

Oral Drugs For Type 2 Diabetes



Getting the Most
Value for Your
Healthcare Dollar



Consumer Reports[®]
BEST BUY DRUGS[®]
PROVEN • EFFECTIVE • AFFORDABLE
www.CRBestBuyDrugs.org

Contents

What is Type 2 Diabetes?	Page 2
Diagnosing Diabetes	Page 4
Treating Type 2 Diabetes	Page 6
Oral Drugs for Diabetes	Page 8
Comparing the Oral Diabetes Drugs	Page 10
Consumer Reports Best Buy Drugs Recommendations	Page 12
Keeping Track of Your Drugs	Page 14

What Is Type 2 Diabetes?

Type 2 diabetes is a disease that causes too much glucose, or sugar, in your blood. About 1 in 14 Americans has type 2 diabetes. Among over 60, 1 in 5 people has type 2 diabetes.

Glucose and insulin

Glucose is the body's main fuel. When you eat, your body breaks most foods down into glucose. Glucose then enters the blood.

Cells get glucose from blood and burn it as energy. Glucose gets into the cells with the help of insulin, a hormone made by the pancreas.

When you have type 2 diabetes, your body's cells resist the action of insulin and your pancreas makes less insulin. As a result, your blood sugar becomes elevated.

Symptoms of diabetes

Often times, there are no symptoms at first. But, over time symptoms occur and can include:

- Fatigue
- The need to urinate more often
- Increased thirst and hunger
- Blurred vision
- Itchy skin
- Numbness in your hands, legs, and feet
- Slow healing of wounds and sores

Complications from high blood sugar

Over time, too much glucose in the blood causes the blood vessels to get thick. This can affect the eyes, kidneys, nerves, heart, feet and brain.

Having diabetes nearly doubles your risk of heart disease. It also raises your risk of stroke, nerve damage, blindness, impotence, amputation, premature death, and other serious health problems.

People who have diabetes and do not lower their blood sugar die an average of 8 years earlier than people who do not have diabetes. Women and minorities are the most likely to become disabled or die from diabetes.



Susana has type 2 diabetes. Her doctor suggested that she take a class on cooking healthier foods. Susana got a lot of recipes that she can use at home. Now she is eating the right foods and feels much better.

Causes of type 2 diabetes

No one knows exactly what causes diabetes. Studies show that it runs in families. We also know that more than half the people who have type 2 diabetes are overweight or obese, usually from eating too much and getting too little exercise.

Treatment

Type 2 diabetes cannot be cured, but you can control it by taking care of yourself. The first and most important step is to make diet and lifestyle changes. If these changes do not lower your blood sugar enough, your doctor will prescribe a diabetes drug along with diet and lifestyle changes.

This booklet tells you about the oral diabetes drugs and how to get the most value for your healthcare dollar if you need to take them.

Diagnosing Diabetes

It can take years for the signs and complications of high blood sugar to show up. Millions of Americans have diabetes and do not even know it. But damage to the blood vessels and organs happen even when there are no symptoms.

Blood sugar tests

People who are at risk for type 2 diabetes should have their blood sugar tested regularly.

You are at risk if:

- You have coronary artery disease or vascular disease.
- You have high blood pressure.
- You have high “bad” (LDL) cholesterol.
- You are overweight or obese.
- You have a parent, brother, or sister who has diabetes.
- You are of African, Mexican, Latin American, Asian, Native American, Pacific Islander, or native Alaskan descent.
- You had diabetes during pregnancy, or you had a baby who weighed more than 9 pounds at birth.

If you are at risk and you have not had your blood sugar tested within the last year, talk to your doctor about getting it tested soon.

You should also ask your doctor about a blood sugar test if you are over 45, even if you are not at risk.

A blood sugar test is easy and inexpensive. It may need to be done 2 or 3 times to make sure that the reading is accurate.

Blood sugar is measured in milligrams per deciliter. Your test results will be written as mg/dl.

Fasting glucose test

This is the most common blood sugar test. It is done after you fast overnight.

If your glucose is:	Then:
Less than 110 mg/dl.	Your blood sugar is normal.
Between 110 and 126 mg/dl.	You have pre-diabetes.
More than 126 mg/dl.	You have diabetes.

Diabetes runs in Earl's family, so his doctor suggested he take the oral glucose tolerance test. The results showed that Earl had pre-diabetes, so his doctor talked to him about changing his diet and exercising more.

Oral glucose tolerance test

This test measures your glucose after you fast overnight and then again 2 hours after you drink a glucose solution. If your glucose is 200 mg/dl or higher after you drink the solution, you have diabetes. If it is between 140 and 199 mg/dl, you have pre-diabetes.

Pre-diabetes

If your blood sugar is above normal but lower than 126 mg/dl, you have pre-diabetes, or borderline diabetes. About 1 in 5 Americans has pre-diabetes.

People with pre-diabetes have a very high risk of getting type 2 diabetes. They also have a higher risk of having heart disease. If your blood sugar is above normal, talk to your doctor about how to lower it and prevent type 2 diabetes.



Treating Type 2 Diabetes

If your blood sugar test shows that you have type 2 diabetes, you will need to get it under control. That means making diet and lifestyle changes, such as losing excess weight, cutting down on fats and sugars, being more physically active, and, if you smoke, quitting. They are not easy changes to make, but your health and your life depend on your taking care of yourself.

If these changes do not lower your blood sugar enough, your doctor will prescribe a diabetes drug along with diet and lifestyle changes. Most people need diabetes drugs sooner or later.

If you also have high blood pressure or high cholesterol, part of taking care of yourself will be to lower them, too. Drugs and the same lifestyle changes that help control blood sugar can help lower blood pressure and cholesterol.

Treatment Goals

Your treatment has short-term, medium-term, and long-term goals.

Short-term goals

The first steps are to:

- Get your fasting glucose below 110 mg/dl. Below 100 mg/dl is better.
- Reduce or get rid of your symptoms.

Medium and long-term goals

The next steps are to:

- Get your HbA1c below 7%—below 6.5% is better—and keep it there.
- Prevent complications.

If you have high blood pressure or high cholesterol, you will need to lower them, too:

- | | |
|----------------------------|--|
| ● Total cholesterol | Below 200 mg/dl |
| ● LDL (“bad” cholesterol) | Below 100 mg/dl (below 75 mg/dl is better) |
| ● HDL (“good” cholesterol) | Above 40 mg/dl for men, 50 mg/dl for women |
| ● Triglycerides | Below 150 mg/dl |
| ● Blood pressure | Below 130/80 mmHg |

On-going monitoring

It takes constant monitoring to make sure your treatment is working and that you do not develop complications. Most diabetes experts recommend taking part in a diabetes self-management program. These programs track your test results and your drugs and train you in self-care.

If your insurance does not cover a diabetes self-management program, work closely with your primary care doctor to monitor your blood sugar and diabetes drugs.

HbA1c test

To find out how well you are controlling your blood sugar, your doctor will order a test called hemoglobin A1c (pronounced “A,” “one,” “c” and usually abbreviated as HbA1c). This test is usually done every 3 to 6 months.

The HbA1c test measures how much glucose is bound to hemoglobin, a protein in your blood. The test result is given as a percent. HbA1c should be below 7%. Below 6.5% is even better. Research shows that keeping HbA1c below 7% reduces the risk of heart disease and other complications.

Mr. Jones takes medicine to control his diabetes, high cholesterol, and high blood pressure. He also goes to a class at his clinic to learn more about keeping track of his drugs and managing his conditions.



Oral Drugs for Diabetes

Oral diabetes drugs—pills you take by mouth—are commonly prescribed to help treat type 2 diabetes. There are 6 groups of oral medicines and 11 different drugs.

Generic versus brand name drugs

Some diabetes drugs are available only as brand-name drugs, while others come in generic form. Generic drugs have the same ingredients as brand-name drugs, but they cost much less. Drugs become available in generic form after a drug company's patent expires. This is usually about 12–15 years after the drug is first sold. Until then, the drug is only available by its brand name.

How the oral diabetes drugs work

Each of the 6 groups of drugs works in a different way.

Metformin

This group of drugs, called biguanides, works by keeping the liver from making glucose and allowing more glucose to enter cells. It includes Glucophage and Glucophage XR, which are also available as generic metformin.

Glipizide, Glimepiride, & Glyburide

This group of drugs, called sulfonylureas, works by helping the pancreas make more insulin. It includes Glucotrol and Glucotrol XL, which are also available as generic glipizide; Amaryl, which is also available as generic glimepiride; and Diabeta, Glynase, Micronase and Prestab, which are also available as generic glyburide.

Prandin & Starlix

This group of drugs, called meglitinides, works by helping the pancreas make more insulin. Prandin (repaglinide) and Starlix (neteglinide) are available only as brand-name drugs.

Precose & Glyset

This group of drugs, called alpha-glucosidase inhibitors, works by keeping the intestines from absorbing glucose as quickly. Precose (acarbose) and Glyset (miglitol) are available only as brand-name drugs.

Januvia

This drug, called a dipeptidyl peptidase 4 inhibitor, works by helping the pancreas release insulin. It is available only as a brand-name drug.

Actos & Avandia

This group of drugs, called thiazolidinediones, works by helping the cells use glucose. Actos (pioglitazone) and Avandia (rosiglitazone) are available only as brand-name drugs.



Each of Dr. Clark's patients who has type 2 diabetes is different. This means that she works with each patient independently to decide which drugs would be best for him or her. She also talks to each patient about possible side effects from the drugs.

The side effects

All of the oral diabetes drugs have possible side effects. In general, these are not bad enough to keep you from taking the drugs if you need them.

The most worrisome side effects are hypoglycemia (low blood sugar) and weight gain. Other possible side effects include nausea, vomiting, diarrhea, and other stomach and intestinal troubles; fluid build-up in the legs and ankles (edema); and an increase in LDL ("bad") cholesterol. Only about 1 person in 100 has a significant side effect.

The chart on the next 2 pages lists the side effects of each group of drugs, along with other advantages and disadvantages.

What the oral diabetes drugs do

Although each group of oral diabetes drugs works differently, all the drugs:

- Lower your blood sugar.
- Help your body use glucose better.
- Decrease your symptoms.
- Help you live normally.
- Help prevent complications and premature death.

Comparing the Oral Diabetes Drugs

Each oral diabetes drug has advantages and disadvantages. Some also cost much more than others. The chart on these 2 pages can help you compare the drugs.

Metformin (Biguanides)

+ Advantages

Low risk of hypoglycemia (low blood sugar)

Does not cause weight gain

Does not raise blood pressure

May lower LDL (“bad”) cholesterol

May lower triglycerides

Low cost because available in generic form

– Disadvantages

Higher risk of nausea and diarrhea

Cannot be taken by people who have kidney disease or heart failure

Need to take 2 or 3 times a day

Glipizide, Glimepiride & Glyburide (Sulfonylureas)

+ Advantages

Acts quickly

Does not raise blood pressure

Does not raise LDL (“bad”) cholesterol

Low cost because available in generic form

Need to take only 1 or 2 times a day

– Disadvantages

Average weight gain of 5–10 pounds

Higher risk of hypoglycemia (low blood sugar), especially for glyburide

Prandin & Starlix (Meglitinides)

+ Advantages

Acts quickly

Does not raise LDL (“bad”) cholesterol

Prandin (repaglinide) may lower triglycerides

– Disadvantages

Prandin (repaglinide) has a higher risk of hypoglycemia (low blood sugar) and weight gain (for older people and people who skip meals—may be less likely to cause low blood sugar than glipizide, glimepiride, and glyburide)

Starlix (nateglinide) does not lower blood sugar as effectively as other drugs

Need to take 3 times a day

Higher cost because not available in generic form



Precose & Glyset (Alpha-glucosidase inhibitors)

+ Advantages

Lower risk of hypoglycemia (low blood sugar) compared to some other drugs

Does not cause weight gain

Lowers triglycerides

Does not raise LDL (“bad”) cholesterol

– Disadvantages

Does not lower blood sugar as effectively as most other drugs

Higher risk of nausea and diarrhea, although not as high as metformin

Need to take 3 times a day

Higher cost because not available in generic form

Januvia (Dipeptidyl peptidase 4 inhibitors)

+ Advantages

Low risk of hypoglycemia (low blood sugar)

Does not cause weight gain

Few known side effects

Need to take only 2 times a day

– Disadvantages

Does not lower blood sugar as effectively as most other drugs

A new drug so less is known about side effects

May only work when combined with other diabetes drugs

Higher cost because not available in generic form

Actos & Avandia (Thiazolidinediones)

+ Advantages

Low risk of hypoglycemia (low blood sugar)

May raise HDL (“good”) cholesterol slightly

Actos (pioglitazone) may lower triglycerides

Need to take only 1 or 2 times a day

– Disadvantages

Higher risk of heart failure

Average weight gain of 5–10 pounds

Higher risk of edema (fluid build-up)

Higher risk of anemia (low blood iron)

Raises LDL (“bad”) cholesterol

Avandia (rosiglitazone) raises triglycerides and may raise risk of heart attack

Rare risk of liver problems (needs to be monitored)

Does not act quickly

Higher cost because not available in generic form

Consumer Reports Best Buy Drugs Recommendations

These *Consumer Reports Best Buy Drugs* recommendations are based on an independent review by doctors of the research on the oral diabetes drugs.

Please remember that only your doctor can prescribe drugs. Our recommendations are not meant to replace your doctor's judgment about what medicine is best for you. We offer them to give you information so you can ask questions and work with your doctor to choose the best drugs for you.

Our Best Buy drugs

We have chosen the following oral diabetes drugs as *Consumer Reports Best Buy Drugs*. Our recommendations are based on the effectiveness, safety, side effects, dosing, and cost of the six groups of oral drugs. All of the Best Buys come as generics, ranging in price from about \$10 to \$60 a month.

Metformin
alone or with glipizide
or glimepiride

The research shows that metformin lowers blood sugar as well as or better than all the other drugs. It also causes fewer side effects. We recommend that you first try metformin alone, unless you have kidney disease or congestive heart failure. If metformin does not lower your blood sugar enough, we recommend adding one of the drugs below.

*Glipizide, Glipizide Sustained
Release, or Glimepiride*
alone or with metformin

If metformin alone does not lower your blood sugar enough, we recommend taking it with glipizide or glimepiride. If you cannot take metformin, we recommend taking glipizide or glimepiride alone. However, these drugs do have a higher risk of lowering your blood sugar too much (hypoglycemia). If that happens, you and your doctor may want to consider Actos, alone or with metformin.

Newer versus older drugs

In our review of the research, we also found that:

The newer drugs are no better. Metformin, glipizide, and glimepiride work just as well as the four newer groups of drugs. In fact, a number of the newer drugs do not lower blood sugar as well as these drugs. If your doctor prescribes Actos or Avandia alone before trying one of the drugs listed above, we suggest that you ask why. We also do not recommend taking Januvia alone as initial treatments until it has been studied more and used for a longer time.

The newer drugs are no safer. All diabetes drugs can cause side effects. (See the chart on pages 10–11.) The possible side effects are important to consider when you and your doctor are deciding which drug or drugs you should take.

The newer drugs are more expensive. The newer, brand-name drugs can cost up to 10 times, or more than \$200 a month, more than the older drugs that come as generics.

Taking more than one diabetes drug can help you control your blood sugar better. Many people cannot get their blood sugar low enough with one drug. Taking a second drug can help. The down side is that taking more than one drug raises the cost and the risk of side effects. If pills do not control your blood sugar enough, you may have to take insulin or other injectable drugs.

Many of Dr. Logan's patients see advertisements for certain diabetes drugs and ask for them. When this happens, sometimes she has to explain that these newer drugs may not be any better or safer, and they may actually cost the patient more money.



About Us: Consumers Union is the non-profit publisher of *Consumer Reports* magazine. The magazine's website is www.consumerreports.org. *Consumer Reports Best Buy Drugs* (www.CRBestBuyDrugs.org) is a public education project administered by Consumers Union. The project was made possible by a major grant from the Engelberg Foundation, a private philanthropy, and a supporting grant from the National Library of Medicine, part of the National Institutes of Health.

Credits: The information in this booklet is adapted from *Treating Type 2 Diabetes: The Oral Diabetes Drugs*, a report in the *Consumer Reports Best Buy Drugs* series. This booklet was written by Health Research for Action at the University of California, Berkeley. For more information about Health Research for Action, go to www.uhealthaction.org, email healthaction@berkeley.edu or call 510-643-9543.

Caution: This publication should not be viewed as a substitute for a consultation with a medical or health professional. The information is meant to enhance communication with your doctor, not replace it. Use of this publication is at your own risk. Neither Consumers Union nor Health Research for Action can be held liable for any loss, injury, or other damages related to your use of this publication.

Your use of this publication is also subject to our User Agreement available at www.CRBestBuyDrugs.org. You are free to download, copy, and distribute the reports for individual and family use. However, you may not modify or create derivative works from the text of the reports, or remove any copyright or trademark notices. Any organization interested in broader distribution of this or any *Consumer Reports Best Buy Drugs* publications in print or on the Internet should contact us at CRBestBuyDrugs@cu.consumer.org. *Consumer Reports Best Buy Drugs*[™] and *Consumer Reports*[®] are trademarks of Consumers Union of U.S., Inc.



Consumer Reports®
BEST BUY DRUGS®
PROVEN • EFFECTIVE • AFFORDABLE
www.CRBestBuyDrugs.org

