



CLASS Action

There are now five classes of diabetes pills and several combination oral meds as well. Each has a different way of helping you control your diabetes.

CLASS ACTION

BY MARIE MCCARREN

With type 1 diabetes, the root of the problem is clear: The pancreas no longer makes any insulin.

Type 2 diabetes is not as easy to understand. If you're a typical person with type 2, your blood glucose levels are high because you have:

- A pancreas that doesn't make enough insulin to control your blood glucose
- A liver that releases glucose inappropriately
- Muscle cells that don't easily take in glucose

Here's how things worked *before* you developed type 2 diabetes:

You ate. Your blood glucose level started to go up. When your pancreas sensed the glucose, it sent out insulin. When your muscle and fat cells sensed the insulin, they let in glucose.

Your liver helped control your blood glucose levels, too. It tracked insulin levels in your blood. Under normal conditions, when there was insulin in your blood, glucose levels were high, too. Your liver would say, "Oh, good, the body just ate. No need for me to send out glucose."

But when you didn't eat for hours (like when you were sleeping), your liver sensed the lack of insulin in your blood. It then released glucose to keep your level from dropping too low.

But today you have type 2 diabetes. If your diabetes is typical, it began like this:

You'd eat. Your blood glucose levels would go up. Your pancreas would put out the right amount of insulin. But your muscle cells couldn't sense the insulin.

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GARRY GAY/GETTY IMAGES



Class
Thiazolidinediones (TZDs)

Main Site of Action
Muscle cells

How They Control Blood Glucose
Make muscle cells more sensitive to insulin.

Class
Sulfonylureas

Main Site of Action
Pancreas

How They Control Blood Glucose
Stimulate pancreas to secrete more insulin.

Class
Meglitinides

Main Site of Action
Pancreas

How They Control Blood Glucose
Stimulate pancreas to secrete more insulin, much like sulfonylureas, but are shorter in action.

Class
Biguanides

Main Site of Action
Liver

How They Control Blood Glucose
Keep the liver from releasing too much glucose, and also make muscle cells more sensitive to insulin.

Class
alpha-Glucosidase Inhibitors

Main Site of Action
Intestine

How They Control Blood Glucose
Slow the digestion of some carbohydrates. After-meal blood glucose peaks aren't as high.

Where The Drugs Work

Different classes of oral agents for type 2 diabetes help control blood glucose levels in different ways.

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So they didn't take in much glucose.

Your liver may have failed to sense the insulin, too. It would think, "Hmm, no insulin means the body hasn't eaten recently. I'd better put out glucose."

Your pancreas would sense that there was still a lot of glucose in your blood, so it would produce extra insulin. This may have gone on for years. When your system could no longer keep up with the extra demand, your blood glucose levels went up and stayed up. And you were told you had diabetes.

So type 2 diabetes involves several problems, and there are a number of potential solutions. One may be insulin injections. These can overcome insulin resistance. There are also five classes of diabetes pills. Each class acts in a different way to control blood glucose levels. (See the illustration on page RG11 for more on how each class works.)

Many people benefit from taking two or more diabetes drugs, each of which addresses a different problem. Such combination therapy is so common that some drug companies now market combination pills. (See "Combination Pills," at lower right.)

No matter which diabetes pill you use, you'll still also need insulin—whether natural or injected—in your body to move glucose into your cells **A**

Marie McCarren is the author of A Field Guide To Type 2 Diabetes. She lives in Arnold, Md.

ORAL AGENTS FOR TYPE 2

Class	Generic Name	Available as a Generic	Brand Names
alpha-Glucosidase Inhibitors	acarbose	no	Precose
	miglitol	no	Glyset
Biguanides	metformin	yes	Glucophage
	metformin (long-acting)	yes	Glucophage XR
	metformin (liquid)	no	Riomet
Meglitinides <i>These drugs could cause low blood glucose, but the risk is lower than with sulfonylureas.</i>	nateglinide	no	Starlix
	repaglinide	no	Prandin
Sulfonylureas <i>These drugs can cause low blood glucose.</i>	acetohexamide	yes	generic only
	chlorpropamide	yes	Diabinese
	glimepiride	no	Amaryl
	glipizide	yes	Glucotrol
	glipizide (long-acting)	yes	Glucotrol XL
	glyburide	yes	DiaBeta, Micronase
	glyburide (micronized)	yes	Glynase PresTab
	tolazamide	yes	generic only
	tolbutamide	yes	generic only
Thiazolidinediones <i>TZDs</i>	pioglitazone	no	Actos
	rosiglitazone	no	Avandia
Combination Pills	metformin + glyburide	yes	Glucovance
	metformin + rosiglitazone	no	Avandamet
	metformin + glipizide	no	Metaglip

Comments/Cautions

Take with the first bite of each meal. **Advantages:** Acarbose and miglitol don't cause weight gain. **Side effects** include gas, bloating, and diarrhea. To minimize side effects, ask your doctor about starting with a low dose and building up slowly. **Who Shouldn't Take:** Because these medications work directly in the intestines, people with inflammatory bowel disease, other intestinal diseases, or obstructions should not take them. **Hypoglycemia:** Acarbose and miglitol don't cause hypoglycemia (low blood glucose) when used alone. When used in combination with certain other diabetes medications, hypoglycemia can occur. In these cases, *treat hypoglycemia with pure glucose*, such as glucose tablets or gels. Acarbose and miglitol slow the breakdown of many other carbohydrates, so those carbs won't work as fast to treat a low blood glucose.

Advantages: Metformin doesn't promote weight gain and may improve cholesterol levels. Common **side effects** when starting metformin are nausea, diarrhea, or loss of appetite, but these should subside within a few weeks. To minimize these side effects, take with meals. **Lactic acidosis** is a rare but serious side effect of using metformin. This can occur in people whose kidneys don't function well or who have severe respiratory disease. Metformin may not be right for you if you have kidney problems, severe respiratory problems, if you are 80 or older, if you are taking medication for heart failure, if you have a history of liver disease, if you drink alcohol excessively, or if you are hospitalized. If you are scheduled for any medical testing or surgical procedures where you will have to fast or have an iodinated dye injected into your veins, you must inform the doctor in charge that you take metformin.

Take right before meals. Don't take either drug if you are skipping a meal.

Longest-acting drug in this class, so it has a higher potential to cause low blood glucose. Not recommended for elderly patients and those with kidney disease. May cause low blood sodium levels, jaundice, and possibly skin rashes.

Probably safe in people with kidney disease, but a patient with kidney disease or who is elderly should be started on a lower-than-usual dose.

Appears to be more effective when taken a half hour before meals.

Can be taken with a meal.

Intermediate-acting, but effects may last entire day.

More readily absorbed than regular glyburide, so the strengths of the tablets are different.

Patients with kidney disease may need smaller doses.

Short-acting sulfonylurea. Less potential for low blood glucose. May be good choice for elderly patients or those with liver or kidney disease. Not a good choice if you often forget to take pills.

Often used in combination with other medications but may be used alone. Typically takes 4–6 weeks to see an effect on your blood glucose. May cause weight gain. **Liver Tests:** Another drug in this class (troglitazone, Rezulin) was taken off the market due to reports of serious liver damage. Your doctor may check your liver function prior to starting these medications and periodically throughout your treatment. Symptoms of liver damage include nausea, vomiting, abdominal pain, fatigue, loss of appetite, and dark urine. Call your doctor immediately if you experience any of these symptoms. **Who Shouldn't Take:** These medications may cause fluid retention or swelling. Therefore, they are not recommended for people with heart failure. **Women:** These medications may cause women who are not ovulating and haven't gone through menopause to begin ovulating again, enabling them to conceive. Also, oral contraceptives may be less effective when taking this medication. Women should discuss this issue with their doctors.

See cautions for each drug in the combination, above.