



## X-ray (Radiography) - Chest

Chest x-ray uses a very small dose of ionizing radiation to produce pictures of the inside of the chest. It is used to evaluate the lungs, heart and chest wall and may be used to help diagnose shortness of breath, persistent cough, fever, chest pain or injury. It also may be used to help diagnose and monitor treatment for a variety of lung conditions such as pneumonia, emphysema and cancer. Because chest x-ray is fast and easy, it is particularly useful in emergency diagnosis and treatment.



This exam requires little to no special preparation. Tell your doctor and the technologist if there is a possibility you are pregnant. Leave jewelry at home and wear loose, comfortable clothing. You may be asked to wear a gown.

## What is a Chest X-ray (Chest Radiography)?

The chest x-ray is the most commonly performed diagnostic x-ray examination. A chest x-ray produces images of the heart, lungs, airways, blood vessels and the bones of the spine and chest.

An x-ray (radiograph) is a noninvasive medical test that helps physicians diagnose and treat medical conditions. Imaging with x-rays involves exposing a part of the body to a small dose of ionizing radiation to produce pictures of the inside of the body. X-rays are the oldest and most frequently used form of medical imaging.

## What are some common uses of the procedure?

The chest x-ray is performed to evaluate the lungs, heart and chest wall.

A chest x-ray is typically the first imaging test used to help diagnose symptoms such as:

- breathing difficulties
- a bad or persistent cough

- chest pain or injury
- fever

Physicians use the examination to help diagnose or monitor treatment for conditions such as:

- pneumonia
- heart failure and other heart problems
- emphysema
- lung cancer
- positioning of medical devices
- fluid or air collection around the lungs
- other medical conditions

## How should I prepare?

A chest x-ray requires no special preparation.

You will be asked to remove some of your clothes and to wear a gown during the exam. You may also be asked to remove jewelry, removable dental appliances, eye-glasses and any metal objects or clothing that might interfere with the x-ray images.

Women should always inform their physician and x-ray technologist if there is any possibility that they are pregnant. Many imaging tests are not performed during pregnancy so as not to expose the fetus to radiation. If an x-ray is necessary, precautions will be taken to minimize radiation exposure to the baby. See the Safety page for more information about pregnancy and x-rays.

## What does the equipment look like?

The equipment typically used for chest x-rays consists of a wall-mounted, box-like apparatus containing the x-ray film, or a special plate that records the image digitally. An x-ray producing tube is positioned about six feet away.

The equipment may also be arranged with the x-ray tube suspended over a table on which the patient lies. A drawer under the table holds the x-ray film or digital recording plate.

A portable x-ray machine is a compact apparatus that can be taken to the patient in a hospital bed or the emergency room. The x-ray tube is connected to a flexible arm that is extended over the patient while an x-ray film holder or image recording plate is placed beneath the patient.

## 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. Once it is carefully aimed at the part of the body being examined, an x-ray machine produces a

small burst of radiation that passes through the body, recording an image on photographic film or a special detector.

Different parts of the body absorb the x-rays in varying degrees. Dense bone absorbs much of the radiation while soft tissue, such as muscle, fat and organs, allow more of the x-rays to pass through them. As a result, bones appear white on the x-ray, soft tissue shows up in shades of gray and air appears black.

On a chest x-ray, the ribs and spine will absorb much of the radiation and appear white or light gray on the image. Lung tissue absorbs little radiation and will appear dark on the image.

Until recently, x-ray images were maintained on large film sheets (much like a large photographic negative). Today, most images are digital files that are stored electronically. These stored images are easily accessible for diagnosis and disease management.

## How is the procedure performed?

Typically, two views of the chest are taken, one from the back and the other from the side of the body as the patient stands against the image recording plate. The technologist, an individual specially trained to perform radiology examinations, will position the patient with hands on hips and chest pressed against the image plate. For the second view, the patient's side is against the image plate with arms elevated.

Patients who cannot stand may be positioned lying down on a table for chest x-rays.

You must hold very still and may be asked to keep from breathing for a few seconds while the x-ray picture is taken to reduce the possibility of a blurred image. The technologist will walk behind a wall or into the next room to activate the x-ray machine.

When the examination is complete, you may be asked to wait until the radiologist determines that all the necessary images have been obtained.

The entire chest x-ray examination, from positioning to obtaining and verifying the images, is usually completed within 15 minutes.

Additional views may be required within hours, days or months to evaluate any changes in the chest.

## What will I experience during and after the procedure?

A chest x-ray examination itself is a painless procedure.

You may experience discomfort from the cool temperature in the examination room and the coldness of the recording plate. Individuals with arthritis or injuries to the chest wall, shoulders or arms may have discomfort trying to stay still during the examination. The technologist will assist you in finding the most comfortable position possible that still ensures diagnostic image quality.

## Who interprets the results and how do I get them?

A radiologist, a physician specifically trained to supervise and interpret radiology examinations, will analyze the images and send a signed report to your primary care or referring physician, who will discuss the results with you.

The results of a chest x-ray can be available almost immediately for review by your physician.

Follow-up examinations may be necessary. Your doctor will explain the exact reason why another exam is requested. Sometimes a follow-up exam is done because a potential abnormality needs further evaluation with additional views or a special imaging technique. A follow-up examination may also be necessary so that any change in a known abnormality can be monitored over time. Follow-up examinations are sometimes the best way to see if treatment is working or if a finding is stable or changed over time.

## What are the benefits vs. risks?

### Benefits

- No radiation remains in a patient's body after an x-ray examination.
- X-rays usually have no side effects in the typical diagnostic range for this exam.
- X-ray equipment is relatively inexpensive and widely available in emergency rooms, physician offices, ambulatory care centers, nursing homes and other locations, making it convenient for both patients and physicians.
- Because x-ray imaging is fast and easy, it is particularly useful in emergency diagnosis and treatment.

### Risks

- There is always a slight chance of cancer from excessive exposure to radiation. However, the benefit of an accurate diagnosis far outweighs the risk.
- The effective radiation dose for this procedure varies. See the Safety page for more information about radiation dose.
- Women should always inform their physician or x-ray technologist if there is any possibility that they are pregnant. See the Safety page for more information about pregnancy and x-rays.

## A Word About Minimizing Radiation Exposure

Special care is taken during x-ray examinations 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 used by radiology professionals.

Modern x-ray systems have very controlled x-ray beams and dose control methods to minimize stray (scatter) radiation. This ensures that those parts of a patient's body not being imaged receive minimal radiation exposure.

## What are the limitations of Chest Radiography?

The chest x-ray is a very useful examination, but it has limitations. Because some conditions of the chest cannot be detected on a conventional chest x-ray image, this examination cannot necessarily rule out all problems in the chest. For example, small cancers may not show up on a chest x-ray. A blood clot in the lungs, a condition called a pulmonary embolism, cannot be seen on chest x-rays.

Further imaging studies may be necessary to clarify the results of a chest x-ray or to look for abnormalities not visible on the chest x-ray.

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