

Ministry of Higher Education and Scientific Research  
Al-Mustaqbal University College  
Radiology Techniques Department



## **Radiological Equipment Techniques**

**Al-Mustaqbal University College**

**2<sup>nd</sup> Class**

**Radiology Techniques Department**

**By**

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**MS.C. Theoretical Physics**

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**Lecture 1: Basic Introduction**

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## Discovery

X-rays were discovered on November 8, 1895 in Europe in the late nineteenth century by German scientist Dr. Wilhelm Conrad Roentgen.

- The function of the x-ray imaging system is to provide a controlled flow of electrons intense enough to produce an x-ray beam appropriate for imaging.

X-rays are classified as a specific type of energy termed electromagnetic radiation, and like all other types of electromagnetic energy, x-rays act like both waves and particles



- The first radiograph that demonstrates the bones of the hand of Roentgen's wife, Anna Bertha, with a ring on one finger.



## **Characteristics of X-rays**

1. Are invisible
2. Are electrically neutral
3. Have no mass
4. Travel at the speed of light in a vacuum
5. Cannot be optically focused
6. Form a polyenergetic or heterogeneous beam
7. Can be produced in a range of energies
8. Travel in straight lines
9. Can cause some substances to fluoresce
10. Cause chemical changes in radiographic and photographic film
11. Can penetrate the human body
12. Can be absorbed or scattered in the human body
13. Can produce secondary radiation
14. Can cause damage to living tissue

## **X – Ray Machine Shape and Size**

The many different types of x-ray imaging systems are usually identified according to the energy of the x-rays they produce or the purpose for which the x-rays are intended. Diagnostic x-ray imaging systems come in many different shapes and sizes.

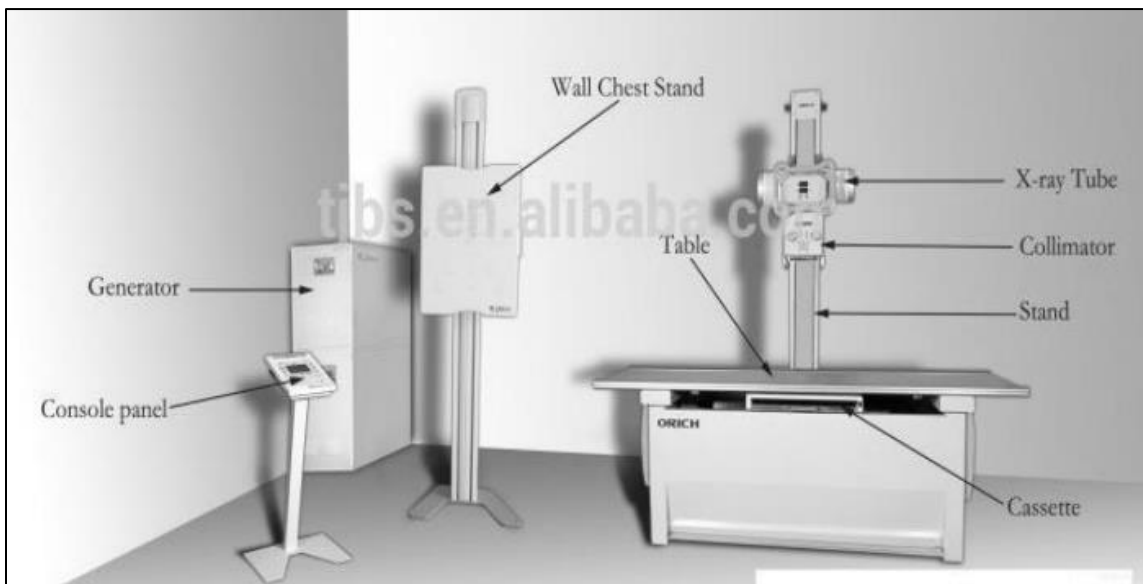
- These systems are usually operated at voltages of 25 to 150 kVp and at tube currents of 100 to 1200 mA.

The radiographic x-ray tube is attached to an overhead movable crane assembly that permits easy positioning of the tube and aiming of the x-ray beam.

Regardless of the type of x-ray imaging system used, a patient-supporting examination couch is required. This examination couch may

be flat or curved but must be uniform in thickness and as transparent to x-rays as possible. Carbon fiber couches are strong and absorb little x-radiation. This contributes to reduced patient radiation dose.

- Just under the couch is an opening to hold a thin tray for a cassette and grid



**Figure 1: Typical radiographic unit.**

### **Principle parts of X – ray machine:**

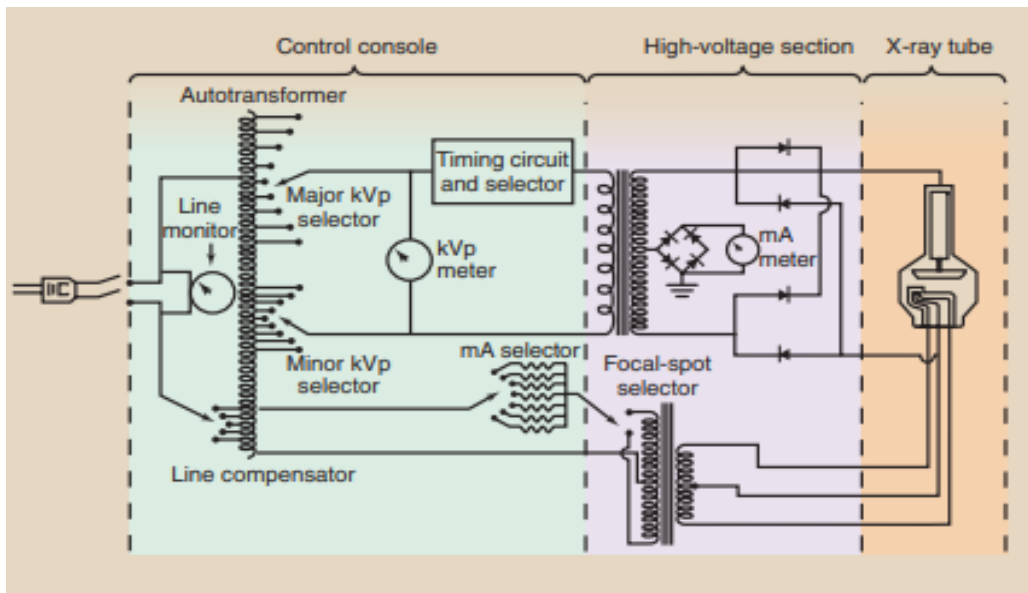
Regardless of its design, every x-ray imaging system has three principal parts:

1. The x-ray tube
2. The operating console
3. The high-voltage generator

The protective barrier must have a window for viewing the patient during examination.

- The **x-ray tube** is located in the examination room,
- **Operating console** is located in an adjoining room with a protective barrier separating the two.

- **The high – voltage generator** may be housed in a cubicle container, perhaps 1 m on a side , located in the corner of the examination room.



**Figure 2: The schematic circuit of an x-ray imaging system.**