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Diabetic ketoacidosis

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Overview

Diabetic ketoacidosis is a serious health condition that can happen as a result of diabetes. It can be life-threatening.

The condition develops when the body can't make enough insulin. Insulin plays a key role in helping blood sugar, also called glucose, enter cells in the body. Glucose is a major source of energy for muscles and other tissues.

Without enough insulin, the body begins to break down fat as fuel. This causes a buildup of acids in the blood. Those acids are called ketones. If it's not treated, the buildup can lead to diabetic ketoacidosis.

If you have diabetes or you're at risk of diabetes, learn the warning signs of diabetic ketoacidosis and when to seek emergency care.

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Symptoms

Diabetic ketoacidosis symptoms often come on quickly, sometimes within 24 hours. For some, these symptoms may be the first sign of diabetes. Symptoms might include:

- Being very thirsty.
- Urinating often.
- Feeling a need to throw up and throwing up.
- Having belly pain.
- Being weak or tired.
- Being short of breath.
- Having fruity-scented breath.
- Being confused.

More-certain signs of diabetic ketoacidosis show up in home blood and urine test kits. They include:

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When to see a doctor

If you feel ill or stressed or you've had a recent illness or injury, check your blood sugar level often. You also might need to check for urine ketones. You can get a test kit at a drugstore.

Contact your healthcare professional right away if:

- You're throwing up and can't keep down food or liquid.
- Your blood sugar level is higher than your target range and doesn't go down after treatment at home.
- Your urine ketone level is moderate or high.

Seek emergency care if:

- Your blood sugar level is higher than 300 milligrams per deciliter (mg/dL), or 16.7 millimoles per liter (mmol/L) for more than one test.
- You have ketones in your urine and can't reach your healthcare professional for advice.
- You have many symptoms of diabetic ketoacidosis. These include being very thirsty, urinating often, feeling a need to throw up or throwing up, belly pain, weakness or tiredness, shortness of breath, fruity-scented breath, and confusion.

It's important to get care right away. If it's not treated, diabetic ketoacidosis can lead to death.

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Causes

The cause of ketoacidosis is not having enough insulin in the body. Without enough insulin, the body can't use the sugar in your blood, also called glucose, to make the energy it needs. Glucose is a main source of energy for the cells that make up muscles and other tissues. Insulin helps glucose enter the cells.

Without enough insulin, the body releases hormones that break down fat. The body tissues use the fat as a form of fuel. This process makes acids known as ketones. Ketones build up in the blood and then go into the urine.

Diabetic ketoacidosis most often happens after:

- **An illness.** An infection or other illness can cause the body to make higher levels of certain hormones, such as adrenaline or cortisol. These hormones work against the effects of insulin. Pneumonia and urinary tract infections are common illnesses that can lead to diabetic ketoacidosis.
- **A problem with insulin therapy.** Missed insulin treatments can result in too little insulin in the body. Not enough insulin therapy or an insulin pump that doesn't work also can lead too little insulin in the body.

Other things that can lead to diabetic ketoacidosis include:

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- Heart attack or stroke.
- Swelling and irritation of the pancreas, called pancreatitis.
- Pregnancy.
- Alcohol or drug misuse, particularly cocaine.
- Certain medicines, such as corticosteroids and some water pills called diuretics.

Risk factors

The risk of diabetic ketoacidosis is highest if you:

- Have type 1 diabetes.
- Often miss insulin doses.

Sometimes, diabetic ketoacidosis happens with type 2 diabetes. Diabetic ketoacidosis may be the first sign of having diabetes.

Complications

The most common health concerns that happen because of diabetic ketoacidosis are related to treatment with fluids, minerals called electrolytes and insulin. These treatment complications include:

- **Low blood sugar, also called hypoglycemia.** Insulin allows sugar to enter cells. This causes the blood sugar level to drop. If the blood sugar level drops too quickly, the drop can lead to low blood sugar.
- **Low potassium, also called hypokalemia.** The fluids and insulin used to

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keep this from happening, potassium and other minerals most often are given with fluid replacement as part of diabetic ketoacidosis treatment.

- **Swelling in the brain, also called cerebral edema.** Changing the blood sugar level too quickly can cause the brain to swell. This tends to be more common in children, especially in those with newly diagnosed diabetes.

Without treatment, diabetic ketoacidosis can lead to loss of consciousness and, in time, death.

Prevention

There are many ways to prevent diabetic ketoacidosis.

- **Manage your diabetes.** Make healthy eating and physical activity part of your daily life. Follow your diabetes care team's directions for taking diabetes medicines or insulin.
- **Watch your blood sugar level.** You might need to check and record your blood sugar level at least 3 to 4 times a day. Check more often if you're ill or stressed. Careful checking is the only way to make sure that blood sugar level stays within your target range.
- **Adjust your insulin dose as needed.** Talk to your healthcare professional or diabetes educator about how to make your insulin dose work for you. Think about your blood sugar level, what you eat, how active you are and whether you're ill. If your blood sugar level begins to rise, follow your diabetes treatment plan to return your blood sugar level to your target range.
- **Check your ketone level.** When you're ill or stressed, test your urine for extra ketones with a urine ketones test kit. You can buy test kits at a drugstore. If your ketone level is moderate or high, contact your healthcare professional right away or get emergency medical care. If you have low levels of ketones, you may need to take more insulin.

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