Chest X-ray (Radiography)

This procedure is reviewed by a physician with expertise in the area presented and is further reviewed by committees from the American College of Radiology (ACR) and the Radiological Society of North America (RSNA), comprising physicians with expertise in several radiologic areas.

What is Chest X-ray (Radiography)?

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

An x-ray (radiograph) is a painless medical test that helps physicians diagnose and treat medical conditions. Radiography 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:

- shortness of breath
- 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
- other medical conditions.

How should I prepare?

A chest x-ray requires no special preparation.

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

Women should always inform their physician or x-ray technologist if there is any possibility that they are pregnant. Many imaging tests are not performed during pregnancy because radiation can be harmful to the fetus. If an x-ray is necessary, precautions will be taken to minimize radiation exposure to the baby.

What does the equipment look like?

The equipment typically used for chest x-rays consists of a box-like apparatus containing the x-ray film or a special plate that records the image digitally and an x-ray tube, which is usually 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 underneath.

How does the procedure work?

X-rays are a form of radiation, like light or radio waves that can be focused into a beam. 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 image recording plate.

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.

X-ray images are maintained as hard film copy (much like a photographic negative) or, more likely, as a digital image that is stored electronically. These stored images are easily accessible and are sometimes compared to current x-ray images for diagnosis and disease management.

How is it 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 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.

The patient 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, the patient will be asked to wait until the technologist determines that the images are of high enough quality for the radiologist to read.

The chest x-ray examination is usually completed within 15 minutes.

Additional views may be required within hours, days or months to evaluate any changes in the chest. This examination is called a serial chest x-ray.

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 will 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 share the results with you.

In an emergency, the results of a chest x-ray can be available almost immediately for review by your physician.

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.
- X-ray equipment is relatively inexpensive and widely available in 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 damage to cells or tissue from radiation. However, the radiation risk is very low compared with the potential benefits.
- The chest x-ray is one of the lowest radiation exposure medical examinations performed today. The effective radiation dose from this procedure is about 0.1 mSv, which is about the same as the average person receives from background radiation in 10 days.
- Women should always inform their physician or x-ray technologist if there is any possibility that they are pregnant.

Chest x-ray. Frontal view of a male patient.

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 councils continually review and update the technique standards used by radiology professionals.

State-of-the-art x-ray systems have tightly controlled x-ray beams with significant filtration and dose control methods to minimize stray or scatter radiation. This ensures 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 an x-ray image, this examination cannot necessarily rule out all problems in the chest. For example, very 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.