas produce extra insulin. Sulfonylureas raise insulin levels for several hours. Meglitinides are taken with food and increase insulin levels for a shorter time than the sulfonylureas. Low blood sugar is a possible side effect of these medications.

“Starch Blockers” (such as acarbose)
These medications slow down the digestion and absorption of starches and sugars. Therefore blood sugars rise more slowly after eating. Gas and bloating are among the common side effects of these medications, but doses can be increased very slowly to lessen the side effects.

Biguanide drugs (such as metformin)
This type of medication works mostly in the liver. Mainly, it stops the liver from making extra sugar when it is not needed. Biguanide medications can cause side effects, the most common being diarrhea, upset stomach or nausea. To minimize side effects, take biguanides with food.

TZDs (such as pioglitazone and rosiglitazone)
TZDs are medicines that treat insulin resistance, a primary cause of diabetes. Insulin resistance is a condition in which the body does not use its own insulin effectively. By reducing insulin resistance, a TZD allows your own insulin or the insulin you take to work more effectively to help reduce the harmful increase in blood sugar level. Side effects of the TZDs may include weight gain and edema (swelling).

Incretin mimetics

An incretin mimetic is a unique kind of type 2 diabetes drug that "mimics" many of the actions of naturally occurring hormones from the intestines, and can help the body make more of its own insulin. BYETTA is the first incretin mimetic approved for the treatment of type 2 diabetes.

BYETTA is an injectable medicine used to improve blood sugar control in adults with type 2 diabetes. BYETTA is not insulin and is not a substitute for insulin; BYETTA actually helps your body make more of its own insulin.

How to take BYETTA

BYETTA should be taken twice daily, at any time within the 60 minutes before the morning and evening meals. BYETTA comes in a prefilled pen for simple, fixed dosing.

How BYETTA works

BYETTA works when used with metformin and/or a sulfonylurea (common oral medications for the treatment of diabetes). It helps with blood sugar problems in several ways:

- **Insulin production:** During meals, BYETTA signals the pancreas to make the right amount of insulin at the right time. This helps lower blood sugar closer to normal levels. After blood sugar levels get closer to normal, BYETTA stops signaling the pancreas to produce insulin.
- **Sugar production:** BYETTA helps prevent the liver from making too much sugar, especially after meals. This helps you avoid high blood sugar levels.
- **Food breakdown:** BYETTA also helps slow down the rate at which food leaves the stomach, so it slows sugar entering the bloodstream. This effect helps you avoid high blood sugar spikes. BYETTA may reduce your appetite, the amount of food you eat, and your weight.

BYETTA may give you better control of your blood sugar by helping your body manage its blood sugar levels. It works when you need it, not when you don't.

Important Safety Information for BYETTA® (exenatide) injection:

- BYETTA improves blood sugar control in adults with type 2 diabetes. It is used with metformin, a sulfonylurea, or both.
- BYETTA is not a substitute for insulin in patients whose diabetes requires insulin treatment. BYETTA has not been studied in children.
- Before using BYETTA, tell your healthcare provider about all of your medical conditions, including if you have severe problems with either your stomach or food digestion; if you have severe kidney disease; or if you are pregnant, plan to become pregnant, or are breastfeeding.
- **When BYETTA is used with a medicine that contains a sulfonylurea, low blood sugar (hypoglycemia) is a possible side effect.** The dose of your sulfonylurea medicine may need to be reduced while you use BYETTA.
- Other common side effects with BYETTA include nausea, vomiting, diarrhea, dizziness, headache, feeling jittery, and acid stomach. Nausea is most common when first starting BYETTA, but decreases over time in most patients.
- BYETTA may reduce your appetite, the amount of food you eat, and your weight. No changes in your BYETTA dose are needed for these side effects.
- These are not all the possible side effects from use of BYETTA. Talk to your healthcare provider about any side effect that bothers you or that does not go away.

Please click here for BYETTA patient information.

Insulin

notes

You have learned that diabetes is a disease that changes over time. Because of this, your diabetes treatment may also need to change to keep your blood sugar level in good control. Early in the treatment of type 2 diabetes, pills may work just fine to control your blood sugar. But over time, the pills may not continue to work as well.

Here are some facts you need to consider:

- Most people with type 2 diabetes will eventually need to take insulin to control their blood sugar levels.
- Nearly three out of every ten people with diabetes use insulin today, with or without diabetes pills.[1]

Some common misconceptions

Even though insulin treatment may bring blood sugar levels under control, many people with diabetes have some mistaken ideas about this important form of treatment.

For example:

- Some people believe that starting insulin means that they have "failed." Nothing could be further from the truth! Because diabetes changes over time, you simply have to adjust your therapy to keep up with the need for good blood sugar control.
- Other people fear taking insulin because they think the shots will be painful. However, many people who take insulin say their initial worries about injections were actually worse than the shots themselves. Modern technology has given us better tools for injecting insulin, such as shorter and thinner needles. Once you know how to use your supplies and develop a technique, injecting insulin can be quite simple.

1. ADA National Diabetes Fact Sheet, 2005. Available at http://www.diabetes.org/diabetes-statistics.jsp. Accessed March 3, 2006.

Lilly

The goal is control

Remember, controlling your blood sugar is far more important than the treatment you use, whether it's pills, insulin shots or both. The number one goal is for your blood sugar to be controlled, as well as possible.

notes

Treatment plans are different for different people. Your doctor or diabetes educator, working with you, will determine the best plan for you.

What types of insulin are available?

If you didn't have diabetes, your body would make different amounts of insulin at different times. It would give you smaller steady amounts between meals and overnight. This is sometimes called "basal" or "background" insulin. It would give you larger amounts when you ate. That is sometimes called "bolus" or "mealtime" insulin. Together, they would keep your blood sugar in control all day.

Because you can't make insulin, or don't make enough for your body's needs, you probably will need to use more than one type of manufactured insulin to get the same effect. These different types of insulin work at different rates and for different amounts of time. Rapid-acting insulins start very quickly and work for a short time. These are best for mealtime and should be used with a longer-acting insulin, which covers your "background" needs.

Which plan is right for me?

Insulin therapy is not "one size fits all." Different people need different insulins. The insulin plan that's right for you will do two things:

Fit your life: What do you do? When do you do it? Let your healthcare team know your usual routine. Or, tell them if you don't have one. The details of your life will make some insulins a better choice than others.

Match your body's needs: You need some insulin all the time, more when you eat, and less when you exercise. If you have type 1 diabetes, all of those needs will be met by your injected insulin. If you have type 2, some of the needs may be met by your body's own insulin.

There are a lot of ways to combine insulins to meet those different needs. Your healthcare team will help you figure out which is right for you.

How much insulin do you need?

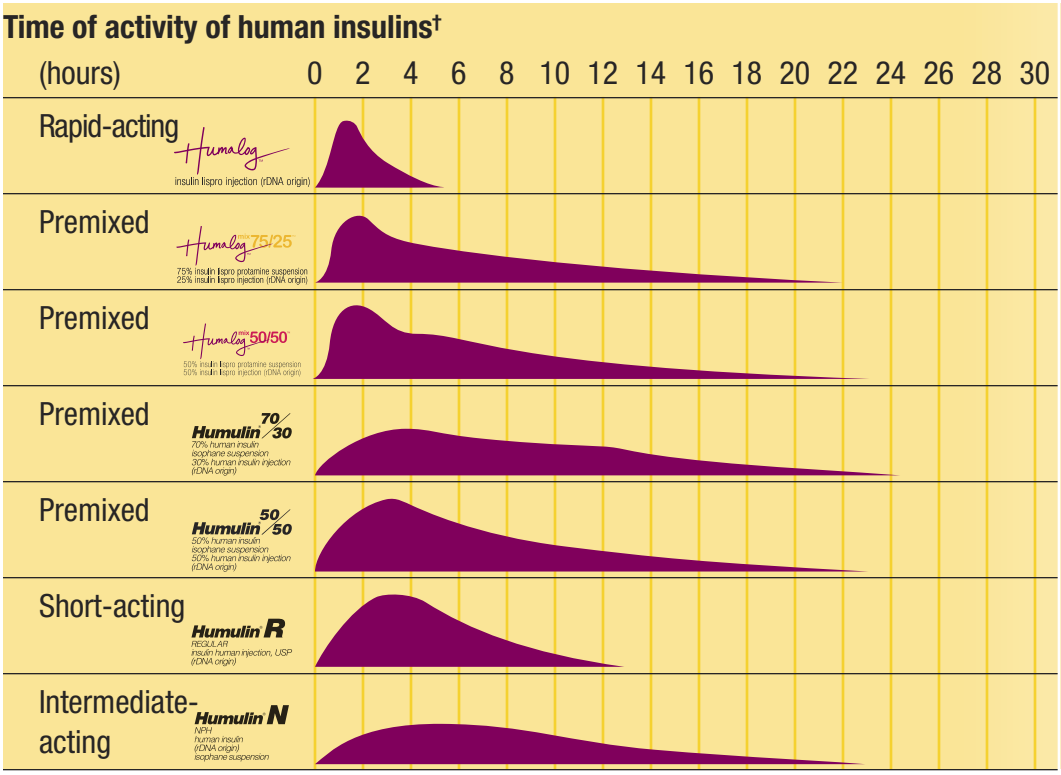
Here are some of the things that affect your need for insulin:

- how much you weigh
- how fit you are (how much fat and muscle you have)
- how much you eat and the foods you choose
- what other medicines you take
- how much you exercise
- how sensitive your body cells are to insulin
- your emotions (such as your amount of stress)

Getting the right insulin dose is a lot like tailoring a suit. You might start with a suit right off the rack. Then, the tailor nips and tucks until it's just right. It doesn't matter how large or small the suit is. What matters is that it fits *you*. Your blood sugars tell you when you've got the right fit.

Different actions of insulin

Knowing an insulin's type will tell you how fast it starts to work and how long its action continues. The chart below shows the activity of some insulins.



Onset: The start of the curve (left side) shows when the insulin starts to work.

Peak: The peak is the highest part of the curve and shows when the insulin usually has its strongest effect.

Duration: The end of the curve (right side) shows how long the insulin may work.

† Typical profiles of insulin activity, based on glucose utilization from clinical trial data. Patients may experience variations in timing and/or intensity of insulin activity due to dose, site of injection, temperature, and patient's physical activity.

Please click here for Humalog, Humalog Mix75/25, Humalog Mix50/50 Patient Information.

Lilly

Advances in Insulin

Humalog, Humalog Mix75/25 and Humalog Mix50/50 are for use in patients with diabetes to control high blood sugar. Humalog should be used with a longer-acting insulin, except when used in combination with sulfonylureas in patients with type 2 diabetes.

Important Safety Information
Humalog insulins are contra-indicated during episodes of hypoglycemia and in patients sensitive to Humalog or one of its excipients. The safety and effectiveness of Humalog in patients less than 3 years of age have not been established. Safety and effectiveness of Humalog Mix75/25 and Humalog Mix50/50 in patients less than 18 years of age have not been established. There are no clinical studies of the use of Humalog insulins in pregnancy or nursing mothers.

Potential side effects associated with the use of all insulins include low blood sugar, weight gain, low blood potassium, changes in fat tissue at the site of injection, and allergic reactions, both general and local. **Humalog Mix75/25 and Humalog Mix50/50 should not be mixed with another insulin. Starting or changing insulin therapy should be done cautiously and only under medical supervision.**

Humalog insulins start lowering blood sugar more quickly than regular human insulin, allowing for convenient dosing immediately before a meal (within 15 minutes). Humalog can even be taken immediately after your meal. Because Humalog is a mealtime insulin, you may also need a longer-acting insulin to get the best blood sugar control (except when using an insulin pump).

Please click here for Humalog, Humalog Mix75/25, and Humalog Mix50/50 Patient Information.

Mealtime insulin

Humalog
insulin lispro injection (rDNA origin)

Over the last decade, several new insulin options have been introduced to the market. As a result, your health-care team has more options than ever before when it comes to creating a treatment plan just for you. Your healthcare team may suggest that you use a mealtime insulin as part of your treatment plan. Humalog is the brand name of one mealtime insulin. Your healthcare team can help you determine if Humalog is right for you and your needs.

Humalog can offer you convenience, control, and flexibility. Its rapid action works similar to your body's own insulin action after meals. Humalog is absorbed quickly and starts working within minutes to lower your blood sugar.

With Humalog, you can enjoy improved blood sugar control with "dose and eat" convenience. Humalog can be taken within 15 minutes before or immediately after a meal. Its dosing schedule is flexible. With Humalog, your insulin dose doesn't determine when you eat, *you do*. This means you can manage your diabetes even when you run into unexpected delays or schedule changes.

Humalog in a convenient premix

Humalog mix 75/25
75% insulin lispro protamine suspension
25% insulin lispro injection (rDNA origin)

Humalog mix 50/50
50% insulin lispro protamine suspension
50% insulin lispro injection (rDNA origin)

Based on your needs, your healthcare team may determine that a premixed insulin should be a part of your treatment plan. This type of insulin offers you convenience by combining a longer-acting insulin with a rapid-acting insulin, like Humalog.

Two kinds of premixed insulin are Humalog Mix75/25 and Humalog Mix50/50. They can provide blood sugar control at meals, between meals, and even at night, depending on your treatment plan. Humalog Mix75/25 and Humalog Mix50/50 can be taken anytime within 15 minutes before a meal so you can dose and eat. This can help you manage your diabetes even with an unpredictable schedule.

Insulin Basics

Recommended insulin storage			
Insulin Type	**Opened†**	**Unopened**	
	Room Temperature or Refrigerated (36°F – 86°F)	Room Temperature (56°F – 86°F)	Refrigerated (36°F – 46°F)
Vials			
Humalog Humalog Mix75/25 Humulin R Humulin N Humulin 70/30 Humulin 50/50	28 days	28 days	Until Expiration Date
Cartridges			
Humalog 3.0 mL	28 days	28 days	Until Expiration Date

Insulin Type	In-Use‡	Not In-Use (unopened)
	Room Temperature (below 86°F)	Refrigerated **(not frozen)**
Pens		
Humalog Humalog Mix75/25 Humalog Mix50/50 Humulin N Humulin 70/30	28 days 10 days 10 days 14 days 10 days	Until Expiration Date

† Opened vials and cartridges are defined as when the stopper or seal has been punctured with a needle. Opened cartridges should be stored in the Pen at room temperature and may be stored outside of the Pen in the refrigerator.

‡ Pens in-use should not be refrigerated but should be kept at room temperature (below 86°F [30°C]) away from direct heat and light.

Humalog
insulin lispro injection (rDNA origin)

Humalog Mix 75/25
75% insulin lispro protamine suspension
25% insulin lispro injection (rDNA origin)

Humalog Mix 50/50
50% insulin lispro protamine suspension
50% insulin lispro injection (rDNA origin)

Humulin 70/30
70% human insulin isophane suspension
30% human insulin injection (rDNA origin)

Humulin 50/50
50% human insulin isophane suspension
50% human insulin injection (rDNA origin)

Humulin R
REGULAR
insulin human injection, USP (rDNA origin)

Humulin N
NPH
human insulin (rDNA origin) isophane suspension

notes

Handling and storing insulin

When insulin is not handled and stored properly, it may not work right, so be sure to read the directions that are packaged with your insulin vials or pens.

To keep insulin in good condition, you must do the following:

- Keep your extra supply of insulin in the refrigerator.
- Never let your insulin freeze.
- If you use a vial, keep the vial you are currently using in the refrigerator whenever possible.
- Your unused pens should be stored in the refrigerator.
- The pen you are currently using should **not** be stored in the refrigerator.
- Keep unrefrigerated insulin as cool as possible (below 86°F) and away from heat and light.
- Never shake your insulin hard or let it get tossed around. Insulin that's handled roughly is more likely to clump or frost.

Traveling with insulin

When you travel, maintaining your regular schedule for insulin injections and blood sugar checks can be challenging. But with careful planning, any trip can go smoothly. Discuss your plans with your healthcare professional before you go.

- Changing time zones can impact your regular insulin schedule. Your healthcare professional can help you figure out how to adjust your dosage before you travel.
- If you're flying, have your healthcare professional write a letter stating that you have diabetes and need to use syringes and insulin. Make sure your supplies are clearly labeled. This will help you get through security without delay.
- Bring 2–3 times the amount of insulin and supplies you need with you. This way, if anything is lost or damaged, you'll have plenty of extras.
- Do not store your insulin in the trunk of your car or in checked luggage. The extreme temperature variations can harm the insulin.
- With any type of travel, always be prepared for delays. Carry your insulin and supplies with you at all times in a cold pack (not packed in your suitcase), along with healthy snacks that can also serve as meals in case of heavy traffic or delayed flights.
- Bring something to eat on the plane, even if it's a short flight. Delays could interfere with your meal schedule. Inject your insulin before or after you eat, as instructed. Be careful not to inject too much air into your insulin vial. The pressurized cabin makes this easier to happen.

notes

How much insulin will I receive?

Just as height is measured in inches, insulin is measured in "units." A unit is a small amount of pure insulin.

The vial: Vials of insulin sold in the United States have 100 units of insulin in each milliliter of fluid. Such vials say U-100 on the label. The amount of insulin in a milliliter (U-100) is called the insulin's concentration. Each vial contains 1000 units.

The Lilly Pen: A box of 5 Lilly Pens contains the same amount of insulin as 1.5 vials.

notes

Check the expiration date

Always look at the expiration date printed on the insulin box before you buy it. The date must allow enough time for you to use all the insulin in the vial or pen. Do not buy or use insulin past its expiration date.

Make sure you're buying the right kind of insulin

Using the wrong insulin can affect your diabetes control, so check the box and label **carefully** before you buy. In order to make sure you're getting the right kind, you must know the exact kind and brand name of insulin your doctor wants you to take (i.e., Humalog, Humalog Mix75/25, Humalog Mix50/50, Humulin N, Humulin 70/30, etc.).

Any change of insulin should be made cautiously and only under medical supervision.

Make sure the contents are in good condition

Regular insulin or Humalog:

- should be clear and have no color
- do not use if it looks cloudy, thickened, even slightly colored or has solid particles in it

PreMixed Insulin or Humulin N:

- should have an even, cloudy appearance after gentle mixing/rolling
- do not use if there are clumps in the insulin after mixing
- do not use if particles on the bottom or wall give the vial a frosted appearance

If any of these conditions appear, call insulin manufacturer.

Note appearance of bad insulin in both bottles.

Humalog™
insulin lispro injection (rDNA origin)

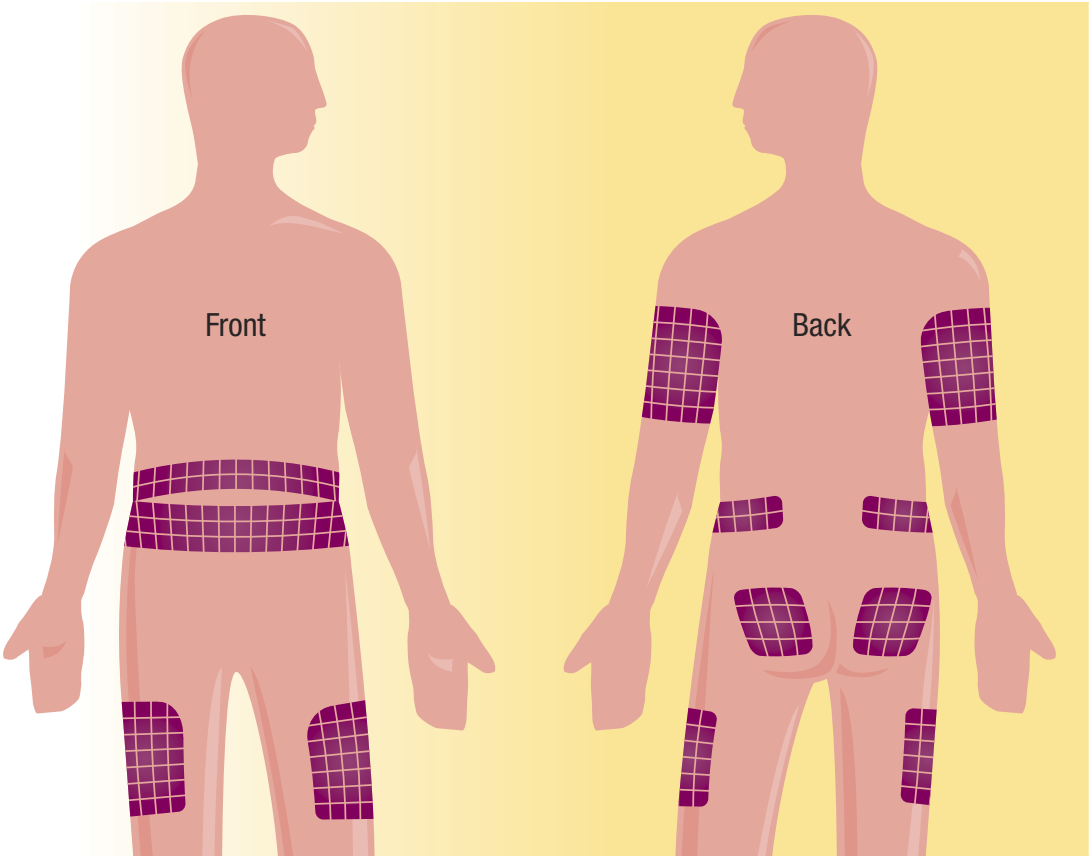
Humalog mix 75/25™
75% insulin lispro protamine suspension
25% insulin lispro injection (rDNA origin)

Humalog mix 50/50™
50% insulin lispro protamine suspension
50% insulin lispro injection (rDNA origin)

Insulin shots

Choosing the site for an insulin shot

Knowing exactly where on your body you should give your shot(s) each day is very important. The chart below shows sites for your insulin shots in the red and white grid areas. Each square is a place to give yourself a shot. You may need help from a family member to give shots in some of the sites.



Insulin injection areas

Rotating sites

For your insulin to work best, it's important to use a different location for each shot. This is called site rotation, and involves following a regular pattern as you move from site to site. If you take more than one shot each day, use a different area for each shot. Different people use different patterns, but the intent should always be to use all of the areas and the sites. When you do this, no one site will be used too often. Overusing a site can cause tissue changes that lower or change insulin absorption.

notes

Insulin enters the blood more quickly from some areas than others. So, your blood sugar may be higher or lower depending on what area is used. At times, you may want to use a certain area because of how quickly or slowly insulin is taken up from that site. For example, when you'll be eating very soon after a shot, you could use a site on your stomach.

Most insulin enters the blood:

- fastest from the abdomen (stomach)
- a little slower from the arms
- even more slowly from the legs
- most slowly from the buttocks

Note: Humalog insulin lispro injection (rDNA origin) is absorbed very quickly from all injection sites.

The most common tools used to give insulin shots are pens and syringes. You may want to try both methods to see what you like best. Ask your doctor or diabetes educator to show you the differences.

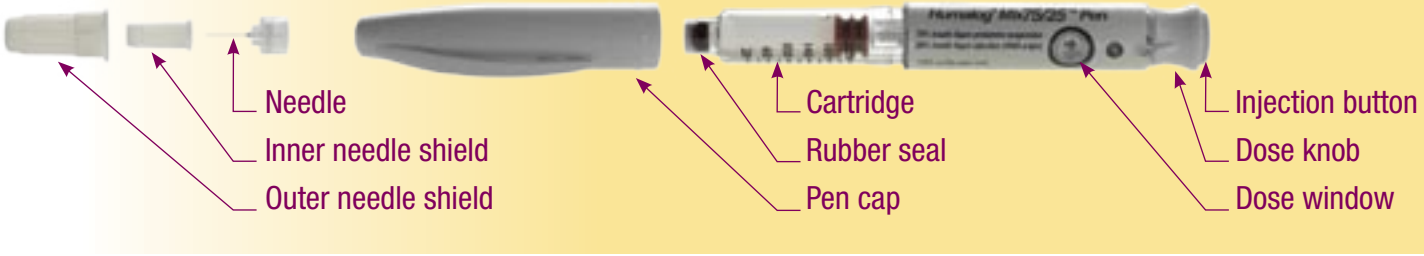
Using the Lilly Pen

If you treat your diabetes with Humalog, Humalog Mix75/25, Humalog Mix50/50, Humulin N or Humulin 70/30, you can take your injections with the easy-to-use insulin Pen. It takes only a few quick and easy steps to use the Lilly Pen. Please see the user manual in your Pen package for complete instructions.

Humalog™ insulin lispro injection (rDNA origin)

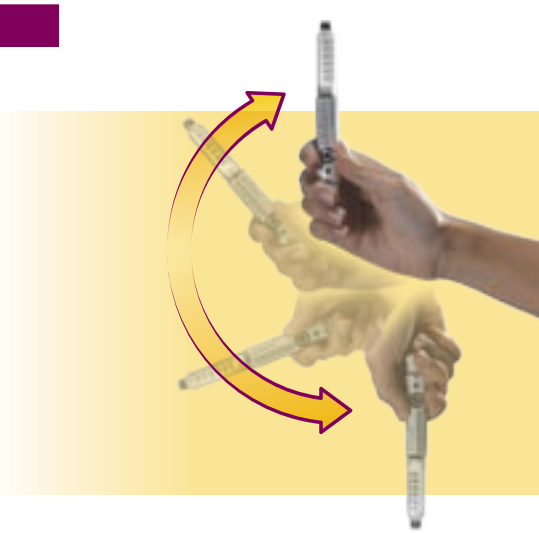
Humalog Mix 75/25™ 75% insulin lispro protamine suspension 25% insulin lispro injection (rDNA origin)

Humalog Mix 50/50™ 50% insulin lispro protamine suspension 50% insulin lispro injection (rDNA origin)



Preparing and priming

1. Remove Pen cap



2. Check your insulin:

- Correct type.
- Within expiration date.
- Correct appearance.

For cloudy insulin:

- Roll the Pen gently 10 times
- Also, gently turn the Pen up and down 10 times until the insulin is evenly mixed

3. Attach needle:

- Clean the rubber seal with alcohol swab.
- Push capped needle straight onto Pen.
- Screw on shielded needle until secure.

4. Set the prime dose

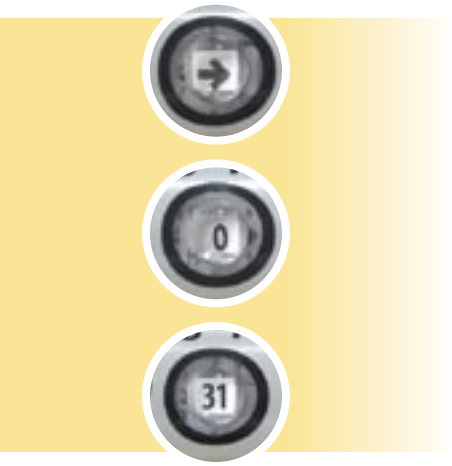
- Turn the dose knob clockwise (to the right) until you see an arrow (→) in the center of the window and the raised notches on the Pen and dose knob are in line.
- Pull out the dose knob in the direction of the arrow until a “0” is seen in the dose window.
- Turn the dose knob clockwise until a “2” is seen in the dose window.

5. Prime the Pen

With the needle pointed up:

- Tap the clear cartridge holder gently with your finger so that any air bubbles collect near the top.
- Push in the injection button completely. Keep pressing and continue to hold firmly while counting slowly to “5”. You should see either a drop or a stream of insulin come out of the tip of the needle.
- If insulin does not come out of the tip of the needle repeat the priming steps.
- Priming is complete when the insulin flow appears at the needle tip and a diamond (♦) is seen centered in the dose window.

Set your dose and inject



6. Set your dose

A diamond must be seen in the center of the dose window before setting your dose

- If you do not see a diamond in the center of the dose window the Pen has not been primed correctly and you are not ready to set your dose. Before continuing repeat the priming steps.
- Turn to the arrow (→).
- Pull to “0”.
- Set your desired dose.
- If the dose you have dialed is too high, simply turn the dose knob backward until the correct dose is seen in the dose window.

7. Injecting

Do not inject a dose unless the Pen is primed just before the injection or you may get too much or too little insulin

- Prepare the skin and use the injection technique recommended by your healthcare professional.
- Insert the Needle.
- Place your thumb on the injection button and push firmly until the dose knob is pushed in completely.
- Hold the injection button in and count slowly to “5” to deliver the full dose.
- Make sure that you received a full dose by checking that the injection button has been completely pushed in and you can see a diamond (♦) or an arrow (→) in the center of the dose window.

8. Store the Pen

Replace the outer needle shield. Unscrew the capped needle and dispose of the needle as directed by your healthcare professional. Place the cap back on the Pen for storage.

If you have any questions about Pens, call Lilly at 1-800-LillyRx (1-800-545-5979) from 9am–5pm EST. If you have any questions about pen needles, please call Becton Dickinson and Company at 1-888-BDCARES (1-888-232-2737) from 9am–5pm EST, or 1-800-LillyRx (1-800-545-5979).

See Pen literature in Pen package for complete instructions and storage information

Every time you inject:

- Use a new needle.
- Prime to make sure the Pen is ready to dose.
- Make sure you received a full dose.
- Remove the needle immediately after your injection.

Using a vial and syringe

Your doctor or diabetes educator will explain how to take your first insulin shot. He or she will then watch you do the following steps.

Preparing a dose of insulin

1. ■ Wash your hands.

Gently mix the insulin by:

• Rolling the vial between the palms of your hands.

• Turning the vial over from end to end a few times.

2. ■ If this is a new vial, remove the flat, colored cap, but not the rubber stopper or the metal band under the cap.

■ Clean the rubber stopper with an alcohol swab.

3. ■ Remove the cover from the needle.

■ Pull the plunger back to pull air into the syringe.

■ Pull back until the tip of the plunger is at the line for the number of units required.

4. ■ Push the needle through the rubber stopper.

■ Make sure the tip of the needle is not in the insulin.

■ Press the plunger to push air into the vial of insulin.

5.
- Turn the vial and syringe upside down. Now the tip of the needle should be in the insulin.
- Holding the vial with one hand, use the other to pull back on the plunger, which will pull insulin into the syringe. Stop when the plunger is at the line for your dose.
- Look at the insulin in the syringe.
  If you see any air bubbles:
  • Use the plunger to push the insulin back into the vial.
  • Then slowly pull the plunger back to the line for your dose of insulin.
  • Repeat this until there are no large air bubbles in the syringe.

6.
- Make sure the tip of the plunger is at the line showing your dose of insulin.
- Double check your dose. Magnifiers are available if needed to help you see more clearly.
- Pull the needle out of the rubber stopper.
- If you need to lay the needle down before taking your shot, put the cover back on the tip to protect it.

Injecting your insulin

7.
- Choose an injection site.
- Make sure the skin is clean.
- Pinch up a large area of skin.
- Push the needle into the skin, going straight in at a 90 degree angle.
- Make sure the needle is all the way in.

8.
- Push the plunger all the way down to inject the insulin into your body.
- Release the pinched skin, count to five slowly, and pull the needle straight out.
- Do not rub the place where you gave your shot.
- Safely dispose of used needles and syringes. Your doctor, pharmacist, diabetes educator or state health authorities can tell you how.

Preparing a mixed dose of insulin

Your doctor may want you to take more than one type of insulin. For example, you may need a combination of rapid-acting and longer-acting insulin to keep your blood sugar in the target range.

There are two ways to do this:

A. Use a premixed insulin. This method does not require you to mix insulin yourself.

B. Mix the two types of insulin yourself. Follow the procedure below if you are mixing insulin yourself. Both insulins can be put in the syringe at the same time, allowing you to take just one shot instead of two.

1.
- Clean the tops of both vials with an alcohol swab.
- Inject (a) units of air into the longer-acting (cloudy) insulin bottle. Do not pull insulin into the syringe.
- Take the needle out of the vial.

2.
- Inject (b) units of air into the rapid-acting (clear) insulin vial.
- Turn the vial and syringe upside down.
- Hold the vial with one hand.
- Use the other hand to pull back on the plunger until you have your required dose of rapid-acting insulin in the syringe.
- Be sure to remove any large air bubbles.
- Take the needle out of the vial.

3.
- Gently roll or shake the longer-acting insulin vial until it is mixed.
- Insert the needle into the vial of longer-acting insulin.
- Turn the vial and syringe upside down.
- Hold the vial with one hand.
- Use the other hand to pull back on the plunger.
- Pull the plunger back until you have a total of both equaled to (a + b) your total prescribed insulin dosage, as recommended by your physician.
- Be careful not to push any of the rapid-acting insulin into the longer-acting insulin vial.

4.
- Remove the needle from the vial.
- Give your shot as described in the “Injecting Your Insulin” section.

(a) *Units reflects your Doctor’s recommendation for units of longer-acting insulin.*

(b) *Units reflects your Doctor’s recommendation for units of rapid-acting insulin.*

Note: Please work with your healthcare professional if you are mixing insulin for guidance on the best way to manage this. Your healthcare professional can help you understand more about mixing insulin.

Section 6

Low Blood Sugar (Hypoglycemia)

When your blood sugar falls below 70 mg/dL, you may have low blood sugar (hypoglycemia). When this happens, most people experience unpleasant symptoms that can be both physical and emotional. These symptoms can come on quite suddenly. Hypoglycemia is usually easy to treat. However, if it is not dealt with quickly, serious reactions may result, including passing out or having convulsions. Talk with your doctor about what steps to take in case of a low blood sugar emergency, and most importantly, how to avoid one.

What causes hypoglycemia?

The most common causes of hypoglycemia are:

- getting more exercise than usual
- taking too much diabetes medication
- eating at the wrong time for the medicine you take
- skipping or not finishing meals or snacks
- drinking alcoholic beverages

Skipping or delaying meals can cause low blood sugar in people who take sulfonylureas, meglitinide or insulin. These drugs increase the body's insulin level. Unless insulin in the blood is balanced by food, it can cause your blood sugar level to fall too low. Before you drink alcoholic beverages, discuss with your healthcare provider whether some use of alcohol may be included in your meal plan.

Symptoms of hypoglycemia

When blood sugar gets too low you may:

- feel shaky
- feel tired
- have a fast heartbeat
- have blurred vision or a headache
- be sweaty
- be hungry
- become ill-tempered or confused
- have no symptoms at all

Having no symptoms of hypoglycemia at all is a dangerous situation! If you have a blood sugar reading below 60 mg/dL and aren't experiencing any of the symptoms described above, you should immediately treat your low blood sugar level. Even if you are feeling fine, this situation still needs to be treated. Make sure to notify your doctor of this event.

Low blood sugar feels different to different people. Learn to recognize your own particular symptoms.

How to prevent hypoglycemia

Low blood sugar can be prevented if you:

- eat your meals on time
- don't skip meals or snacks
- learn to adjust your food and diabetes medicine for exercise
- test your blood sugar on schedule
- do extra tests when you don't feel normal, and write down the results in your log book

notes

How to treat hypoglycemia

You need to treat low blood sugar right away. It will not get better on its own. So be sure to keep foods that contain sugar or glucose products with you at all times. When you feel your blood sugar might be low, test your blood. If your reading is less than 70 mg/dL (or the level set by your doctor), take one of the following right away.

Each one contains about 15 grams of carbohydrate:

- 3 glucose tablets (5 grams glucose each)
- 1/2 cup of fruit juice or regular soda (not sugar free)
- 6 or 7 hard candies (not sugar free)
- 1 tablespoon of honey or sugar

notes

If you feel your blood sugar is low, but cannot test — take one of the above items anyway. When in doubt, it's safer to take something that will quickly raise your blood sugar than to risk having a serious low blood sugar reaction.

After eating or drinking something:

- Wait 15 minutes then test your blood sugar again. Record the number in your log book. Also, be sure to write down that you had a low blood sugar reaction.
- If you don't feel better in 15 minutes, repeat above steps (How to treat hypoglycemia).
- If your blood sugar is still low, call your doctor's office.
- If your next meal is more than an hour away, follow the sugar with something that provides carbohydrate and protein (like half a sandwich or some crackers and cheese).
- Be sure to eat your normal meal at the regular time, even if you have previously used a low blood sugar treatment.

Important to do:

- learn your body's warning signs of falling blood sugar
- when you notice symptoms, test your blood and you may need to have a snack
- always wear or carry diabetes identification
- educate family members, friends or coworkers on symptoms and treatment for low blood sugar

What is glucagon?

Glucagon is a medicine that raises blood sugar and is important therapy for hypoglycemia. It is given as a shot just like insulin. If your blood sugar level gets so low that you pass out or can't swallow, you will need a glucagon shot. If you take insulin, your family, friends, coworkers, and exercise partners should learn how to give you a shot of glucagon. When you need glucagon, you may not be able to give it yourself. Ask your doctor about glucagon, because you will need a prescription for it.

notes

When others should inject you with glucagon

Family, friends, coworkers or exercise partners should give you glucagon if:

- You are unconscious.
- You are unable to eat sugar or sugar-sweetened product.

Whenever possible, it is important to test blood sugar before giving glucagon.

Glucagon is a safe drug. There is no danger of taking too much. However, it is for emergencies and should be used only under the direction of your doctor. As with hypoglycemia, nausea and vomiting may occur. Generalized allergic reactions have also been reported with glucagon use.

Click here for Lilly Glucagon Patient Information for the User.

High Blood Sugar (Hyperglycemia)

You have “high blood sugar” or hyperglycemia when your blood sugar level has risen and stayed well above normal. When this happens often, your diabetes is said to be “out of control.” Blood sugars will change depending upon a number of factors.

What causes hyperglycemia

Here are some things that will cause your blood sugar to increase:

- food
- emotional stress
- extra sugar made by the liver
- physical stress (being sick or in pain)
- not taking enough diabetes medicine
- not taking the right diabetes medicine
- getting less exercise than usual

A number of medicines, including over-the-counter medicines, may increase your blood sugar. Talk to your healthcare provider to find out what is safe for you.

Blood sugar levels are considered to be above normal when they rise above 120 mg/dL before meals or above 180 mg/dL after meals. This happens to everyone with diabetes at certain times. However, if this happens often, it is a problem that needs attention.

Symptoms of hyperglycemia

The tricky thing about hyperglycemia is that you can feel just fine even though your blood sugar is too high. When symptoms of hyperglycemia are present, they may be mild or come on so slowly you don't notice them. So, this is why it is important to test your blood sugar regularly.

Watch for the following symptoms:

- more hunger or thirst than usual
- feeling tired or sleepy
- frequent infections
- having to urinate often, especially at night
- dry or itchy skin
- blurred vision
- slow healing of cuts or sores

notes

How to treat hyperglycemia

If you have hyperglycemia, it should be treated. Although there may be no short-term symptoms, there are long-term health risks related to hyperglycemia. Talk with your doctor or diabetes educator about hyperglycemia. Discuss your desire to improve control and ask what your options are for reaching your goals.

The following options may include:

- a change in medicines or doses
- more careful meal planning
- more regular exercise
- more frequent blood testing and a plan for acting on the results

notes

Ketoacidosis

Ketoacidosis (kē″tō-ă″sĭ-dō′sĭs) is a serious condition that usually occurs only in people with type 1 diabetes. When your body does not have enough insulin, it cannot use sugar as fuel, even though your blood sugar level may be high. Instead your body starts to burn fat for fuel, and ketones are produced as a result. As ketone levels rise in the bloodstream, they cause a serious illness called ketoacidosis.

If you don't take extra insulin when your body begins to make ketones, three things may happen:

- Your blood sugar level will keep increasing.
- Ketones may build up in the blood and make your body tissues too acidic.
- The body cells may be damaged, which can lead to severe illness and even death.

Ketoacidosis can develop very quickly, especially when you're sick with a cold, flu or any other kind of infection, or during periods of severe stress. That's why it's so important to check your blood sugar and urine ketone levels several times a day when you are sick.

Symptoms of ketoacidosis

There are several warning signs that you may be in ketoacidosis. Do not ignore them. Check your blood sugar and urine ketone levels when you:

- feel more hungry and thirsty than usual
- have to urinate more often than usual
- throw up or feel sick to your stomach
- have stomach pain
- have a fruity smell on your breath
- notice that your breathing is fast and deep
- have a fever

Talk to your healthcare team about treating ketoacidosis. They may have specific recommendations for you to follow when you are sick.

Treatment of ketoacidosis

This is not a condition you should try to treat yourself! Call your doctor immediately if you are ill **and** you have ketones in your urine. Your doctor will tell you what to do. If you are unable to reach your doctor, go to the nearest emergency room right away.

Section 8

Possible long-term problems

Many long-term problems with diabetes are strongly related to high blood sugar levels. **By keeping your blood sugar as close to normal as possible you may lower your chances of having the following:**

- eye problems
- kidney disease
- surgical loss of a foot or leg
- nerve damage
- sexual problems
- frequent infections
- a heart attack or stroke

These are truly serious problems and are scary to hear about. But knowing about possible damage from diabetes, and taking positive action, can help you cope with your fears.

Eye problems

Diabetes can cause the very small blood vessels in the eye to become fragile or blocked, resulting in damage that affects your ability to see. This is called diabetic retinopathy. With these eye problems, at first you many notice no changes to your vision. But over time, diabetic retinopathy may get worse and can cause vision loss. That's why it's important to have a comprehensive dilated exam every year. These eye problems can be treated if they are discovered in their early stages.

Scene viewed by a person with normal vision

Scene viewed by a person with severe vision loss from diabetic retinopathy

Diabetic retinopathy (rĕt″ĭn-ŏp′ă-thē) often has no early warning signs. ***Don't wait for symptoms.*** *Be sure to have a complete dilated eye exam at least once a year.*

National Eye Institute, National Institutes of Health Eye Simulations. Ref#'s EDS01 and EDS04. Available at: http://www.nei.nih.gov/photo/sims. Accessed on March 3, 2006.

Lilly

Kidney disease

Diabetes can also damage the small blood vessels in the kidneys. This kind of kidney damage is called nephropathy (nĕ-frŏp´ă-thē), and has no early symptoms.

When this condition occurs:

- Waste products are kept in the body instead of leaving with the urine.
- Important nutrients like protein that should stay in the body are flushed away.
- Wastes continue to build up in the blood stream.
- If the damage continues, the kidneys may fail completely.

If your kidneys fail, you must depend upon a special filtering machine to remove impurities from your bloodstream. However, kidney damage can be found at an early and treatable stage with simple office testing that detects small amounts of protein in the urine. This test is called a *microalbumin* (mī˝krō-ăl-bū´mĭn) screen. A second test to check kidney function is a blood test called serum creatinine. You should have both of these tests done at least once a year.

Nerve damage

Nerve damage is also called neuropathy (nū˝rŏp´ă-thē). When blood sugar is high, nerve cells swell and scar. In time, the nerves lose their ability to send signals through the body the way they should.

This can lead to symptoms which may come and go. Some examples are:

- burning pain, numbness, tingling or loss of feeling in the feet or lower legs, especially at night
- problems in sexual function in both men and women
- changes in stomach and bowel function

The following can happen to your feet:

- when nerves are damaged, an injury to the foot may not cause pain
- with no pain to warn of the injury, the foot can become badly infected before the problem is discovered
- because of poor blood flow and high blood sugar, the body is less able to fight the infection and heal the injury
- in very serious cases, it may be necessary to surgically remove the foot or the limb

In most cases, proper care of your feet can prevent the need for any surgery. This is why it's so important to protect your feet—especially when you exercise—and check them daily for any sign of a problem. See Chapter 9 for some important tips.

There are new treatments for neuropathy, so be sure to tell your doctor or diabetes educator if you have any of the above symptoms.

notes

Frequent infections

High blood sugar levels can reduce the body's ability to fight off many kinds of infections, including the flu. Check with your doctor about getting a flu vaccine.

People with diabetes are more prone to developing:

- skin infections
- vaginal yeast infections
- bladder infections
- tooth and gum infections

Heart attack or stroke

Heart attacks are a major cause of death in people with type 2 diabetes. People with type 2 diabetes have an increased risk for heart attacks because of:

- abnormal levels of blood fats
- high blood sugar levels
- high blood pressure

Talk to your doctor about how to reduce your risk of heart disease.

General healthcare

Taking extra good care of yourself is important when you have diabetes.

Eye care

Possible eye problems (diabetic retinopathy, glaucoma [glaw-kō´mă] and cataract [kăt´ă-răkt]) caused by diabetes often have NO symptoms in the early, most treatable stages. Therefore, you should have a complete dilated eye examination every year from an eye doctor (optometrist or ophthalmologist).

A complete dilated eye exam must include eye drops that allow your eye doctor to see the blood vessels in your eyes more clearly. In addition you should visit your eye doctor at the first signs of any of the following:

- blurred or double vision
- seeing dark spots
- narrowed field of vision
- feeling pressure or pain in the eyes
- unusual difficulty seeing in dim light

To further reduce your risk of eye problems, you should have your blood pressure checked often and avoid smoking.

*Remember a complete dilated eye exam **every year** will help you preserve your vision.*

Foot care

Poor circulation, nerve damage, and trouble fighting infections can make foot problems very serious. Have your doctor or podiatrist (a foot doctor) test your feet at least once a year for loss of feeling. Visit a podiatrist regularly if you need help with routine nail or callus care. Here are some other things you can do to help keep your feet in top condition.

- Check your feet every day for redness, swelling, corns, calluses, ingrown toenails or breaks in the skin. Use a mirror if necessary. Report any problems to your doctor immediately.
- Cut your toenails straight across, not into the corners, and smooth with an emery board.
- Wear only comfortable, well fitting shoes. If your shoes are uncomfortable, get rid of them.
- Check inside your shoes for foreign objects or rough spots every time you put them on.
- Wear socks and shoes at all times.
- Be especially careful with your feet when weather is very hot or very cold.

Taking your shoes and socks off at every office visit will remind your doctor to check your feet.

notes

Skin care

Skin problems related to diabetes range from bothersome itching to painful infections, but there is a lot you can do to keep from having these problems.

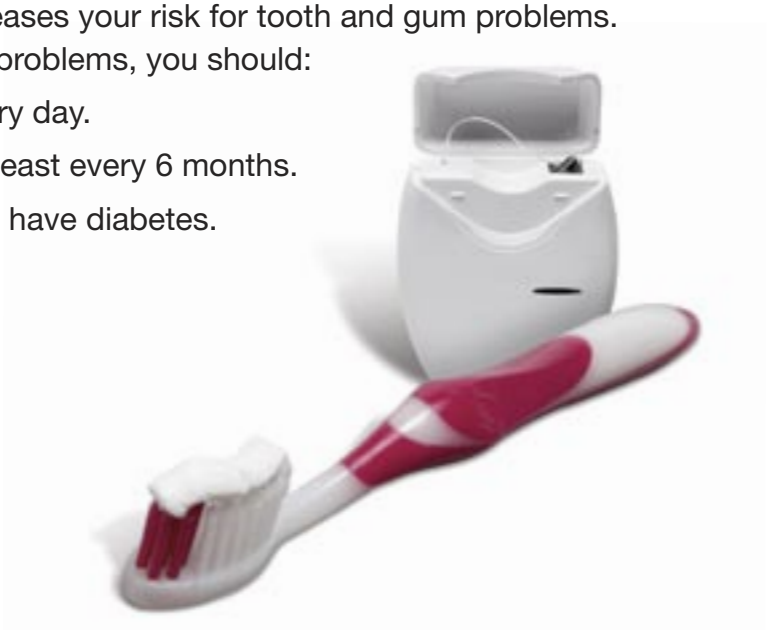
Basic skin care should include the following:

- Bathe every day with mild soap and lukewarm water, using a small amount of lotion afterward to keep skin soft.
- Take extra care to avoid scratches or bruises.
- Wear gloves when you do work that may cause injury.
- Use a sunscreen and common sense to avoid sunburn.
- Dress warmly and avoid long exposure in very cold weather.
- Wash cuts and scrapes with soap and water; then cover with a sterile bandage.
- Treat a skin injury quickly and call your doctor if it doesn't heal.

Dental care

High blood sugar increases your risk for tooth and gum problems. To help prevent these problems, you should:

- Brush and floss every day.
- See your dentist at least every 6 months.
- Tell your dentist you have diabetes.



Sick Days: Special information

notes

Sick day rules

- Always take your insulin or diabetes pills.
- Test your blood sugar before each meal and at bedtime.
- Test your urine for ketones if blood sugars are greater than 240 mg/dL.
- Follow your meal plan if you can eat. If you can't eat, you should try to take in at least 4 oz. of a sugar-containing beverage every hour to keep your blood sugar from falling too low.

Call your doctor when:

- You are vomiting and unable to keep down foods, liquids or diabetes pills.
- Your illness lasts longer than 24 hours.
- Ketones are present in your urine.
- All blood sugars are higher than 240 mg/dL for more than one day.

When the above symptoms occur, insist on speaking to your doctor or nurse to let them know something is wrong.

Section 10

You are in control

The more you know about diabetes and act upon that knowledge, the healthier you can be. We hope that you'll make good use of the important treatment tools we've discussed in these pages. These tools will help you to accomplish your key goals for living successfully with diabetes.

Strategies for dealing with diabetes

Learning to deal with diabetes can be difficult. At first, you may feel angry, afraid, frustrated, guilty or depressed. These feelings are quite normal. Expressing how you feel may help you to work through these emotions. Some people feel most comfortable talking with family and friends about their feelings. Others find comfort in talking with their healthcare team or a diabetes support group. The important thing is to talk about how you are feeling.

Here are some other things to keep in mind:

- The love and support of your family and friends is an endless source of strength. Take advantage of it.
- Fear, anger, and confusion can stop you from taking care of yourself. If you feel them gaining control — get help!
- Learn to take an active role in your care.
- Continue to do the things you love. Diabetes does not have to stop you from getting satisfaction and pleasure out of life.

Remember that you're not alone. You're part of a team committed to managing your diabetes. Never forget that diabetes is challenging. Celebrate your successes instead of striving for perfection. Keep track of your successes, and work to repeat them. When things don't turn out the way you planned, ask yourself, "What can I learn from this?"

By learning and using your knowledge to meet each new challenge, you'll gain confidence in your ability to take care of yourself. One day, instead of simply coping with your diabetes, you'll find that you truly are *Managing Your Diabetes.*

Managing Your Diabetes Checklist

Here are some key things you need to do.
Keep this list handy and refer to it often.

Things to do every day

- Test your blood sugar and write it down in your logbook.
- Take your medicines as directed.
- Check your feet.
- Follow your plan for meals and exercise.
- Take care of teeth and skin.

Things to do at each doctor's visit

- Take your blood sugar logbook with you. Your logbook will help your doctor help you.
- Ask about your A1C level and determine your goal for your next visit.
- Have your doctor check your feet. Taking off your shoes and socks will help you remember.
- Have your blood pressure checked.

Things to do at least once a year

- Have your blood fats checked (total cholesterol, LDL, HDL, triglycerides).
- Have your urine checked for protein (microalbumin screen) and a serum creatinine.
- Visit an eye doctor for a comprehensive dilated eye exam.
- Visit your doctor for a foot exam.

notes

notes

Index

Through a long-standing commitment to diabetes care, Lilly provides patients with breakthrough treatments that enable them to live full and active lives.

Since 1923, Lilly has been the industry leader in pioneering therapies to help healthcare professionals improve the lives of people with diabetes, and research continues on innovative medicines to address the unmet needs of patients.

For more information about Lilly's current diabetes products, visit www.LillyDiabetes.com.

Lilly

Answers That Matter.