



National Digestive Diseases Information Clearinghouse (NDDIC)

A service of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), NIH

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Gastroparesis and Diabetes

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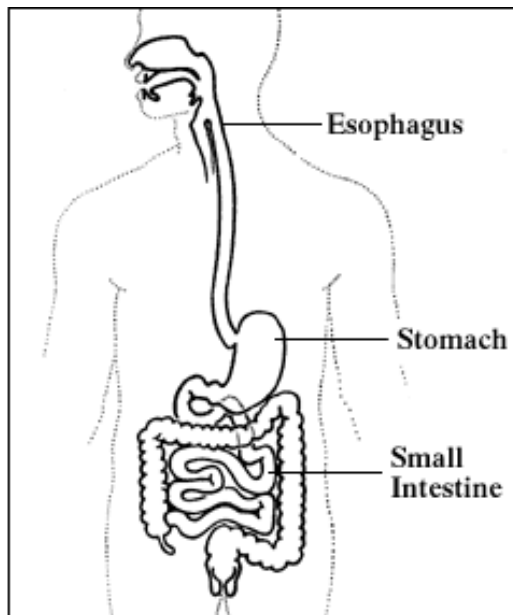
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What is gastroparesis?

Gastroparesis, also called delayed gastric emptying, is a disorder in which the stomach takes too long to empty its contents. It often occurs in people with type 1 diabetes or type 2 diabetes.

Gastroparesis happens when nerves to the stomach are damaged or stop working. The vagus nerve controls the movement of food through the digestive tract. If the vagus nerve is damaged, the muscles of the stomach and intestines do not work normally, and the movement of food is slowed or stopped.

Diabetes can damage the vagus nerve if blood glucose levels remain high over a long period of time. High blood glucose causes chemical changes in nerves and damages the blood vessels that carry oxygen and nutrients to the nerves.



The digestive system

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Signs and Symptoms

Signs and symptoms of gastroparesis are

- heartburn
- nausea
- vomiting of undigested food
- an early feeling of fullness when eating
- weight loss
- abdominal bloating
- erratic blood glucose levels
- lack of appetite
- gastroesophageal reflux
- spasms of the stomach wall

These symptoms may be mild or severe, depending on the person.

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Complications of Gastroparesis

If food lingers too long in the stomach, it can cause problems like bacterial overgrowth from the fermentation of food. Also, the food can harden into solid masses called bezoars that may cause nausea, vomiting, and obstruction in the stomach. Bezoars can be dangerous if they block the passage of food into the small intestine.

Gastroparesis can make diabetes worse by adding to the difficulty of controlling blood glucose. When food that has been delayed in the stomach finally enters the small intestine and is absorbed, blood glucose levels rise. Since gastroparesis makes stomach emptying unpredictable, a person's blood glucose levels can be erratic and difficult to control.

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Major Causes of Gastroparesis

Gastroparesis is most often caused by

- diabetes
- postviral syndromes
- anorexia nervosa
- surgery on the stomach or vagus nerve
- medications, particularly anticholinergics and narcotics (drugs that slow contractions in the intestine)
- gastroesophageal reflux disease (rarely)
- smooth muscle disorders such as amyloidosis and scleroderma
- nervous system diseases, including abdominal migraine and Parkinson's disease
- metabolic disorders, including hypothyroidism

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Diagnosis

The diagnosis of gastroparesis is confirmed through one or more of the following tests.

- **Barium x ray.** After fasting for 12 hours, you will drink a thick liquid called barium, which coats the inside of the stomach, making it show up on the x ray. Normally, the stomach will be empty of all food after 12 hours of fasting. If the x ray shows food in the stomach, gastroparesis is likely. If the x ray shows an empty stomach but the doctor still suspects that you have delayed emptying, you may need to repeat the test another day. On any one day, a person with gastroparesis may digest a meal normally, giving a falsely normal test result. If you have diabetes, your doctor may have special instructions about fasting.
- **Barium beefsteak meal.** You will eat a meal that contains barium, thus allowing the radiologist to watch your stomach as it digests the meal. The amount of time it takes for the barium meal to be digested and leave the stomach gives the doctor an idea of how well the stomach is working. This test can help detect emptying problems that do not show up on the liquid barium x ray. In fact, people who have diabetes-related gastroparesis often digest fluid normally, so the barium beefsteak meal can be more useful.
- **Radioisotope gastric-emptying scan.** You will eat food that contains a radioisotope, a slightly radioactive substance that will show up on the scan. The dose of radiation from the radioisotope is small and not dangerous. After eating, you will lie under a machine that detects the radioisotope and shows an image of the food in the stomach and how quickly it leaves the stomach. Gastroparesis is diagnosed if more than half of the food remains in the stomach after 2 hours.
- **Gastric manometry.** This test measures electrical and muscular activity in the stomach. The doctor passes a thin tube down the throat into the stomach. The

tube contains a wire that takes measurements of the stomach's electrical and muscular activity as it digests liquids and solid food. The measurements show how the stomach is working and whether there is any delay in digestion.

- **Blood tests.** The doctor may also order laboratory tests to check blood counts and to measure chemical and electrolyte levels.

To rule out causes of gastroparesis other than diabetes, the doctor may do an upper endoscopy or an ultrasound.

- **Upper endoscopy.** After giving you a sedative, the doctor passes a long, thin tube called an endoscope through the mouth and gently guides it down the esophagus into the stomach. Through the endoscope, the doctor can look at the lining of the stomach to check for any abnormalities.
- **Ultrasound.** To rule out gallbladder disease or pancreatitis as a source of the problem, you may have an ultrasound test, which uses harmless sound waves to outline and define the shape of the gallbladder and pancreas.

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Treatment

The primary treatment goal for gastroparesis related to diabetes is to regain control of blood glucose levels. Treatments include insulin, oral medications, changes in what and when you eat, and, in severe cases, feeding tubes and intravenous feeding.

It is important to note that in most cases treatment does not cure gastroparesis—it is usually a chronic condition. Treatment helps you manage the condition so that you can be as healthy and comfortable as possible.

Insulin for blood glucose control

If you have gastroparesis, your food is being absorbed more slowly and at unpredictable times. To control blood glucose, you may need to

- take insulin more often
- take your insulin after you eat instead of before
- check your blood glucose levels frequently after you eat and administer insulin whenever necessary

Your doctor will give you specific instructions based on your particular needs.

Medication

Several drugs are used to treat gastroparesis. Your doctor may try different drugs or combinations of drugs to find the most effective treatment.

- **Metoclopramide (Reglan).** This drug stimulates stomach muscle contractions to help empty food. It also helps reduce nausea and vomiting. Metoclopramide is taken 20 to 30 minutes before meals and at bedtime. Side effects of this drug are fatigue, sleepiness, and sometimes depression, anxiety, and problems with physical movement.

- **Erythromycin.** This antibiotic also improves stomach emptying. It works by increasing the contractions that move food through the stomach. Side effects are nausea, vomiting, and abdominal cramps.
- **Domperidone.** The Food and Drug Administration is reviewing domperidone, which has been used elsewhere in the world to treat gastroparesis. It is a promotility agent like metoclopramide. Domperidone also helps with nausea.
- **Other medications.** Other medications may be used to treat symptoms and problems related to gastroparesis. For example, an antiemetic can help with nausea and vomiting. Antibiotics will clear up a bacterial infection. If you have a bezoar, the doctor may use an endoscope to inject medication that will dissolve it.

Meal and Food Changes

Changing your eating habits can help control gastroparesis. Your doctor or dietitian will give you specific instructions, but you may be asked to eat six small meals a day instead of three large ones. If less food enters the stomach each time you eat, it may not become overly full. Or the doctor or dietitian may suggest that you try several liquid meals a day until your blood glucose levels are stable and the gastroparesis is corrected. Liquid meals provide all the nutrients found in solid foods, but can pass through the stomach more easily and quickly.

The doctor may also recommend that you avoid high-fat and high-fiber foods. Fat naturally slows digestion—a problem you do not need if you have gastroparesis—and fiber is difficult to digest. Some high-fiber foods like oranges and broccoli contain material that cannot be digested. Avoid these foods because the indigestible part will remain in the stomach too long and possibly form bezoars.

Feeding Tube

If other approaches do not work, you may need surgery to insert a feeding tube. The tube, called a jejunostomy tube, is inserted through the skin on your abdomen into the small intestine. The feeding tube allows you to put nutrients directly into the small intestine, bypassing the stomach altogether. You will receive special liquid food to use with the tube. A jejunostomy is particularly useful when gastroparesis prevents the nutrients and medication necessary to regulate blood glucose levels from reaching the bloodstream. By avoiding the source of the problem—the stomach—and putting nutrients and medication directly into the small intestine, you ensure that these products are digested and delivered to your bloodstream quickly. A jejunostomy tube can be temporary and is used only if necessary when gastroparesis is severe.

Parenteral Nutrition

Parenteral nutrition refers to delivering nutrients directly into the bloodstream, bypassing the digestive system. The doctor places a thin tube called a catheter in a chest vein, leaving an opening to it outside the skin. For feeding, you attach a bag containing liquid nutrients or medication to the catheter. The fluid enters your bloodstream through the vein. Your doctor will tell you what type of liquid nutrition to use.

This approach is an alternative to the jejunostomy tube and is usually a temporary method to get you through a difficult spell of gastroparesis. Parenteral nutrition is used only when gastroparesis is severe and is not helped by other methods.

New Treatments

A gastric neurostimulator has been developed to assist people with gastroparesis. The battery-operated device is surgically implanted and emits mild electrical pulses that help control nausea and vomiting associated with gastroparesis. This option is available to people whose nausea and vomiting do not improve with medications.

The use of botulinum toxin has been shown to improve stomach emptying and the symptoms of gastroparesis by decreasing the prolonged contractions of the muscle between the stomach and the small intestine (pyloric sphincter). The toxin is injected into the pyloric sphincter.

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Hope Through Research

NIDDK's Division of Digestive Diseases and Nutrition supports basic and clinical research into gastrointestinal motility disorders, including gastroparesis. Among other areas, researchers are studying whether experimental medications can relieve or reduce symptoms of gastroparesis, such as bloating, abdominal pain, nausea, and vomiting, or shorten the time needed by the stomach to empty its contents following a standard meal.

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Points to Remember

- Gastroparesis may occur in people with type 1 diabetes or type 2 diabetes.
- Gastroparesis is the result of damage to the vagus nerve, which controls the movement of food through the digestive system. Instead of the food moving through the digestive tract normally, it is retained in the stomach.
- The vagus nerve becomes damaged after years of poor blood glucose control, resulting in gastroparesis. In turn, gastroparesis contributes to poor blood glucose control.
- Symptoms of gastroparesis include early fullness, nausea, vomiting, and weight loss.
- Gastroparesis is diagnosed through tests such as x rays, manometry, and scanning.
- Treatments include changes in when and what you eat, changes in insulin type and timing of injections, oral medications, a jejunostomy, parenteral nutrition, gastric neurostimulators, or botulinum toxin.

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National Digestive Diseases Information Clearinghouse

2 Information Way
Bethesda, MD 20892–3570
Email: nddic@info.niddk.nih.gov

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National Digestive Diseases Information Clearinghouse
2 Information Way
Bethesda, MD 20892–3570
Phone: 1–800–891–5389
Fax: 703–738–4929
Email: nddic@info.niddk.nih.gov



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