



By: Baharak Moshiree MD MSc, Atrium Health, Carolinas HealthCare System, Digestive Health-Morehead Medical Plaza; Marissa Lombardi, Program Coordinator, IFFGD



International Foundation for Gastrointestinal Disorders (www.iffgd.org)

🕒 Reading time: 11 minutes © Copyright 2022 by the International Foundation for Gastrointestinal Disorders

Definitions

Cystic fibrosis (CF) is a disease, passed down from parents or other family members, affecting cells that produce mucus in the lungs or the digestive system. CF causes mucus or fluids to become thicker than normal inside the lungs and gut. This causes body passageways to become plugged up, causing damage to these organs. In addition, CF can have an effect on gastrointestinal (GI) motility, causing the stomach, small bowel and colon to slow down. This is called GI dysmotility.

Motility is the movement of food through the body’s GI tract.

Dysmotility occurs with a change in speed, coordination, and/or strength of contractions in the walls of digestive organs.

Gastroparesis (GP) is when the stomach, specifically, slows down its movement.

To ensure that GP is causing the stomach to slow down, a healthcare provider may do tests to ensure nothing is blocking the stomach from emptying. Healthcare providers often refer to GP as *delayed gastric emptying*. This is a disorder where the stomach does not empty food as quickly as it should. Normally, the stomach empties its contents into the small intestines in a controlled way. The speed on this process depends on the contents of the meal eaten; whether it is fat, carbohydrate or composed of mostly protein. In GP, the muscles, or nerves responsible for moving food along the GI tract do not work properly. This causes the stomach to empty too slowly or stop moving all together.

The **GI tract** includes all digestive organs from the mouth to the anus.

Overlap of Cystic Fibrosis (CF) and Gastroparesis (GP)

Research has shown that about 38% of people with CF also have GP. According to The National Institutes Diabetes and Digestive and Kidney Diseases (NIDDK), about 10 men and 38 women of every 100,000 people have GP. The impact that GP has on a person depends on multiple factors which include gender, body mass,

symptoms, and the degree of stomach delay.

Gastroparesis Symptoms

These symptoms may occur in all people with GP, including those living with CF. People with constipation, malnutrition, diabetes (which many patients with CF also have), and lower body mass index (BMI) are more

BMI refers to a person’s weight divided by their height. The percentage that is calculated can be used to see if people may be at a higher risk of some health problems.

Malnutrition is the result of not absorbing enough nutrients which occurs in many CF patients, which can be very harmful to the body and quality of life.

The National Institutes Diabetes and Digestive and Kidney Diseases (NIDDK) is a division of the National Institutes of Health (NIH). NIH is the United States leading medical research agency. The NIDDK is an organization within the NIH that focuses on research for diabetes and digestive and kidney diseases.

The NIH and all the organizations within it, works to encourage innovative and creative research strategies to protect and improve health while developing and maintaining resources to ensure the U.S. has the ability to prevent disease. Research through the NIH is intended to expand knowledge in medical and related sciences with a high return on public research investments.

likely to develop GP.

- **Abdominal pain/discomfort** – dull to sharp pain/discomfort that occurs inside the belly. This is often in the stomach or intestines.
- **Nausea** – a feeling of sickness felt in the abdomen, stomach, chest, or head with feeling the need to vomit.

- **Vomiting** – bringing food back up from the stomach into the mouth.
- **Early satiety** – feeling full after only a small amount of food.
- **Reflux** – a burning feeling in the esophagus.
- **Regurgitation** – bringing contents up through the esophagus from the stomach.
- **Losing weight without intentionally trying.**

Diagnosing Gastroparesis

Diagnosis of GP may begin with various tests. This will determine if there is anything preventing the stomach from emptying properly. These tests will also help to determine if GP is caused by another condition. This may include imaging tests (such as CT scans or x-rays), and an upper endoscopy. An endoscope, a long flexible tube with a camera, is used in an endoscopy. An endoscopy involves placing this tube in the mouth, down the esophagus, and into the stomach and duodenum. The duodenum is the first part of the small intestine. This tube has a camera and light on the end allowing your healthcare provider to see inside your GI tract during the test and make sure an ulcer, cancer or other findings are not the reason for the symptoms noted above.

The tests below are also used to diagnose GP, including for people with CF. A healthcare provider will review how severe symptoms are when choosing a test. Drugs (medications) that are being taken should also be reviewed prior to testing as some of them may interfere with test results.

- **Gastric emptying scintigraphy (GES)** – GES involves eating a meal with a small amount of radioactive substance. This allows images to be taken during digestion, determining the rate of stomach emptying. Typically, the meal includes eggs, butter, jam, and toast. People with allergies to those food will have a modified meal which should contain the same contents and calories of the original standard meal. The test can take between 2 to 4 hours to complete. The test will give the most accurate results if it is done for the full 4 hours.
- **Wireless motility capsule** – This is a piece of equipment in the form of a pill. This pill is swallowed and then travels through the GI tract. It will measure temperature, contractions of the

entire gut as the pill moves down, and the pH levels (acidity or alkalinity) of the GI tract. This information is collected by wearing a receiver over 5 days that records the data. This test also measures the amount of time the GI tract takes as it moves contents through the gut.

- **Gastric emptying breath test (GEBT)** – This test is done by using breath samples that are collected. To begin the test the patient eats a meal that contains a nonradioactive ingredient. This allows the food to be tracked and measured in your breath over a few hours. This test can be done in a doctor's office or at home and can show how quickly the stomach empties.
- **Other testing for gastroparesis is in development and many have not yet been standardized.**

Treatment Considerations for Gastroparesis with Cystic Fibrosis

People with CF and GP will need a carefully chosen treatment plan. This makes it more important for patients to talk about symptoms and concerns with their healthcare provider. Treatment options and symptom management should be unique to each person. A diagnosis of GP can have a significant impact on the treatment and care of CF patients. Symptoms related to GP and CF can lessen quality of life and nutrient intake. Severe GP symptoms can prevent some people from taking drugs by mouth and therefore a feeding tube may be needed in some patients. People with even milder GP symptoms may not properly absorb drugs because of the slowed movement.

Drugs used to treat the pain or allergy symptoms of CF may negatively affect the GI tract and delay stomach emptying. This is especially harmful for people diagnosed with GP. Patients with CF may be prescribed two different types of drugs that can slow down the rate the stomach empties. These are:

- **Opiates** – This is a class of drugs that are used to treat pain. They are heavily controlled prescription drugs including oxycodone, hydrocodone, and fentanyl.
- **Anticholinergics** – These are drugs used to treat allergies. One example of this type of medication is diphenhydramine.

Treatment of Gastroparesis

Treatment of GP in CF is not any different from treatment of GP due to other conditions. Treatment of GP and CF will vary from person to person. The treatment options listed below may also be used by all people with GP, including those who also have CF. Careful discussion between patients and their healthcare providers will help find the treatment options that are best for each patient.

- **Prokinetics** – These drugs may speed up the movement of food through the GI tract. This occurs by increasing the strength and number of muscle contractions. This type of drug may also be referred to as a pro-motility agent.

- **Metoclopramide** - The only Food and Drug Administration (FDA) approved treatment for GP is metoclopramide. Metoclopramide is now available in three forms, a pill to swallow, nasal spray, and a shot (given in the muscle). Drugs approved by the FDA have been deemed safe, with benefits outweighing possible risks. This is done after reviewing studies and tests that have been done on a drug. However, this drug also has a black box warning which highlights risk of tremors and what is called tardive dyskinesia- uncontrolled muscle movements of the face and upper limbs. This is similar to that seen in a patient with Parkinson’s disease. For this reason, patients over age of 65 cannot be prescribed this medication for longer than 3 months.

A **black box warning** is a strict labeling requirement established by the FDA for medications that have known potential for serious and/or life-threatening adverse events.

- **Ghrelin Agonists** – This drug mimics ghrelin, a natural compound found in the stomach that improves the movement of contents through the stomach. Ghrelin agonists are currently being researched and are not yet available on the market. Current research has shown that these drugs can cause headaches and an increase in appetite.
- **Erythromycin and Azithromycin** – Both of these can speed up the movement of food through the GI tract. These drugs are not approved by

the FDA for use with GP but are used in adults and pediatric patients with these conditions. As they are both antibiotics, caution should be used in long term use to prevent antibiotic resistance. Both drugs also can cause some cardiac arrhythmias. An arrhythmia occurs when the heart beats too fast, too slow, or out of rhythm. However, many patients with CF are already on azithromycin for prevention of pneumonias.

- **Domperidone** – A drug that may improve stomach emptying in some patients. This drug is not available in the U.S., unless approved for use through the FDA’s expanded access program and application process. There are possible serious side effects of this drug.
- **Antiemetics** – These are drugs that block neurotransmitters in the body. This works to ease nausea and vomiting. Neurotransmitters are chemicals that travel through the nervous system and impact body functions. The brain, spinal cord, and nerves make up the nervous system which is a target for many neurotransmitters. These drugs are currently not approved by the FDA for GP treatment, unless short-term use after surgery. A list of these medications is in the table below.
- **Proton Pump Inhibitors (PPI’s)** – These drugs may be recommended for those who have heartburn or who regurgitate their food or acid. This is called gastroesophageal reflux disease (GERD). PPI’s help by affecting the acid making glands within the stomach to reduce the amount of acid they produce. By lowering the amount of acid, food is digested slower too, causing the stomach to empty slower. However, for patients with GERD these are necessary medications.
- **Bethanechol** – This drug works on the lower esophageal sphincter (LES), helping it to contract. The LES is located at the bottom of the esophagus and closes to prevent stomach contents from coming back up into the esophagus. Possible side effects of this drug include diarrhea, abdominal cramping, and flushing (redness of the face and neck).
- **Botulinum Toxin** – Also commonly known as botox, this treatment is injected into the pylorus of the stomach. The pylorus is the last part of the stomach

Drug	Brand name examples
Antiemetics	
Ondansetron	Zuplenz®, Zofran®
Trimethobenzamide	Tigan®
Promethazine	Phenergan®
Prochlorperazine	Compazine®
Granisetron	Kytril®
Proton Pump Inhibitors	
Pantoprazole	Protonix®
Rabeprazole	AcipHex®
Omeprazole	Prilosec OTC®, Zegerid OTC®, OmePPI®
Prokinetics	
Erythromycin	Erythrocin®, EryPed®
Azithromycin	Zithromax®, Z-Pak®
Domperidone*	Motilium®
Bethanechol	Duvoid®, Urecholine®, Myotonachol®

This table does not include all drugs available but can be used as a guide to help discuss treatment options with your healthcare provider.

that connects to the beginning of the small intestine. Although this substance is naturally a harmful toxin, it has many medical uses that are scientifically proven as safe. This toxin blocks the release of the chemical acetylcholine from nerves. This chemical causes smooth muscles, which make up the stomach, to contract. Preventing the stomach from contracting closed can allow food to pass into the stomach easier for those with GP. The only common side effect of this treatment is swelling at the injection site.

- **Dietary management** – Healthcare providers may recommend eating small meals as well as a low fiber or a low residue diet which are more easily digested in patients with GP. Low residue diets leave less contents behind in the GI tract and result in less or smaller bowel movements. Additionally, although most CF patients need to be on a high fat diet given their pancreas issues and inability to absorb fat and many related vitamins, a dietitian can help patients with suggestions for healthy fats that are more readily absorbed and less likely to slow down the stomach. A registered

IFFGD's **Dietitian Listing** is a resource that allows you to search for a dietitian that is in your area and treats specific GI conditions. You can find this resource on www.iffgd.org

dietitian who specializes in GI illnesses can help create an optimal diet for each person.

- **Lifestyle modifications** – If physically possible, it may be helpful to modify some habits after meals. Gentle physical activity such as walking after a meal may help with symptoms. Your healthcare provider may also recommend you avoid lying down for 2 hours after finishing a meal.
- **Feeding tube** – In severe cases of GP a tube may be inserted in the stomach or the small bowel either by endoscopy, surgery or by an interventional radiologist. A 6 to 12-inch tube comes out of the stomach or small intestine to allow foods via a liquid shake and pump as well as your medications to be fed through the tube. This is managed with the support of a doctor and dietitian.
- **Parenteral Nutrition** – In severe GP cases, when feeding by mouth and tube feeding is not possible, an intravenous (IV) catheter may be placed to provide nutrition while avoiding the GI tract. This is usually placed in the arm and is called a PICC line. An IV catheter is a small flexible tube that goes into a vein. Formula placed into the catheter is specially made to provide nutrients that the body does not need to digest. This allows nutrients to go directly into the blood and be absorbed by the body.
- **Other treatment options for GP are in development and may become available in the near future.**

Overlapping Conditions

Particularly in CF, there is also delay seen in other parts of the GI tract which may lead to the following disorders:

- **Gastroesophageal reflux disease (GERD)** – GERD is a common GI condition where patients feel acidic burning in their chest, stomach, and throat. People with GERD may also experience regurgitation which occurs when acidic contents from the stomach come back up through the esophagus. The esophagus is the tube that connects the mouth and stomach.
- **Chronic constipation (CC)** – People with CC experience a variety of symptoms, including:
 - reduced passing of bowel movements (BMs) (Less than three bowel movements per week is considered low. Although, people have

different ranges of what is normal.)

- passing hard or pellet-like BMs and having to strain or overly push to start or complete a BM.
- a sensation that muscles will not relax enough to pass a BM or that a BM did not completely empty the rectum. The rectum is the final portion of the large intestine that holds bowel movements before they are emptied.
- **Distal intestinal obstruction syndrome (DIOS)** – This is an extreme form of constipation specific to CF where BMs block the terminal ileum (end portion of the small intestine). This blockage could even require surgery.

Conclusion

Gastroparesis and Cystic Fibrosis occur together can lead to malnutrition and impaired quality of life. All GI symptoms and concerns must be talked about with a healthcare provider so that the nutrition concerns are addressed and so that patients' daily living can improve. Where a delay in stomach emptying is found, the help of a dietitian should be sought quickly to help improve patient's nutrition. Especially in CF, the risk of pneumonia and worsening lung disease escalates with poor nutrition therefore this is of main concern to pulmonologists who are the lung doctors usually taking care of these patients.

A strong multidisciplinary team approach is vital to taking care of a CF patient. As research into GP and CF continues, we will gain better understanding of these conditions and improve our patients' outcomes. The ultimate goal is to develop a cure for GP and CF. All research toward that cure should also improve patients' symptoms and enhance their quality of life.

About IFFGD

The International Foundation for Gastrointestinal Disorders (IFFGD) is a 501(c)(3) nonprofit education and research organization. We work to promote awareness, scientific advancement, and improved care for people affected by chronic digestive conditions. Our mission is to inform, assist, and support people affected by gastrointestinal disorders. Founded in 1991, we rely on donors to carry out our mission. Visit our websites at: www.iffgd.org or www.AboutGastroparesis.org.

IFFGD

537 Long Point Rd. Suite 101
Mount Pleasant, SC 29464

About the Publication

Opinions expressed are an author's own and not necessarily those of the International Foundation for Gastrointestinal Disorders (IFFGD). IFFGD does not guarantee or endorse any product in this publication, or any claim made by an author and disclaims all liability relating thereto. This article is not intended to replace the knowledge or diagnosis of your healthcare provider. We advise seeing a healthcare provider whenever a health problem arises requiring an expert's care.

For more information, or permission to reprint this article, contact IFFGD by phone at 414-964-1799 or by email at iffgd@iffgd.org.