

Upper GI x-ray

Upper gastrointestinal tract radiography or upper GI uses a form of real-time x-ray called fluoroscopy and a barium-based contrast material to produce images of the esophagus, stomach and small intestine. It is safe, noninvasive, and may be used to help accurately diagnose pain, acid reflux, blood in the stool and other symptoms.

You will be instructed on how to prepare. Your stomach must be empty, so you will likely be told not to eat or drink anything (including oral medications) or chew gum after midnight the night before. Tell your doctor if there's a possibility you are pregnant and discuss any recent illnesses, medical conditions, medications you're taking and allergies, especially to contrast materials. Leave jewelry at home and wear loose, comfortable clothing. You may be asked to wear a gown.



What is an upper GI?

Upper gastrointestinal tract radiography, also called an upper GI, is an x-ray examination of the esophagus, stomach and first part of the small intestine (also known as the duodenum). Images are produced using a special form of x-ray called fluoroscopy and an orally ingested contrast material such as barium.

An x-ray exam helps doctors diagnose and treat medical conditions. It exposes you to a small dose of ionizing radiation to produce pictures of the inside of the body. X-rays are the oldest and most often used form of medical imaging.

Fluoroscopy makes it possible to see internal organs in motion. When the upper GI tract is coated with barium, the radiologist is able to view and assess the anatomy and function of the esophagus, stomach and duodenum.

An x-ray examination that evaluates only the pharynx and esophagus is called a barium swallow.

In addition to drinking barium, some patients are also given baking-soda crystals (similar to Alka-Seltzer) to further improve the images. This procedure is called an air-contrast or double-contrast upper GI.

On occasion, some patients are given other forms of orally ingested contrast, usually containing iodine. These alternative contrast materials may be used if the patient has recently undergone surgery on the GI tract, or has allergies to other contrast materials. The radiologist will determine which type of contrast material will be used.

What are some common uses of the procedure?

An upper GI examination helps evaluate digestive function and can detect:

- ulcers
- tumors
- inflammation of the esophagus, stomach and duodenum

- hiatal hernias
- scarring
- blockages
- abnormalities of the muscular wall of GI tract
- anatomical problems such as intestinal malrotation (a twisting of a baby's intestine)

The procedure is also used to help diagnose the cause of symptoms such as:

- difficulty swallowing
- chest and abdominal pain
- reflux (a backward flow of partially digested food and digestive juices)
- unexplained vomiting
- severe indigestion
- blood in the stool (indicating internal GI bleeding)

How should I prepare?

Your physician will give you detailed instructions on how to prepare for your upper GI.

Tell your doctor about all the medications you take. List any allergies, especially to iodine contrast materials. Tell your doctor about recent illnesses or other medical conditions.

Women should always tell their doctor and technologist if they are pregnant. Doctors will not perform many tests during pregnancy to avoid exposing the fetus to radiation. If an x-ray is necessary, the doctor will take precautions to minimize radiation exposure to the baby. *See the Safety in X-ray, Interventional Radiology and Nuclear Medicine Procedures page (<https://www.radiologyinfo.org/en/info/safety-radiation>) for more information about pregnancy and x-rays.*

To ensure the best possible image quality, your stomach must be empty of food. Therefore, your doctor will likely ask you not to eat or drink anything (including any medications taken by mouth, especially antacids) and to refrain from chewing gum after midnight on the day of the examination.

You may need to remove some clothing and/or change into a gown for the exam. Remove jewelry, removable dental appliances, eyeglasses, and any metal objects or clothing that might interfere with the x-ray images.

What does the x-ray equipment look like?

This exam typically uses a radiographic table, one or two x-ray tubes, and a video monitor. Fluoroscopy converts x-rays into video images. Doctors use it to watch and guide procedures. The x-ray machine and a detector suspended over the exam table produce the video.

How does the procedure work?

X-rays are a form of radiation like light or radio waves. X-rays pass through most objects, including the body. The technologist carefully aims the x-ray beam at the area of interest. The machine produces a small burst of radiation that passes through your body. The radiation records an image on photographic film or a special detector.

Fluoroscopy uses a continuous or pulsed x-ray beam to create images and project them onto a video monitor. Your exam may use a contrast material to clearly define the area of interest. Fluoroscopy allows your doctor to view joints or internal organs in motion. The exam also captures still images or movies and stores them electronically on a computer.

Most x-ray images are electronically stored digital files. Your doctor can easily access these stored images to diagnose and manage your condition.

How is the procedure performed?

A radiologic technologist and a radiologist, a physician specifically trained to supervise and interpret radiology examinations, guide the patient through the upper GI series.

As the patient drinks the liquid barium, which resembles a light-colored milkshake, the radiologist will watch the barium pass through the patient's digestive tract on a fluoroscope, a device that projects radiographic images in a movie-like sequence onto a monitor. The exam table will be positioned at different angles and the patient's abdomen may be compressed to help spread the barium. Once the upper GI tract is adequately coated with the barium, still x-ray images will be taken and stored for further review.

Children usually drink barium contrast material without any objection. If a child will not drink the contrast, the radiologist may need to pass a small tube into the stomach to complete the examination.

Very young children may be placed on a special rotating platform to help turn them into slanted positions. This allows the radiologist to see all the organs. Older children will be asked to hold very still and may be asked to hold their breath for a few seconds while the x-ray pictures are taken.

Older children may undergo a double-contrast upper GI series. The patient will swallow baking-soda crystals that create gas in the stomach while additional x-rays are taken.

When the examination is complete, the technologist may ask you to wait until the radiologist confirms they have all the necessary images.

This exam is usually completed within 20 minutes.

What will I experience during and after the procedure?

Occasionally, patients find the thick consistency of the barium unpleasant and difficult to swallow. The liquid barium has a chalky taste that may be masked somewhat by added flavors such as strawberry or chocolate.

Being tilted on the examination table and having pressure applied to the abdomen can be uncomfortable for some patients. The examination may also make you feel bloated.

If you receive gas-producing crystals, you may feel the need to belch. However, the radiologist or technologist will tell you to try to hold the gas in (by swallowing your saliva if necessary) to enhance the detail on the x-ray images.

In some medical centers, the technologist can minimize patient movement by automatically tilting the examining table. These actions ensure that the barium is coating all parts of the upper GI tract. As the procedure continues, the technologist or the radiologist may ask you to drink more barium. You may hear the mechanical noises of the radiographic apparatus moving into place during the exam.

After the examination, you can resume a regular diet and take orally administered medications unless instructed otherwise by your doctor.

The barium may color your stools gray or white for 48 to 72 hours after the procedure. Sometimes the barium can cause temporary constipation, which is usually treated by an over-the-counter laxative. Drinking large quantities of fluids for several days following the test can also help. If you are unable to have a bowel movement or if your bowel habits undergo any significant changes following the exam, you should contact your physician.

Who interprets the results and how do I get them?

A radiologist (<https://www.radiologyinfo.org/en/info/article-your-radiologist>), a doctor trained to supervise and interpret radiology examinations, will analyze the images. The radiologist will send a signed report to your primary care or referring physician who will discuss the results (<https://www.radiologyinfo.org/en/info/article-read-radiology-report>) with you.

You may need a follow-up exam. If so, your doctor will explain why. Sometimes a follow-up exam further evaluates a potential issue with more views or a special imaging technique. It may also see if there has been any change in an issue over time. Follow-up exams are often the best way to see if treatment is working or if a problem needs attention.

What are the benefits vs. risks?

Benefits

- Upper GI tract radiography is an extremely safe, noninvasive procedure.
- The results of the upper GI series usually lead to accurate evaluation of the esophagus, stomach and duodenum.
- Because barium is not absorbed into the blood, allergic reactions are extremely rare.
- No radiation stays in your body after an x-ray exam.
- X-rays usually have no side effects in the typical diagnostic range for this exam.

Risks

- There is always a slight chance of cancer from excessive exposure to radiation. However, given the small amount of radiation used in medical imaging, the benefit of an accurate diagnosis far outweighs the associated risk.
- The radiation dose for this procedure varies. *See the Radiation Dose in X-Ray and CT Exams* (<https://www.radiologyinfo.org/en/info/safety-xray>) page for more information about radiation dose.
- Occasional patients may be allergic to the flavoring added to some brands of barium. If you have experienced allergic reactions after eating chocolate, certain berries or citrus fruit, be sure to tell your physician or the technologist before the procedure.
- There is a slight chance that some barium could be retained, leading to a blockage of the digestive system. Therefore, patients who have a known obstruction in the GI tract should not undergo this examination.
- Women should always tell their doctor and x-ray technologist if they are pregnant. *See the Safety in X-ray, Interventional Radiology and Nuclear Medicine Procedures* (<https://www.radiologyinfo.org/en/info/safety-radiation>) page for more information about pregnancy and x-rays.

A Word About Minimizing Radiation Exposure

Doctors take special care during x-ray exams to use the lowest radiation dose possible while producing the best images for evaluation. National and international radiology protection organizations continually review and update the technique standards radiology professionals use.

Modern x-ray systems minimize stray (scatter) radiation by using controlled x-ray beams and dose control methods. This ensures that the areas of your body not being imaged receive minimal radiation exposure.

What are the limitations of an upper GI?

Mild irritation of the lining of the stomach or esophagus is difficult to detect, as well as ulcers smaller than 1/4 inch in diameter. The test will detect larger ulcers. It can also suggest the presence of underlying infection with the bacterium, *Helicobacter pylori*,

the most common cause of ulcers; but additional noninvasive tests such as a blood test or breath test may be required to confirm this infection. Finally, biopsies of any abnormal areas cannot be performed with this test.

Disclaimer

This information is copied from the RadiologyInfo Web site (<http://www.radiologyinfo.org>) which is dedicated to providing the highest quality information. To ensure that, each section is reviewed by a physician with expertise in the area presented. All information contained in the Web site is further reviewed by an ACR (American College of Radiology) - RSNA (Radiological Society of North America) committee, comprising physicians with expertise in several radiologic areas.

However, it is not possible to assure that this Web site contains complete, up-to-date information on any particular subject. Therefore, ACR and RSNA make no representations or warranties about the suitability of this information for use for any particular purpose. All information is provided "as is" without express or implied warranty.

Please visit the RadiologyInfo Web site at <http://www.radiologyinfo.org> to view or download the latest information.

Note: Images may be shown for illustrative purposes. Do not attempt to draw conclusions or make diagnoses by comparing these images to other medical images, particularly your own. Only qualified physicians should interpret images; the radiologist is the physician expert trained in medical imaging.

Copyright

This material is copyrighted by either the Radiological Society of North America (RSNA), 820 Jorie Boulevard, Oak Brook, IL 60523-2251 or the American College of Radiology (ACR), 1891 Preston White Drive, Reston, VA 20191-4397. Commercial reproduction or multiple distribution by any traditional or electronically based reproduction/publication method is prohibited.

Copyright © 2022 Radiological Society of North America, Inc.