

What I need to know about Diabetes Medicines



U.S. Department
of Health and
Human Services

NATIONAL INSTITUTES OF HEALTH

NIDDK NATIONAL INSTITUTE OF
DIABETES AND DIGESTIVE
AND KIDNEY DISEASES

National Diabetes Information Clearinghouse

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*Inserts are in back pocket

What do diabetes medicines do?

Over time, high levels of blood glucose, also called blood sugar, can cause health problems. These problems include heart disease, heart attacks, strokes, kidney disease, nerve damage, digestive problems, eye disease, and tooth and gum problems. You can help prevent health problems by keeping your blood glucose levels on target.

Everyone with diabetes needs to choose foods wisely and be physically active. If you can't reach your target blood glucose levels with wise food choices and physical activity, you may need diabetes medicines. The kind of medicine you take depends on your type of diabetes, your schedule, and your other health conditions.

Diabetes medicines help keep your blood glucose in your target range. The target range is suggested by diabetes experts and your doctor or diabetes educator. See page 2 for more information about target levels for good health.



You may need diabetes medicines to reach your blood glucose targets.

What targets are recommended for blood glucose levels?

The National Diabetes Education Program uses blood glucose targets set by the American Diabetes Association (ADA) for most people with diabetes. To learn your daily blood glucose numbers, you'll check your blood glucose levels on your own using a blood glucose meter.

Target blood glucose levels for most people with diabetes		My targets
Before meals	70 to 130 mg/dL*	
1 to 2 hours after the start of a meal	Less than 180 mg/dL	

* Milligrams per deciliter.

Also, you should ask your doctor for a blood test called the A1C at least twice a year. The A1C will give you your average blood glucose for the past 3 months.

Target A1C result for people with diabetes	My target
Less than 7 percent	

Your personal A1C goal might be higher or lower than 7 percent. Keeping your A1C as close to normal as possible—below 6 percent without having frequent low blood glucose—can help prevent long-term diabetes problems.

Doctors might recommend other goals for very young children, older people, people with other health problems, or those who often have low blood glucose.

Talk with your doctor or diabetes educator about whether the target blood glucose levels and A1C result listed in the charts on page 2 are best for you. Write your own target levels in the charts. Both ways of checking your blood glucose levels are important.

If your blood glucose levels are not on target, you might need a change in how you take care of your diabetes. The results of your A1C test and your daily blood glucose checks can help you and your doctor make decisions about

- what you eat
- when you eat
- how much you eat
- what kind of exercise you do
- how much exercise you do
- the type of diabetes medicines you take
- the amount of diabetes medicines you take

What happens to blood glucose levels in people with diabetes?

Blood glucose levels go up and down throughout the day and night in people with diabetes. High blood glucose levels over time can result in heart disease and other health problems. Low blood glucose levels can make you feel shaky or pass out. But you can learn how to make sure your blood glucose levels stay on target—not too high and not too low.

What makes blood glucose levels go too high?

Your blood glucose levels can go too high if

- you eat more than usual
- you're not physically active
- you're not taking enough diabetes medicine
- you're sick or under stress
- you exercise when your blood glucose level is already high

What makes blood glucose levels go too low?

Your blood glucose levels can go too low if

- you eat less than usual
- you miss a meal or snack or eat later than usual
- you're more active than usual
- you drink alcoholic beverages on an empty stomach

Some diabetes medicines can also lower your blood glucose too much. Ask your doctor whether your diabetes medicines can cause low blood glucose. See Insert N for information about low blood glucose.



The results of your blood glucose checks can help you make decisions about your diabetes medicines, food choices, and physical activity.

Medicines for My Diabetes

Ask your doctor what type of diabetes you have and check off the answer.

I have

- type 1 diabetes
- type 2 diabetes
- gestational diabetes
- another type of diabetes: _____

Medicines for Type 1 Diabetes

Type 1 diabetes, once called juvenile diabetes or insulin-dependent diabetes, is usually first found in children, teenagers, or young adults. If you have type 1 diabetes, you must take insulin because your body no longer makes it. You also might need to take other types of diabetes medicines that work with insulin.

Medicines for Type 2 Diabetes

Type 2 diabetes, once called adult-onset diabetes or noninsulin-dependent diabetes, is the most common form of diabetes. It can start when the body doesn't use insulin as it should, a condition called insulin resistance. If the body can't keep up with the need for insulin, you may need diabetes medicines. Many choices are available. Your doctor might prescribe two or more medicines. The ADA recommends that most people start with metformin, a kind of diabetes pill.

Medicines for Gestational Diabetes

Gestational diabetes is diabetes that occurs for the first time during pregnancy. The hormones of pregnancy or a shortage of insulin can cause gestational diabetes. Most women with gestational diabetes control it with meal planning and physical activity. But some women need insulin to reach their target blood glucose levels.

Medicines for Other Types of Diabetes

If you have one of the rare forms of diabetes, such as diabetes caused by other medicines or monogenic diabetes, talk with your doctor about what kind of diabetes medicine would be best for you.

Types of Diabetes Medicines

Diabetes medicines come in several forms.

Insulin

If your body no longer makes enough insulin, you'll need to take it. Insulin is used for all types of diabetes. Your doctor can help you decide which way of taking insulin is best for you.

- **Taking injections.** You'll give yourself shots using a needle and syringe. The syringe is a hollow tube with a plunger. You will put your dose of insulin into the tube. Some people use an insulin pen, which looks like a pen but has a needle for its point.
- **Using an insulin pump.** An insulin pump is a small machine about the size of a cell phone, worn outside of your body on a belt or in a pocket or pouch. The pump connects to a small plastic tube and a very small needle. The needle is inserted under the skin and stays in for several days. Insulin is pumped from the machine through the tube into your body.

- **Using an insulin jet injector.** The jet injector, which looks like a large pen, sends a fine spray of insulin through the skin with high-pressure air instead of a needle.
- **Using an insulin infuser.** A small tube is inserted just beneath the skin and remains in place for several days. Insulin is injected into the end of the tube instead of through the skin.



If your body no longer makes enough insulin, you'll need to take it.

What does insulin do?

Insulin helps keep blood glucose levels on target by moving glucose from the blood into your body's cells. Your cells then use glucose for energy. In people who don't have diabetes, the body makes the right amount of insulin on its own. But when you have diabetes, you and your doctor must decide how much insulin you need throughout the day and night.

What are the possible side effects of insulin?

Possible side effects include

- low blood glucose (for more information, see Insert N)
- weight gain

How and when should I take my insulin?

Your plan for taking insulin will depend on your daily routine and your type of insulin. Some people with diabetes who use insulin need to take it two, three, or four times a day to reach their blood glucose targets. Others can take a single shot. Your doctor or diabetes educator will help you learn how and when to give yourself insulin.

Types of Insulin

Each type of insulin works at a different speed. For example, rapid-acting insulin starts to work right after you take it. Long-acting insulin works for many hours. Most people need two or more types of insulin to reach their blood glucose targets.

Look at the list of types of insulin on Insert C in the pocket of this booklet. Check off the names of the kinds of insulin you take. Then write the names of your insulins under **My Insulins** in the chart on Insert A.

Diabetes Pills

Along with meal planning and physical activity, diabetes pills help people with type 2 diabetes or gestational diabetes keep their blood glucose levels on target. Several kinds of pills are available. Each works in a different way. Many people take two or three kinds of pills. Some people take combination pills. Combination pills contain two kinds of diabetes medicine in one tablet. Some people take pills and insulin.



Diabetes pills help people with type 2 diabetes or gestational diabetes keep their blood glucose levels on target.

Your doctor may ask you to try one kind of pill. If it doesn't help you reach your blood glucose targets, your doctor may ask you to

- take more of the same pill
- add another kind of pill
- change to another type of pill
- start taking insulin
- start taking another injected medicine

If your doctor suggests that you take insulin or another injected medicine, it doesn't mean your diabetes is getting worse. Instead, it means you need insulin or another type of medicine to reach your blood glucose targets. Everyone is different. What works best for you depends on your usual daily routine, eating habits, and activities, and your other health conditions.

For information about the different kinds of pills and what they do, see the cards in the pocket of this booklet. You'll see the brand name and the generic name—the scientific name—for each medicine. Find your diabetes pills and check off the names. Then write the names of your diabetes pills under **My Pills and Injected Medicines** in the chart on Insert A.

Injections Other Than Insulin

In addition to insulin, two other types of injected medicines are now available. Both work with insulin—either the body's own or injected—to help keep your blood glucose from going too high after you eat. Neither is a substitute for insulin.

See the cards in the pocket of this booklet for more information about these injected medicines. Check off the kinds you take. Then write the names of your injected medicines under **My Pills and Injected Medicines** in the chart on Insert A.

Talk with your doctor if you have questions about your diabetes medicines. Do not stop taking your diabetes medicines without checking with your doctor first. See Insert B for a list of questions to ask your doctor about your medicines.

What do I need to know about side effects of medicines?

A side effect is an unwanted problem caused by a medicine. For example, some diabetes medicines can cause nausea or an upset stomach when you first start taking them. Before you start a new medicine, ask your doctor about possible side effects and how you can avoid them. If the side effects of your medicine bother you, tell your doctor.

For More Information

To find diabetes educators—nurses, dietitians, and other health professionals—near you, call the American Association of Diabetes Educators toll-free at 1–800–TEAMUP4 (1–800–832–6874). Or go to *www.diabeteseducator.org* and see the “Find a Diabetes Educator” section.

For additional information about diabetes, contact

American Diabetes Association

National Service Center

1701 North Beauregard Street

Alexandria, VA 22311–1742

Phone: 1–800–DIABETES (1–800–342–2383)

Fax: 703–549–6995

Email: AskADA@diabetes.org

Internet: www.diabetes.org

Juvenile Diabetes Research Foundation International

26 Broadway, 14th Floor

New York, NY 10004

Phone: 1–800–533–CURE (1–800–533–2873)

Fax: 212–785–9595

Email: info@jdrf.org

Internet: www.jdrf.org

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1 Diabetes Way

Bethesda, MD 20814-9692

Phone: 1-888-693-NDEP (1-888-693-6337)

TTY: 1-866-569-1162

Fax: 703-738-4929

Email: ndep@mail.nih.gov

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This publication is available at www.diabetes.niddk.nih.gov.

This publication may contain information about medications. When prepared, this publication included the most current information available. For updates or for questions about any medications, contact the U.S. Food and Drug Administration toll-free at 1-888-INFO-FDA (1-888-463-6332) or visit www.fda.gov. Consult your doctor for more information.

Inserts

My Diabetes Medicines	Insert A
Questions to Ask about Your Diabetes Medicines....	Insert B
Types of Insulin	Insert C
Glyset and Precose (Alpha-Glucosidase Inhibitors).....	Insert D
Glucophage, Glucophage XR, and Riomet (Biguanides)	Insert E
Starlix (D-Phenylalanine Derivative).....	Insert F
Januvia (DPP-4 Inhibitor)	Insert G
Prandin (Meglitinide)	Insert H
Amaryl, DiaBeta, Diabinese, Glucotrol, Glucotrol XL, Glynase PresTab, Micronase, tolazamide, and tolbutamide (Sulfonylureas)	Insert I
Actos and Avandia (Thiazolidinediones)	Insert J
Actoplus Met, Actoplus Met XR, Avandamet, Avandaryl, Duetact, Glucovance, Janumet, and Metaglip (Combination Diabetes Pills)	Insert K
Symlin (Amylin Mimetic)	Insert L
Byetta (Incretin Mimetic).....	Insert M
About Low Blood Glucose	Insert N

My Diabetes Medicines

Write the names of your diabetes medicines here.

My Insulins

Brand Name	Generic Name	Type of Insulin

My Pills and Injected Medicines

Brand Name	Generic Name

Questions to Ask about Your Diabetes Medicines

Ask your doctor these questions when you get a prescription for a medicine. Make copies of this card and use one card for each of your medicines.

What are the names of my medicine? Brand name: _____ Generic name: _____
What does my medicine do?
When should I start this medicine?
This medicine is prescribed by:
How long will it take this medicine to work?
What is the strength (for example, how many milligrams, written as mg)?
How much should I take for each dose?
How many times a day should I take my medicine?
At what times should I take my medicine?

Should I take it before, with, or after a meal?

Should I avoid any foods or medicines when I take it?

Should I avoid alcoholic beverages when I take it?

Are there any times when I should change the amount of medicine I take?

What should I do if I forget to take it?

If I'm sick and can't keep food down, should I still take my medicine?

Can my diabetes medicine cause low blood glucose?

What should I do if my blood glucose is too low?

What side effects can this medicine cause?

What should I do if I have side effects?

How should I store this medicine?

Types of Insulin

Each type of insulin has an onset, a peak, and a duration time.

The **onset** is how soon the insulin starts to lower your blood glucose after you take it.

The **peak** is the time the insulin is working the hardest to lower your blood glucose.

The **duration** is how long the insulin lasts—the length of time it keeps lowering your blood glucose.

The times shown in the chart are estimates. Your onset, peak, and duration times may be different. You'll work with your health care team to come up with an insulin plan that works best for you.

Type of Insulin	Brand Name	Generic Name	Onset	Peak	Duration
Rapid-acting	<input type="checkbox"/> NovoLog	<input type="checkbox"/> Insulin aspart	15 minutes	30 to 90 minutes	3 to 5 hours
	<input type="checkbox"/> Apidra	<input type="checkbox"/> Insulin glulisine	15 minutes	30 to 90 minutes	3 to 5 hours
	<input type="checkbox"/> Humalog	<input type="checkbox"/> Insulin lispro	15 minutes	30 to 90 minutes	3 to 5 hours
Short-acting	<input type="checkbox"/> Humulin R	<input type="checkbox"/> Regular (R)	30 to 60 minutes	2 to 4 hours	5 to 8 hours
	<input type="checkbox"/> Novolin R				
Intermediate-acting	<input type="checkbox"/> Humulin N	<input type="checkbox"/> NPH (N)	1 to 3 hours	8 hours	12 to 16 hours
	<input type="checkbox"/> Novolin N				
Long-acting	<input type="checkbox"/> Levemir	<input type="checkbox"/> Insulin detemir	1 hour	Peakless	20 to 26 hours
	<input type="checkbox"/> Lantus	<input type="checkbox"/> Insulin glargine			
Pre-mixed NPH (intermediate-acting) and regular (short-acting)	<input type="checkbox"/> Humulin 70/30	<input type="checkbox"/> 70% NPH and 30% regular	30 to 60 minutes	Varies	10 to 16 hours
	<input type="checkbox"/> Novolin 70/30				
Pre-mixed insulin lispro protamine suspension (intermediate-acting) and insulin lispro (rapid-acting)	<input type="checkbox"/> Humulin 50/50	<input type="checkbox"/> 50% NPH and 50% regular	30 to 60 minutes	Varies	10 to 16 hours
	<input type="checkbox"/> Humalog Mix 75/25				
Pre-mixed insulin lispro protamine suspension (intermediate-acting) and insulin lispro (rapid-acting)	<input type="checkbox"/> Humalog Mix 50/50	<input type="checkbox"/> 50% insulin lispro protamine and 50% insulin lispro	10 to 15 minutes	Varies	10 to 16 hours
	<input type="checkbox"/> Humalog Mix 75/25				
Pre-mixed insulin aspart protamine suspension (intermediate-acting) and insulin aspart (rapid-acting)	<input type="checkbox"/> NovoLog Mix 70/30	<input type="checkbox"/> 70% insulin aspart protamine and 30% insulin aspart	5 to 15 minutes	Varies	10 to 16 hours

Alpha-Glucosidase (AL-fuh-gloo-KOH-sih-dayss) Inhibitor (in-HIB-ih-tur)

Brand Name	Generic Name
<input type="checkbox"/> Glyset (GLY-set)	<input type="checkbox"/> miglitol (MIG-lih-tol)
<input type="checkbox"/> Precose (PREE-kohss)	<input type="checkbox"/> acarbose (A-kahr-bohss)

What does this type of pill do?

This type of pill helps keep your blood glucose from going too high after you eat, a common problem in people with diabetes. It works by slowing down the digestion of foods high in carbohydrate, such as rice, potatoes, bread, milk, and fruit.

Who should not take Glyset or Precose?

Talk with your doctor about whether to take this type of pill if

- you have bowel disease or other intestinal conditions
- you have advanced kidney or liver disease
- you are pregnant, planning to get pregnant, or breastfeeding

What are the possible side effects?

This type of pill doesn't cause low blood glucose by itself. But your risk of having low blood glucose goes up if you also take

- diabetes pills that cause low blood glucose
- insulin

Your doctor may ask you to take a lower dose of your other diabetes medicines while you take this type of pill.

Taking Glyset or Precose may cause stomach pain, gas, bloating, or diarrhea. These symptoms usually go away after you have taken these pills for a while.

If you take Glyset or Precose: What you need to know about low blood glucose

If you take Glyset or Precose, only glucose tablets or glucose gel will bring your blood glucose level back to normal quickly. Other quick-fix foods and drinks won't raise your blood glucose as quickly because Glyset and Precose slow the digestion of other quick-fix foods and drinks.

Biguanide (by-GWAH-nyd)

Brand Name	Generic Name
<input type="checkbox"/> Glucophage (GLOO-coh-fahj)	<input type="checkbox"/> metformin (met-FOR-min)
<input type="checkbox"/> Glucophage XR	<input type="checkbox"/> metformin—long-acting
<input type="checkbox"/> Riomet (RY-oh-met)	<input type="checkbox"/> metformin—liquid

The American Diabetes Association recommends metformin (Glucophage, Glucophage XR, Riomet) as the first choice of diabetes medicine for most people with type 2 diabetes. Metformin can be taken alone or with other diabetes medicines. See Insert K for information about combination pills that contain both metformin and another diabetes medicine.

What does this type of medicine do?

This type of medicine, which comes in pill or liquid form, lowers the amount of glucose made by your liver. Then your blood glucose levels don't go too high. This type of medicine also helps treat insulin resistance. With insulin resistance, your body doesn't use insulin the way it should. When your insulin works properly, your blood glucose levels stay on target and your cells get the energy they need. This type of medicine improves your cholesterol levels. It also may help you lose weight.

Who should not take Glucophage, Glucophage XR, or Riomet?

Talk with your doctor about whether to take this type of medicine if

- you have advanced kidney or liver disease
- you drink excessive amounts of alcoholic beverages
- you are pregnant, planning to get pregnant, or breastfeeding

What are the possible side effects?

This type of pill doesn't cause low blood glucose by itself. But your risk of having low blood glucose goes up if you also take

- diabetes pills that cause low blood glucose
- insulin

Your doctor may ask you to take a lower dose of your other diabetes medicines while you take this type of pill.

You may have nausea, diarrhea, or an upset stomach when you first start taking this type of medicine. These side effects are likely to go away after a while.

Rarely, a serious condition called lactic acidosis occurs as a side effect of taking this medicine. Call your doctor right away if you

- become weak and tired
- become dizzy
- feel very cold
- have trouble breathing
- have unusual muscle pain and stomach problems
- have a sudden change in the speed or steadiness of your heartbeat

Sometimes you'll need to stop taking this type of medicine for a short time so you can avoid developing lactic acidosis. If you have severe vomiting, diarrhea, or a fever, or if you can't keep fluids down, call your doctor right away. You should also talk with your doctor well ahead of time about stopping this type of medicine if

- you'll be having special x rays that require an injection of dye
- you'll be having surgery

Your doctor will tell you when it's safe to start taking your medicine again.

D-Phenylalanine (dee-FEN-il-AL-uh-need)

Derivative (duh-RIV-uh-tiv)

Brand Name	Generic Name
<input type="checkbox"/> Starlix (STAR-likes)	<input type="checkbox"/> nateglinide (nuh-TEG-lih-nyd)

What does this type of pill do?

This type of pill helps your body make more insulin for a short period of time right after meals. The insulin helps keep your blood glucose from going too high after you eat, a common problem in people with diabetes.

Who should not take Starlix?

Talk with your doctor about whether to take this type of pill if

- you are pregnant, planning to get pregnant, or breastfeeding
- you have liver disease

What are the possible side effects?

Possible side effects are

- low blood glucose, also called hypoglycemia (HY-poh-gly-SEE-mee-uh)—for more information, see Insert N
- weight gain
- dizziness

DPP-4 Inhibitor

Dipeptidyl (dy-PEP-tih-dil) Peptidase-4 (PEP-tih-dayss-FOR) Inhibitor (in-HIB-ih-tur)

Brand Name	Generic Name
<input type="checkbox"/> Januvia (juh-NOO-vee-uh)	<input type="checkbox"/> sitagliptin (sih-tuh-GLIP-tin) phosphate (FOSS-fayt)

What does this type of pill do?

This type of pill lowers your blood glucose by helping your body make more insulin when it's needed, especially right after meals. It also helps keep your liver from putting stored glucose into your blood.

Who should not take Januvia?

Talk with your doctor about whether to take this type of pill if

- you are pregnant, planning to get pregnant, or breastfeeding
- you have kidney disease
- you have type 1 diabetes and if you have a condition called diabetic ketoacidosis

What are the possible side effects?

This type of pill doesn't cause low blood glucose by itself. But your risk of having low blood glucose goes up if you also take

- diabetes pills that cause low blood glucose
- insulin

Your doctor may ask you to take a lower dose of your other diabetes medicines while you take this type of pill.

Possible side effects are

- a cold
- runny nose
- sore throat
- headache

If you take Januvia and have kidney problems, your health care provider might order blood tests to see how well your kidneys are working.

Meglitinide (meh-GLIH-tih-nyde)

Brand Name	Generic Name
<input type="checkbox"/> Prandin (PRAN-din)	<input type="checkbox"/> repaglinide (ruh-PAG-luh-nyd)

What does this type of pill do?

This type of pill helps your body make more insulin for a short period of time right after meals. The insulin helps keep your blood glucose from going too high after you eat, a common problem in people with diabetes.

Who should not take Prandin?

Talk with your doctor about whether to take this type of pill if

- you are pregnant, planning to get pregnant, or breastfeeding
- you have liver disease

What are the possible side effects?

Prandin can cause

- low blood glucose, also called hypoglycemia (HY-poh-gly-SEE-mee-uh)—for more information, see Insert N
- weight gain
- upset stomach
- back pain or a headache

Sulfonylurea (SUHL-foh-nil-yoo-REE-uh)

Brand Name	Generic Name
<input type="checkbox"/> Amaryl (AM-uh-ril)	<input type="checkbox"/> glimepiride (gly-MEP-ih-ryd)
<input type="checkbox"/> DiaBeta (dy-uh-BAY-tuh)	<input type="checkbox"/> glyburide (GLY-buh-ryd)
<input type="checkbox"/> Diabinese (dy-AB-ih-neeze)	<input type="checkbox"/> chlorpropamide (klor-PROH-puh-myd)
<input type="checkbox"/> Glucotrol (GLOO-kuh-trohl)	<input type="checkbox"/> glipizide (GLIP-ih-zyd)
<input type="checkbox"/> Glucotrol XL (GLOO-kuh-trohl)(EKS-EL)	<input type="checkbox"/> glipizide (GLIP-ih-zyd) (long-acting)
<input type="checkbox"/> Glynase (GLY-nayz) PresTab	<input type="checkbox"/> glyburide (GLY-buh-ryd)
<input type="checkbox"/> Micronase (MY-kroh-nayz)	<input type="checkbox"/> glyburide (GLY-buh-ryd)
	<p>Available only in generic form:</p> <input type="checkbox"/> tolazamide (tahl-AZ-uh-myd) <input type="checkbox"/> tolbutamide (tahl-BYOO-tuh-myd)

What does this type of pill do?

This type of pill helps your body make more insulin. The insulin helps lower your blood glucose.

Who should not take sulfonylureas?

Talk with your doctor about whether to take this type of pill if

- you are allergic to sulfa drugs
- you are pregnant, planning to get pregnant, or breastfeeding

What are the possible side effects?

Possible side effects include

- low blood glucose, also called hypoglycemia (HY-poh-gly-SEE-mee-uh)—for more information, see Insert N
- upset stomach
- skin rash
- weight gain

Thiazolidinedione (THY-uh-ZOHL-ih-deen-DY-ohn)

Brand Name	Generic Name
<input type="checkbox"/> Actos (AK-tohss)	<input type="checkbox"/> pioglitazone (py-oh-GLIH-tuh-zohn)
<input type="checkbox"/> Avandia (uh-VAN-dee-uh)	<input type="checkbox"/> rosiglitazone (rohss-ih-GLIH-tuh-zohn)

If you are currently taking one of the thiazolidinedione medicines—pioglitazone (Actos), rosiglitazone (Avandia), or a combination diabetes pill containing pioglitazone or rosiglitazone: See the U.S. Food and Drug Administration (FDA) announcements on the next pages about these pills.

Discuss treatment options with your doctor before stopping your diabetes medicines. Stopping your diabetes medicines without talking with your doctor can cause serious short-term health problems and could increase the risk of long-term diabetes-related complications.

See Insert K for more information about combination diabetes pills that contain pioglitazone or rosiglitazone.

In June 2011, the FDA warned that use of Actos for more than 1 year may be associated with an increased risk of bladder cancer. The FDA recommended that people receiving treatment for bladder cancer should not take Actos, and Actos should be used with caution in people with a history of bladder cancer. This warning also applies to the combination diabetes pills containing pioglitazone—Actoplus Met, Actoplus Met XR, and Duetact; see Insert K.

Visit www.fda.gov/Drugs/DrugSafety/ucm259150 or call the FDA at 1-888-INFO-FDA (1-888-463-6332) for more information about the FDA's warning on the use of Actos.

In September 2010, the FDA announced that access to Avandia would be restricted because of studies linking Avandia to an increased risk of cardiovascular events, such as heart attacks. In May 2011, the FDA announced new restrictions on the use and distribution of Avandia and combination diabetes pills containing rosiglitazone.

After November 18, 2011, Avandia and the combination diabetes pills Avandamet and Avandaryl—see Insert K—will no longer be available through retail pharmacies. Health care providers and patients must enroll in a special program in order to prescribe and receive these medicines.

Visit www.fda.gov/Drugs/DrugSafety/ucm255005 or call the FDA at 1-888-INFO-FDA (1-888-463-6332) for more information about the FDA's restrictions on the use of Avandia.

What does this type of pill do?

This type of pill helps treat insulin resistance. With insulin resistance, your body doesn't use insulin the way it should. Thiazolidinediones help your insulin work properly. Then your blood glucose levels stay on target and your cells get the energy they need.

Who should not take this type of pill?

People with heart failure, also called congestive heart failure, should not take this type of pill.

This type of pill can cause heart failure or make it worse.

Heart failure is a condition in which your heart no longer pumps properly. Then your body keeps too much fluid in your legs, ankles, and lungs.

Call your doctor right away if you have signs of heart failure. Warning signs include

- having swelling in your legs or ankles
- gaining a lot of weight in a short time

- having trouble breathing
- having a cough
- being very tired

People being treated for bladder cancer should not take Actos or combination pills containing pioglitazone.

If you have a history of bladder cancer and are taking Actos, talk with your doctor.

You should also talk with your doctor about whether to take this type of pill if

- you are pregnant, planning to get pregnant, or breastfeeding
- you have liver disease

What are the possible side effects?

Heart failure is a serious side effect. Avandia is also linked to an increased risk of cardiovascular events, such as heart attacks and strokes.

Bladder cancer may be more likely to occur in people who take Actos for more than 1 year. Call your doctor right away if you have symptoms of bladder cancer while taking Actos:

- pink, red, or cola-colored urine, indicating the presence of blood
- an urgent need to urinate or pain while urinating
- pain in your back or lower abdomen

This type of pill doesn't cause low blood glucose by itself. But your risk of having low blood glucose goes up if you also take

- diabetes pills that cause low blood glucose
- insulin

Your doctor may ask you to take a lower dose of your other diabetes medicines while you take this type of pill.

Other possible side effects are

- anemia (uh-NEE-mee-uh), a condition that can make you feel very tired
- an increased risk of getting pregnant even if you're taking birth control pills

Women who take Actos, Avandia, or combination diabetes pills containing pioglitazone or rosiglitazone may have an increased risk of bone fractures.

If you take Actos or Avandia, your health care provider should make sure your liver is working properly. Call your doctor right away if you have any signs of liver disease: nausea, vomiting, stomach pain, tiredness, dark-colored urine, or loss of appetite.

Combination Diabetes Pills

Many people with diabetes need more than one medicine to control their diabetes. If you need more than one type of diabetes pill, your health care provider may prescribe a combination pill. Combination pills contain two different types of diabetes medicines, so you can take one pill instead of two separate pills.

Combination pills available include the following:

<p>See warning below; these medicines contain pioglitazone (Actos):</p> <ul style="list-style-type: none"> ● Actoplus Met ● Actoplus Met XR ● Duetact 	<p>See warning below; these medicines contain rosiglitazone (Avandia):</p> <ul style="list-style-type: none"> ● Avandamet ● Avandaryl 	<ul style="list-style-type: none"> ● Glucovance ● Janumet ● Metaglip
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If you are currently taking a combination diabetes pill containing one of the thiazolidinedione medicines—pioglitazone (Actos) or rosiglitazone (Avandia): See the U.S. Food and Drug Administration (FDA) announcements on the next pages about these pills.

Discuss treatment options with your doctor before stopping your diabetes medicines. Stopping your diabetes medicines without talking with your doctor can cause serious short-term health problems and could increase the risk of long-term diabetes-related complications.

See Insert J for more information about the thiazolidinedione medicines.

In June 2011, the FDA warned that use of Actos for more than 1 year may be associated with an increased risk of bladder cancer. The FDA recommended that people receiving treatment for bladder cancer should not take Actos, and Actos should be used with caution in people with a history of bladder cancer. This warning also applies to combination diabetes pills containing pioglitazone—Actoplus Met, Actoplus Met XR, and Duetact.

Visit www.fda.gov/Drugs/DrugSafety/ucm259150 or call the FDA at 1-888-INFO-FDA (1-888-463-6332) for more information about the FDA's warning on the use of Actos.

In September 2010, the FDA announced that access to Avandia would be restricted because of studies linking Avandia to an increased risk of cardiovascular events, such as heart attacks. In May 2011, the FDA announced new restrictions on the use and distribution of Avandia and combination diabetes pills containing rosiglitazone.

After November 18, 2011, Avandia and the combination diabetes pills Avandamet and Avandaryl will no longer be available through retail pharmacies. Health care providers and patients must enroll in a special program in order to prescribe and receive these medicines.

Visit www.fda.gov/Drugs/DrugSafety/ucm255005 or call the FDA at 1-888-INFO-FDA (1-888-463-6332) for more information about the FDA's restrictions on the use of Avandia.

Brand Name	Generic Name
<input type="checkbox"/> Actoplus Met (AK-toh-pluhss)(met) <input type="checkbox"/> Actoplus Met XR <input type="checkbox"/> Avandamet (uh-VAN-duh-met)	<input type="checkbox"/> pioglitazone (py-oh-GLIH-tuh-zohn) + metformin (met-FOR-min) <input type="checkbox"/> rosiglitazone (rohss-ih-GLIH-tuh-zohn) + metformin (met-FOR-min)

What does this type of pill do?

Actoplus Met, Actoplus Met XR, and Avandamet are a combination of two types of pills. One type lowers the amount of glucose made by your liver. Both types help your insulin work the way it should. Actoplus Met XR contains an extended release form of metformin along with pioglitazone.

To learn more about the types of pills in Actoplus Met, Actoplus Met XR, and Avandamet, see

- Insert J for information about pioglitazone and rosiglitazone (thiazolidinediones)
- Insert E for information about metformin (a biguanide)

Brand Name	Generic Name
<input type="checkbox"/> Avandaryl (uh-VAN-duh-ril)	<input type="checkbox"/> rosiglitazone (rohss-ih-GLIH-tuh-zohn) + glimepiride (gly-MEP-ih-ryd)
<input type="checkbox"/> Duetact (DOO-uh-tak)	<input type="checkbox"/> pioglitazone (py-oh-GLIH-tuh-zohn) + glimepiride (gly-MEP-ih-ryd)

What does this type of pill do?

Avandaryl and Duetact are a combination of two types of pills. One type helps your insulin work the way it should. The other type helps your body make more insulin.

To learn more about the types of pills in Avandaryl and Duetact, see

- Insert J for information about pioglitazone and rosiglitazone (thiazolidinediones)
- Insert I for information about glimepiride (a sulfonylurea)

Brand Name	Generic Name
<input type="checkbox"/> Glucovance (GLOO-koh-vanss)	<input type="checkbox"/> glyburide (GLY-buh-ryd) + metformin (met-FOR-min)

What does this type of pill do?

Glucovance is a combination of two types of pills. One type helps your body make more insulin. The other type lowers the amount of glucose made by your liver and helps your insulin work the way it should.

To learn more about the types of pills in Glucovance, see

- Insert I for information about glyburide (a sulfonylurea)
- Insert E for information about metformin (a biguanide)

Brand Name	Generic Name
<input type="checkbox"/> Janumet (JAN-yoo-met)	<input type="checkbox"/> sitagliptin (sih-tuh-GLIP-tin) + metformin (met-FOR-min)

What does this type of pill do?

Janumet is a combination of two types of pills. One type helps your body make more insulin when it's needed, especially right after meals. It also helps keep your liver from putting stored glucose into your blood. The other type lowers the amount of glucose made by your liver and helps your insulin work the way it should.

To learn more about the types of pills in Janumet, see

- Insert G for information about sitagliptin (a DPP-4 inhibitor)
- Insert E for information about metformin (a biguanide)

Brand Name	Generic Name
<input type="checkbox"/> Metaglip (MET-uh-glip)	<input type="checkbox"/> glipizide (GLIP-ih-zyd) + metformin (met-FOR-min)

What does this type of pill do?

Metaglip is a combination of two types of pills. One type helps your body make more insulin. The other type lowers the amount of glucose made by your liver and helps your insulin work the way it should.

To learn more about the types of pills in Metaglip, see

- Insert I for information about glipizide (a sulfonylurea)
- Insert E for information about metformin (a biguanide)

Amylin (AM-ih-lin) Mimetic (mih-MET-ik)

Brand Name	Generic Name
<input type="checkbox"/> Symlin (SIM-lin)	<input type="checkbox"/> pramlintide (PRAM-lin-tyd) acetate (ASS-ih-tayt)

What does this medicine do?

Symlin helps keep your blood glucose from going too high after you eat, a common problem in people with diabetes. It works by helping food move more slowly through your stomach. Symlin helps keep your liver from putting stored glucose into your blood. It also may prevent hunger, helping you eat less and maybe lose weight.

Symlin is for people who already take insulin. However, you should always use a separate syringe to inject Symlin. Symlin is not used in place of insulin. But taking Symlin may change the amount of insulin you take.

Who should not take Symlin?

Talk with your doctor about whether you should take this type of medicine if

- you can't tell when you are having low blood glucose, a condition called hypoglycemia unawareness

- you have recently had severe low blood glucose
- you have stomach problems caused by diabetes-related nerve damage
- you are pregnant, planning to get pregnant, or breastfeeding

Symlin has not been studied for use in children.

There may be times when you should not take your usual dose of Symlin. If you're having surgery or you're sick and can't eat, you should not take your Symlin. Ask your doctor about other times to not take it.

What are the possible side effects?

Symlin can cause

- nausea and vomiting—most often when you first start taking Symlin
- swelling, redness, or itching of the skin where Symlin is injected
- headache
- decreased appetite

- stomach pain and indigestion
- tiredness
- dizziness

This type of medicine doesn't cause low blood glucose by itself. But your risk of having low blood glucose is higher because Symlin is always taken along with insulin.

Incretin (in-KREE-tin) Mimetic (mih-MET-ik)

Brand Name	Generic Name
<input type="checkbox"/> Byetta (by-YAY-tuh)	<input type="checkbox"/> exenatide (eks-EN-uh-tyd)

What does this medicine do?

Byetta helps your body make more insulin when it's needed. It helps keep your blood glucose from going too high after you eat, a common problem in people with diabetes. It works by helping food move more slowly through your stomach. Byetta helps keep your liver from putting stored glucose into your blood. It also may prevent hunger, helping you eat less and maybe lose weight.

Byetta is not used in place of insulin.

Who should not take Byetta?

Talk with your doctor about whether you should take this type of medicine if

- you have severe stomach or digestive problems
- you have any symptoms of kidney disease or are on dialysis

- you are pregnant, planning to get pregnant, or breastfeeding
- you have type 1 diabetes

Byetta has not been studied for use in children.

What are the possible side effects?

Byetta can cause

- nausea and vomiting—most often when you first start taking Byetta
- headache
- diarrhea
- dizziness

Byetta also can cause an acid stomach or make you feel nervous.

If you take Byetta: What you need to know about problems with your kidneys

Talk with your doctor right away if you notice any of the following:

- changes in the color of your urine, how often you urinate, or the amount you urinate
- swelling of your hands or feet
- tiredness
- changes in your appetite or digestion
- a dull ache in your mid to lower back

This type of medicine doesn't cause low blood glucose by itself. But your risk of having low blood glucose goes up if you also take

- diabetes pills that cause low blood glucose
- insulin

Your doctor may ask you to take a lower dose of your other diabetes medicines while you take this type of medicine.

About Low Blood Glucose

What is low blood glucose?

Low blood glucose, also called hypoglycemia (HY-poh-gly-SEE-mee-uh), is when your blood glucose is lower than normal. Blood glucose is too low when it's below 70 mg/dL. If you don't eat or drink something to bring your blood glucose level back to normal, you could pass out. Then you might need emergency treatment at a hospital. If you have low blood glucose several times a week, tell your doctor or diabetes educator. You might need a change in your diabetes medicines, meal plan, or activity routine.

What can cause low blood glucose?

Diabetes Medicines

Some diabetes medicines can cause low blood glucose if there isn't a balance between your medicines, food, and activity. Ask your doctor whether your diabetes medicines can cause low blood glucose.

Other diabetes medicines do not cause low blood glucose on their own. But when they are taken with certain other diabetes medicines, they can increase the risk of low blood glucose.

Other Causes of Low Blood Glucose

Low blood glucose can happen if you skip or delay a meal, eat too little at a meal, get more exercise than usual, or drink alcoholic beverages on an empty stomach.

How will I feel if I have low blood glucose?

Low blood glucose can make you feel

- hungry
- shaky
- confused
- dizzy
- sweaty
- anxious
- nervous
- sleepy
- weak

Low blood glucose can also happen while you sleep. You might cry out or have nightmares, sweat a lot, feel tired or confused when you wake up, or have a headache when you wake up.

What should I do if I have low blood glucose?

Follow these steps:

1. If you feel like your blood glucose is low, check your blood glucose level with your blood glucose meter.
2. If your blood glucose is below 70 mg/dL, have a serving of a “quick fix” food or drink right away. See the list of **Quick-fix Foods and Drinks for Low Blood Glucose** on the next page. If you can’t check your blood glucose but you feel like your blood glucose level is low, have something from the quick-fix list.
3. After 15 minutes, check your blood glucose again. If it’s still below 70 mg/dL, have another serving of a quick-fix food or drink.
4. Check your blood glucose again 15 minutes later. If it’s 70 mg/dL or above, you’ll feel better soon. If your blood glucose is still low, have another serving of a quick-fix food or drink. Keep doing so until your blood glucose is 70 mg/dL or above.
5. When your blood glucose has reached 70 mg/dL or above, think about when your next meal will be. If it will be more than an hour before your next meal, have a snack.

Quick-fix Foods and Drinks for Low Blood Glucose

- 3 or 4 glucose tablets
- 1 serving of glucose gel—the amount equal to 15 grams of carbohydrate
- 1/2 cup (4 ounces) of any fruit juice
- 1/2 cup (4 ounces) of a regular—**not diet**—soft drink
- 1 cup (8 ounces) of milk
- 5 or 6 pieces of hard candy
- 1 tablespoon of sugar or honey

Always carry a quick-fix food or drink. You also can keep quick-fix foods in your car, at work, or wherever you go. Then you'll be ready to take care of yourself if your blood glucose dips too low.



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