

*RADIOLOGY*

# WHAT IS RADIOLOGY?

- *Branch of medicine that uses ionizing and non ionizing radiation for diagnosis and treatment of disease.*
- *Radiology uses imaging technologies such as x-ray, magnetic resonance imaging (MRI), nuclear medicine, ultrasound, computed tomography(CT scan) and positron emission tomography(PET) to see within the human body in order to diagnose disease and abnormalities.*
- *Note that MRI and ultrasound do not use radiation.*

# TYPES

- Radiology can refer to two sub fields, diagnostic and therapeutic radiology.
- *Diagnostic radiology* is concerned with the use of various imaging modalities to aid the diagnosis of disease.
- *Therapeutic radiology* or as it now called, radiation oncology uses radiation to treat diseases such as cancer using a form of treatment called radiation therapy.

# *Diagnostic radiology includes*

- *Computed tomography (CT SCAN)*
- *Magnetic resonance imaging (MRI)*
- *Ultrasound*
- *X-rays*
- *Nuclear imaging techniques*

# CT- SCAN



# CT SCAN

- Computed tomography is a type of imaging technique that *uses special x-ray equipment to make cross sectional pictures of the body.*
- CT scans are used to look for
  - Broken bones
  - Cancers
  - Blood clots
  - Signs of heart disease
  - Internal bleeding

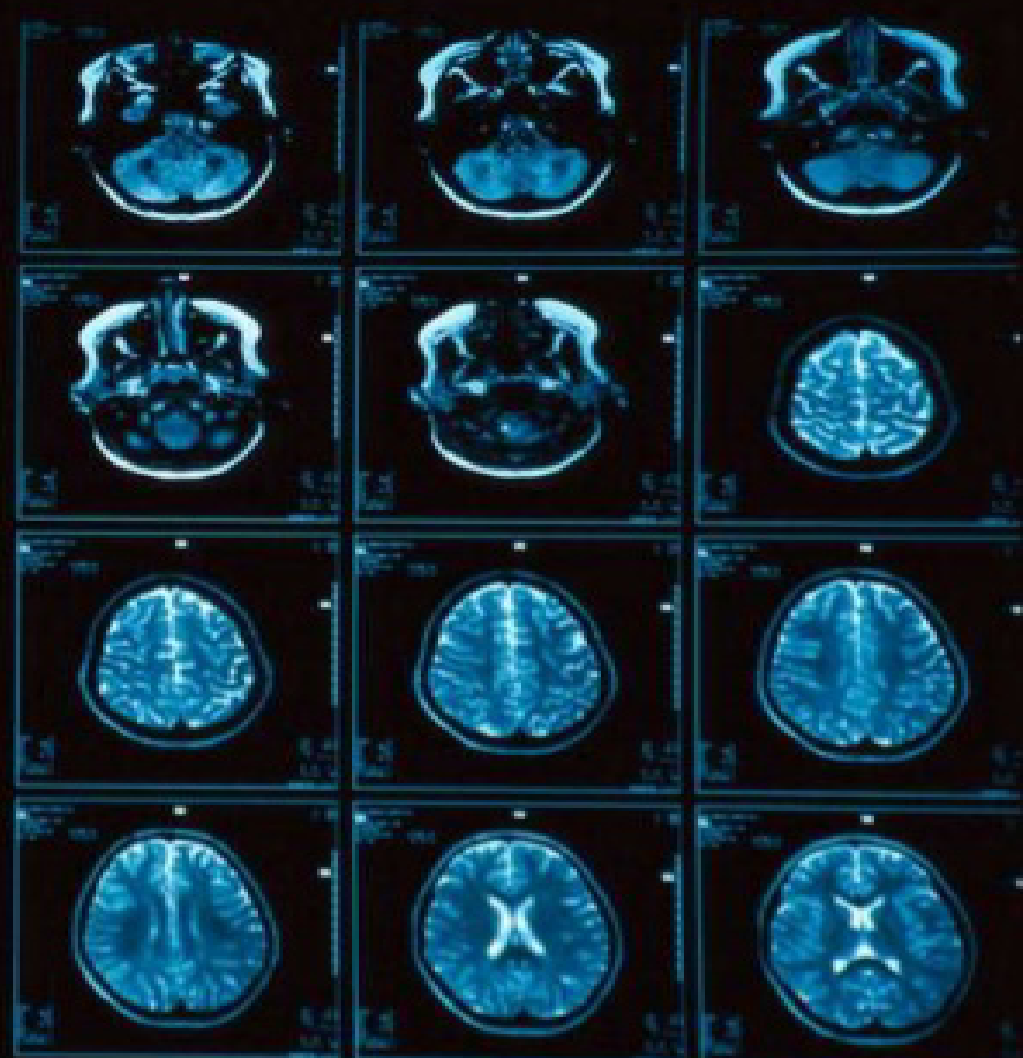
# MRI



# MRI

- Magnetic resonance imaging uses a *large magnet and radio waves* to look at internal organs and structures inside your body.
- Health care professionals use MRI scans to diagnose a variety of conditions e.g tumors.
- MRI are very useful for examining the brain and spinal cord especially.





MRI images of a human brain  
Photograph by Ken Glaser/Corbis

# ULTRASOUND



# US

- Ultrasound is a type of imaging that *uses high frequency sound waves* to look at organs and structures inside the body.
- Health care professionals use it to view the heart, blood vessels, kidneys, liver and other organs.
- During pregnancy, doctors use ultrasound to view the fetus. Unlike x-rays, ultrasound does not expose to radiation.

*XRAY*

# INTRODUCTION

- X-rays are a type of radiation called electromagnetic waves
- X-ray imaging creates pictures of the inside of your body in different shades of black and white. This is because different tissues absorb different amounts of radiation.
- Calcium in bones absorbs x-rays the most hence bones look white.
- Fat and other soft tissues absorb less and look grey
- Air absorbs the least ,so lungs look black
- The amount of radiation you get from an x-ray is small e.g a chest xray gives out a dose of radiation similar to the amount of radiation you're exposed to from the environment in 10 days

# *Types*

- *Extremity x-ray, dental x-ray, chest x-ray,, bone x-ray, abdominal x-ray, spine x-ray, barium x-ray, angiography,*
- *X-rays are also called radiographs*
- *The most familiar use of X-rays is checking for broken bones.*
- *However x-rays are also used in other ways , for example chest x-rays to spot pneumonia or mammograms use x-rays to spot breast cancer.*
- *This slide will focus on how to read chest x-rays mostly.*

*Chest x-rays.....*

# *Anatomy ....chest consists of*

- *The lungs*
- *The pleura*
- *The ribcage*
- *The heart and its vessels*
- *The trachea and the bronchial tree*
- *Pulmonary vasculature*
- *Thoracic spine*
- *Clavicles*
- *Diaphragm*
- *C5,c6,c7*

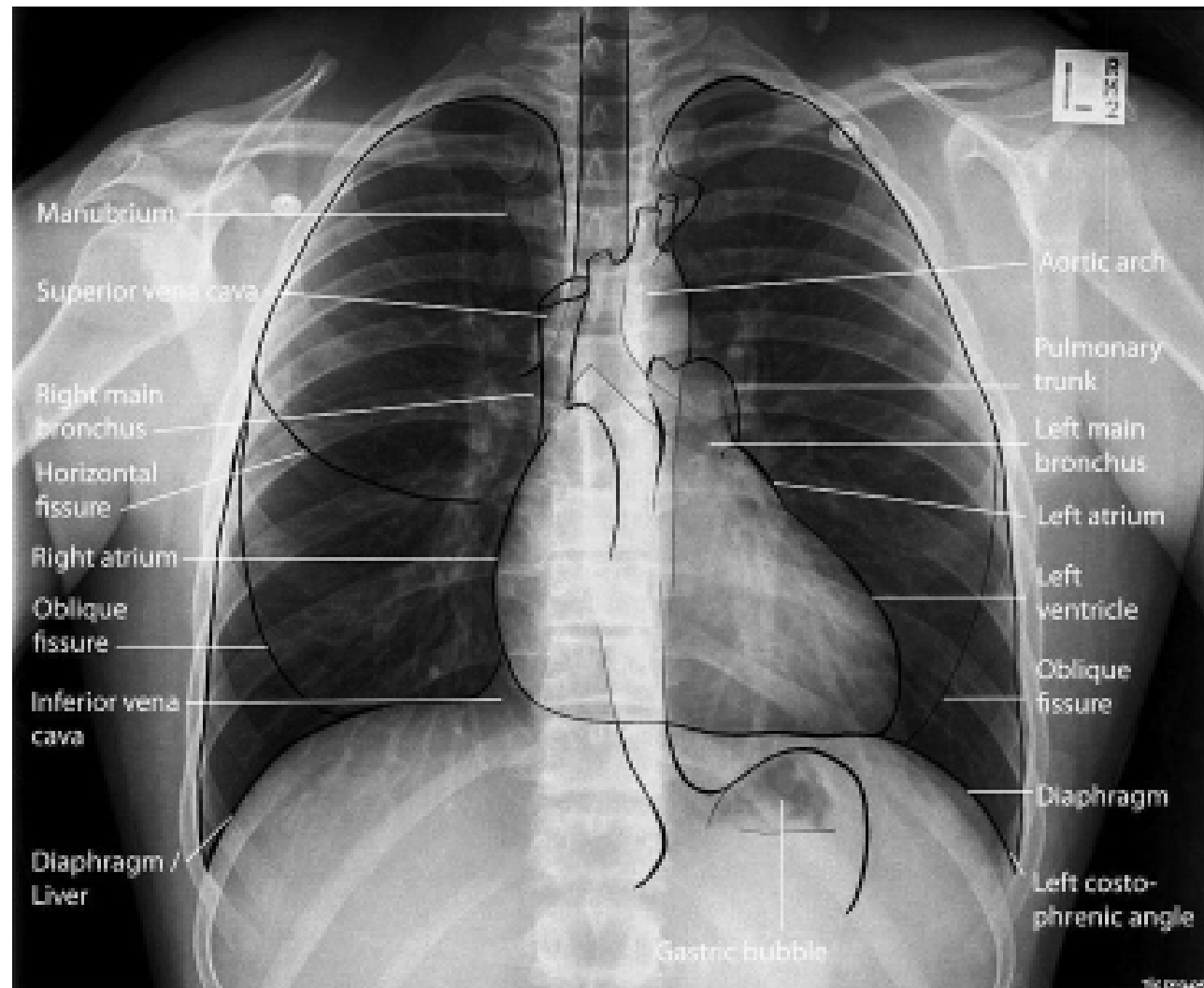


# *Chest x-ray projections*

- *PA(posterior anterior)*
- *AP(anterior posterior)*
- *Lateral*
- *Decubital view*

# *Chest x-ray indications*

- *Pneumonia*
- *Pulmonary edema*
- *Pleural effusion*
- *Fractured ribs*
- *Pneumothorax*
- *Pleural effusion*
- *Cardiomegaly*
- *Pericardial effusion*
- *Lung collapse*
- *Lung fibrosis*
- *Many others....*



# *A good chest x-ray should have :*

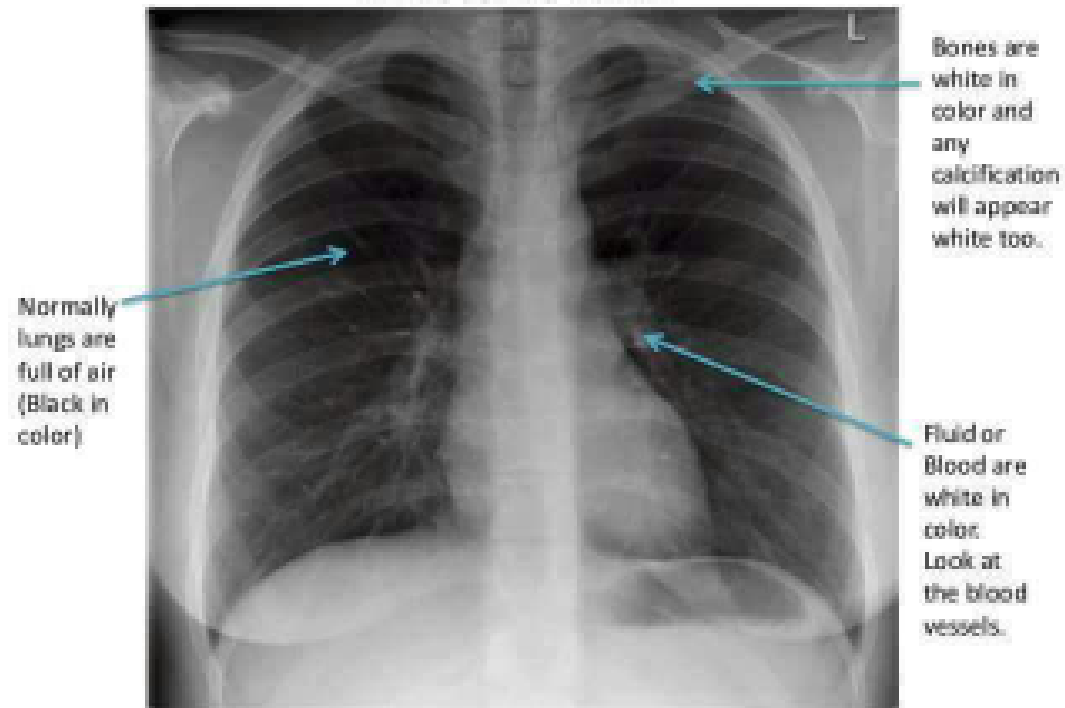
- Correct patient identification; name, sex/age ,x ray number, hospital name and number*
- 9 posterior ribs and 6-7 anterior ribs demonstrated*
- Coastal and cardial phrenic angles demonstrated*
- Lung apices demonstrated*
- Scapulars should be away from the lung field*
- Clavicles equidistant from the sternal notch*
- C5,C6 and C7 included*
- The vertebral spaces and bones should be just visible through the heart*

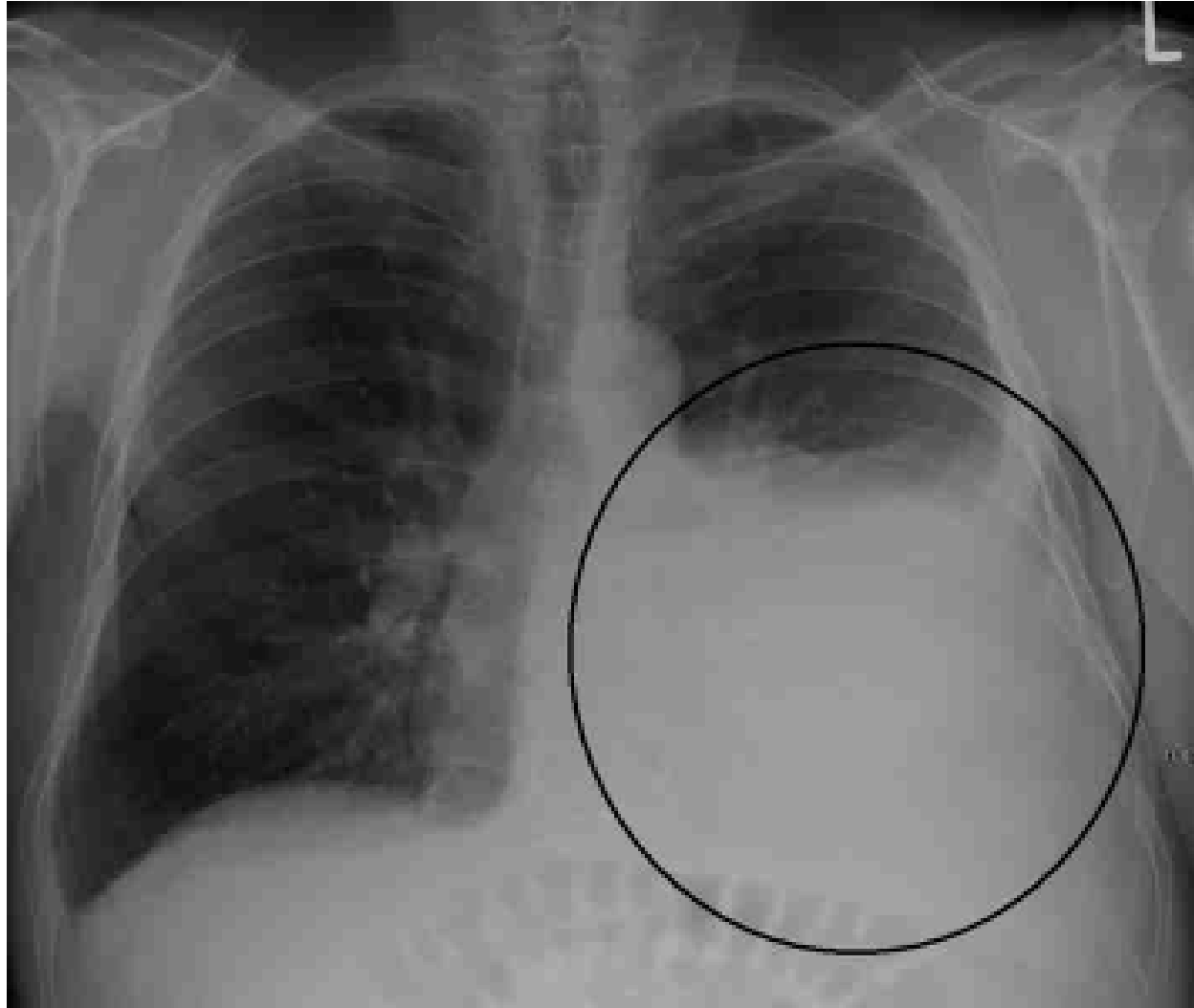
# How to read a chest x ray correctly

- Check patients name, hospital name and date x ray was taken
- Check if it was well penetrated or over penetrated or underpenetrated. (vertebral bodies must be barely visible just behind the heart).
- Identify that the left and right side are correctly marked on the x-ray
- Verify if the x-ray is AP or PA
- Verify if chest x-ray was taken in inspiration or expiration (if it was in full inspiration, 9 posterior ribs and at least 5 anterior ribs must be seen)
- Check for rotation. There should be an equal distance between the clavicle heads and the sternal notch
- Check that the costophrenic and cardiophrenic angle are sharp and normal

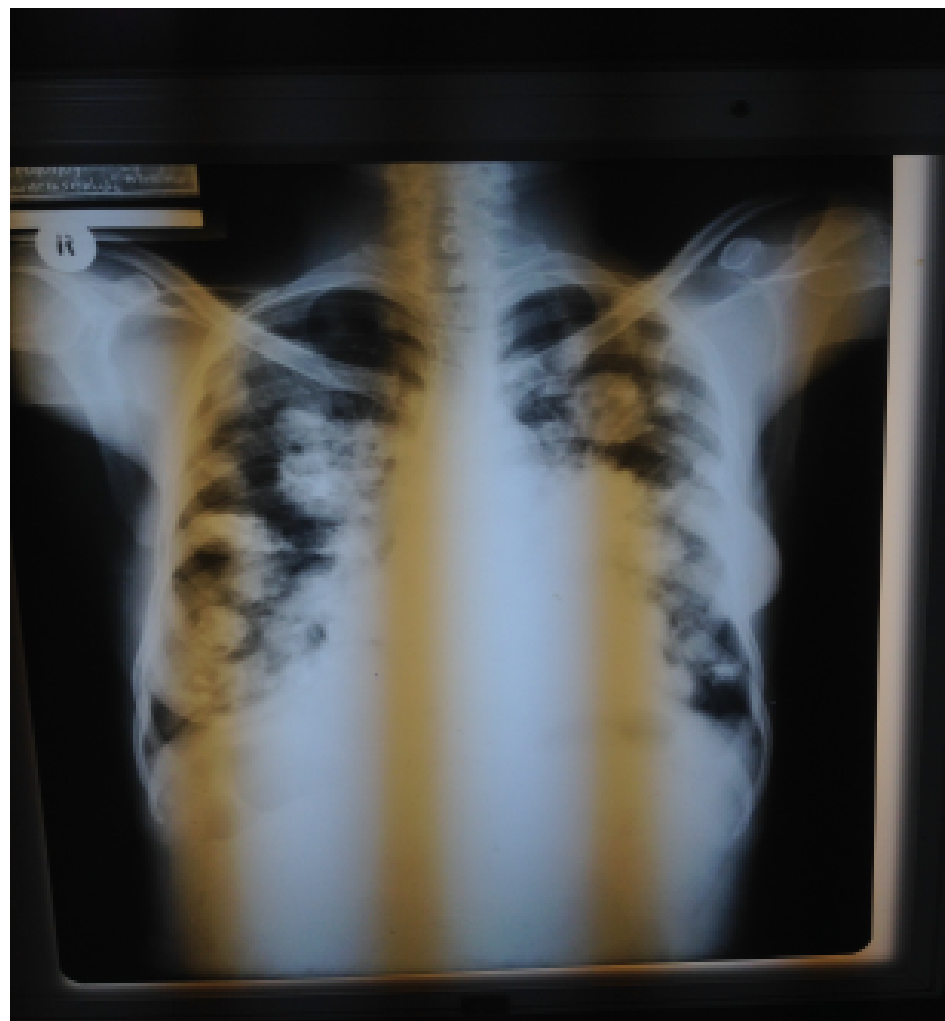
- *Check for the gastric bubble on the left side below the diaphragm*
- *Check that the trachea is centrally located.*
- *Asses the lung fields for any abnormalities like pleural effusion , cavitation, consolidation, opacities etc.*
- *Assess cardiothoracic ratio (ratio of maximal cardiac diameter to maximal horizontal thoracic diameter...normal is less than 0.5)*

## Normal CXR

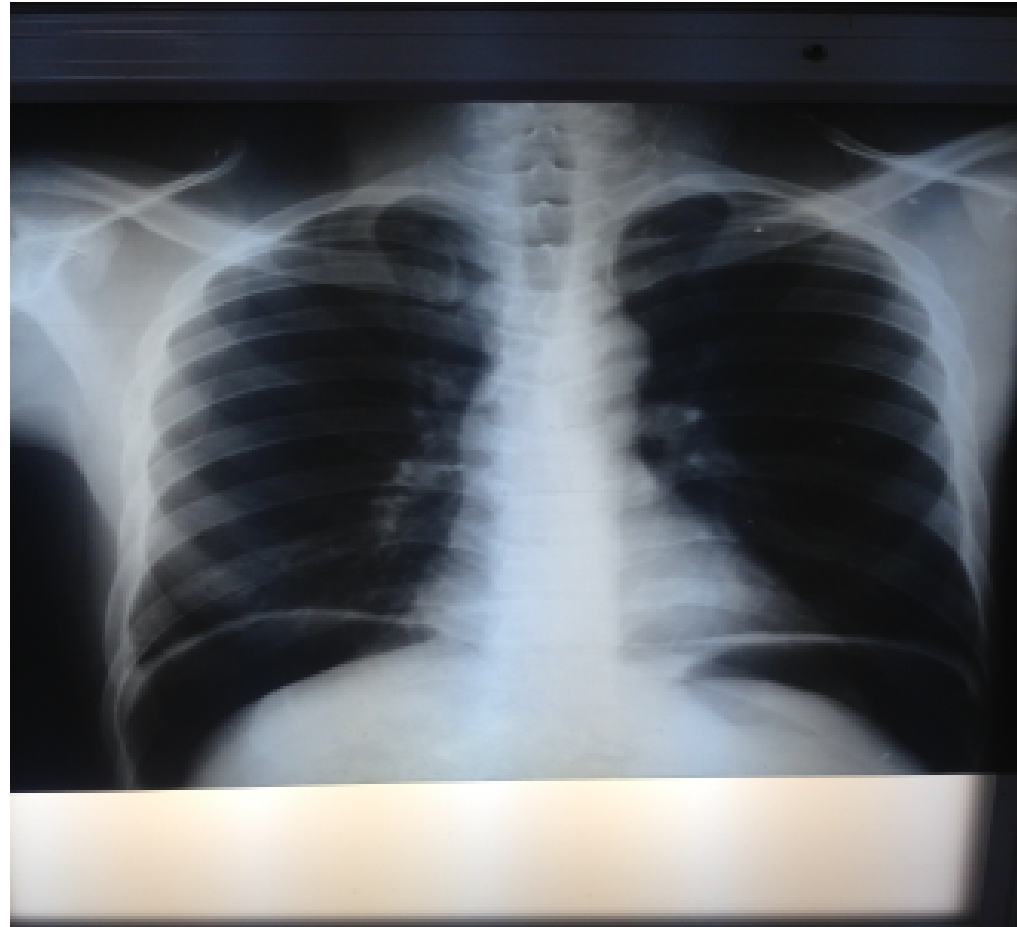




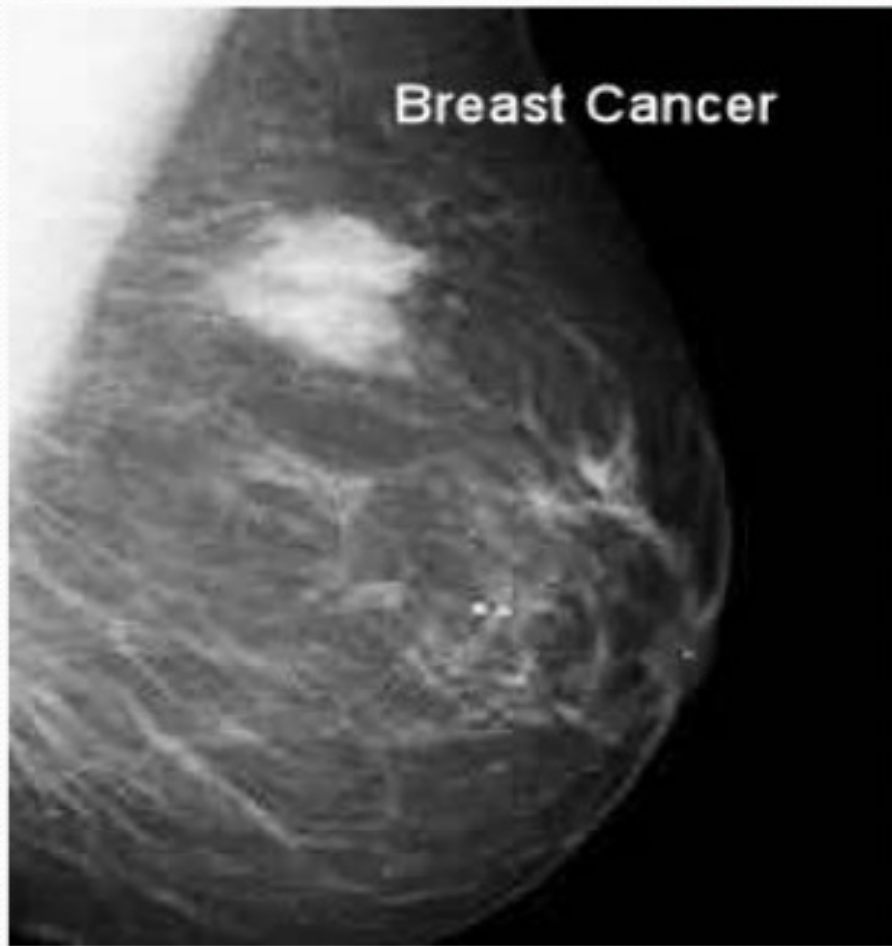


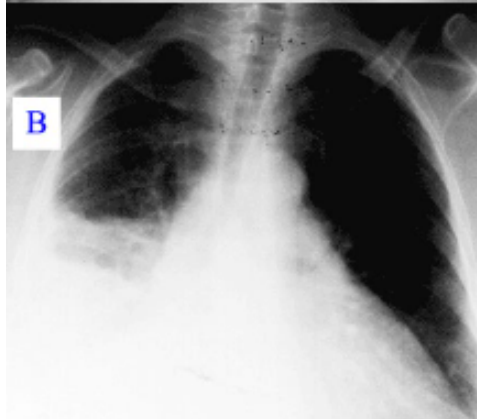
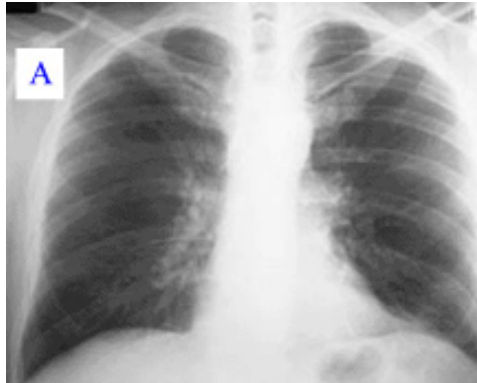






**Breast Cancer**









*THANK YOU*