





How Does Metformin Work? Here's What You Need to Know

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How Does Metformin Work?

Metformin is a type of drug used to treat [Type 2 diabetes](#). It belongs to a class of drugs known as biguanides and works in two main ways to help control blood sugar for those with Type 2 diabetes.

First, it regulates the amount of sugar released by the liver into the blood. However, it also helps the body respond better to [insulin](#), which in turn helps it remove sugar from the blood. In these two ways, metformin is able to help many people better regulate their blood sugar levels.

Let's take a deeper look at the drug millions of people rely on each day to live a normal life.

What does Metformin Do?

At a high level, Metformin regulates blood sugar levels by decreasing glycogenesis

and increasing insulin sensitivity. Let's take a deeper dive and take a look at how that works exactly.

Metformin's Mechanism of Action

[Metformin's mechanism of action](#) is rather interesting and unique from the other types of antihyperglycemic drugs.

In fact, there are various mechanisms of action the drug could take to treat type 2 diabetes, which include:

- Decreasing blood sugar levels by decreasing glycogenesis
- Increasing insulin sensitivity by increasing its uptake and utilization
- Decreasing intestinal insulin absorption – metformin does this by intensifying anaerobic glucose

The primary area of action for the drug is in the mitochondrion. Organic cation 1 is responsible for the uptake of metformin in the hepatocytes and metformin inhibits the mitochondrial complex 1 activity.

How? The drug has a positive charge; thus, it easily accumulates in the mitochondrion. By inhibiting the activity of the mitochondrial complex, it prevents mitochondrial ATP production, leading to increased levels of cytoplasmic ADP.

Metformin Weight Loss

There is no clear relationship between metformin and weight, either gain or loss. But some theories support the claim that metformin helps with weight loss.

Reduced hunger is one theory that explains weight fluctuation in patients with type 2 diabetes under metformin. The drug affects hunger patterns, causing reduced appetite. It might not appear as if you are taking fewer amounts of food, but you do while under metformin medication. For instance, the number of calories you consume over breakfast, lunch, or dinner will likely be lower than normal, if you're less hungry. This subtle change in appetite and diet could be the reason for the gradual weight loss you might experience.

Other side effects e.g., upset stomach and diarrhea can affect your appetite as well. Although metformin is associated with weight loss, the amount of weight you lose may be less than what you expect. For this reason, a type 2 diabetic patient shouldn't abuse metformin in the name of losing weight.

Metformin Dosage

Metformin dosage varies with age and how quickly you want it to elicit its effect. The maximum dosage for the drug is 2500mg a day, according to [Mayo Clinic](#). However, the number of tablets might change due to different brand packages that come in different strengths.

There are two dosage types for metformin based on the desired effect:

Immediate release – The initial dose is 500mg twice daily. You can also choose to take an 850mg tablet once daily, orally.

Extended-release – The initial dose is between 500mg and 1000mg metformin daily, taken orally. Your doctor will provide a prescription for the amount to take depending on the sugar levels in your bloodstream.

Patients under immediate release dosage can switch to extended-release once daily. However, it's critical to adhere to the maximum dosage.

[Your doctor](#) may also advise that you take metformin with food or during meals to help with tolerance.

Metformin for PCOS polycystic ovary syndrome

Metformin can also be used for the [treatment of PCOS](#). People suffering from PCOS also suffer insulin resistance, and metformin's mode of action is to improve insulin sensitivity. Metformin can be a very effective ovulation induction agent as well. This is more effective in non-obese women with PCOS. It also offers an advantage over the preferred treatment for anovulatory fertility such as clomiphene.

It's important to note the FDA has not yet approved metformin for the treatment of PCOS. However, if insulin resistance is serious, your doctor could recommend

metformin as a preventive measure.

Metformin and Alcohol

Metformin and alcohol are a dangerous combination, and doctors caution against drinking alcohol on metformin. One of the side effects of taking metformin is an increase in the production of lactic acid. Lactic acid is a chemical byproduct as the body uses up energy. When you combine metformin and alcohol, the body cannot get rid of lactic acid as quickly. Because metformin increases lactic acid production, lactic acidosis can occur.

Lactic acidosis is serious and can cause serious damage to the heart, lungs, and blood vessels. If not treated, it can lead to death. In case you combine the two, be on the lookout for the following symptoms of lactic acidosis:

- Unusual severe pain in muscles. This pain could be sudden.
- Dizziness
- Weakness
- Lightheadedness
- Increased heart rate
- Stomach discomfort

In addition, metformin reduces appetite, and drinking on an empty stomach causes hypoglycemia, which counters the drug's effect.

Foods to Avoid When Taking Metformin

Unlike many medications, metformin does not require you to avoid any food. Type 2 diabetes is the leading type of diabetes in the United States of America. The American Diabetes Association has approved metformin as the first-line mode of treatment for this type of diabetes. Furthermore, metformin is not associated with any form of weight gain, like other diabetes medicines.

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