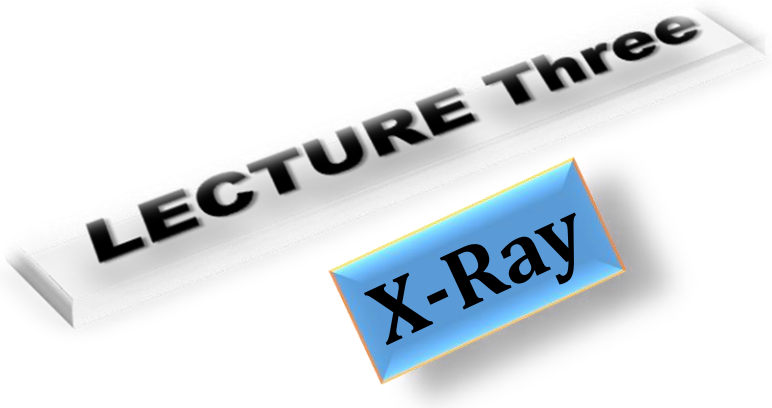
التصوير الطبي
Medical Imaging



Introduction to X-Ray

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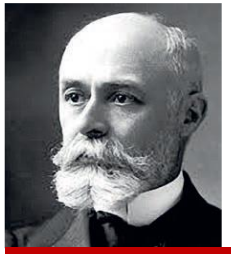
Introduction to X-Ray

X-ray is electromagnetic radiation with short wavelength of 10^{-10}m and high frequency of 10^{18} Hz, which is able to pass through many materials.

- In 1895, Wilhelm **Roentgen**, a German physicist, discovered radiation, which he called X-rays that could be used to look into the human body.

Wilhelm Roentgen

- The first use of X-rays was in medical diagnosis by **Henri** Becquerel within six months of their discovery in 1895,



Henri Becquerel

Properties of X-Ray

- X-ray is a type of electromagnetic radiation with a frequency of 10^{18} Hz and wavelength of 10^{-10} m
- X-ray has the ability to pass through liquids, solids, gases، and many materials.
- X-ray is traveling in a straight line.
- X-ray is invisible to the eye.
- Long X-ray exposure can be harmful to live organisms, and short exposure to X-rays may be is not harmful.

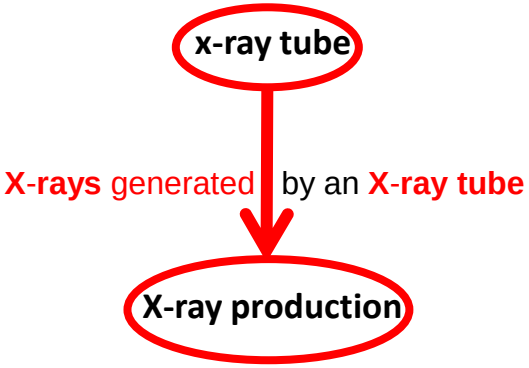
Uses of X-Ray

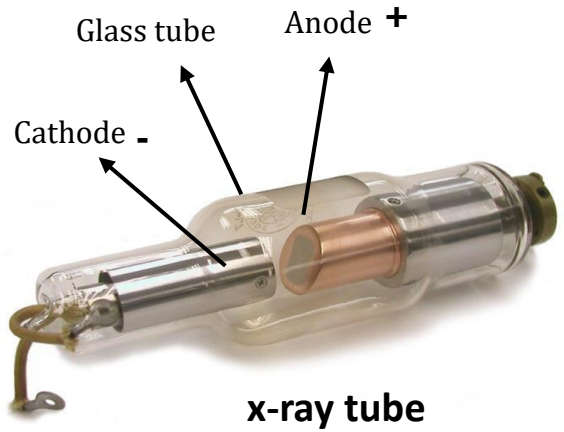
- **Medical image:** X-rays are used to view images of the different parts of the human body (Used in medical images) because the X-rays penetrate different materials

- **Radiation therapy:** X-rays play an important role in the fight against cancer, with high-energy radiation used to kill cancer cells.

- **Airport security:** x-ray security system that scans baggage to check for dangerous items and full body X-ray scans.

Components of X-ray generator





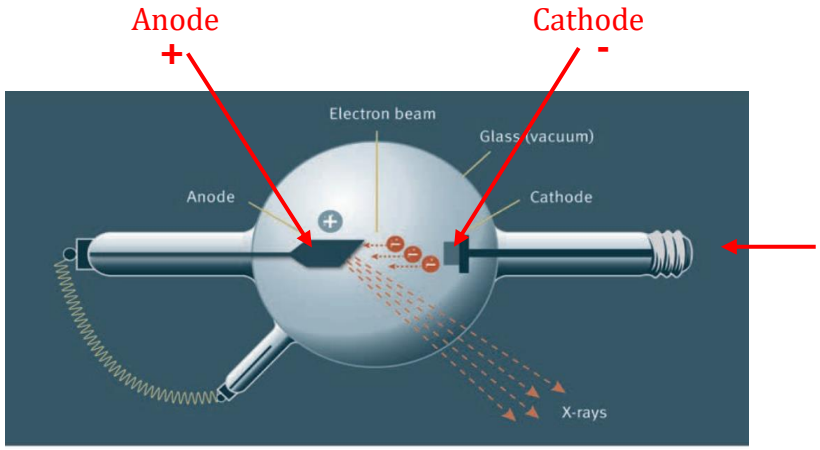
The **X-ray tube** is an electrical device used for the generation of X-rays, which constant of many parts:

(i) Glass tube : It is a vacuum glass tube (Pyrex glass) that contains the anode and cathode

(ii) Cathode : It consists of a tungsten wire that has a high melting point of 3410°C

(iii) Anode : It is a copper rod made with a tilted surface.

Generate X-rays



- When the current passes through the cathode (tungsten wire), the temperature in the cathode will increase so that it can release electrons toward the anode.

- Therefore, according to the **excited-state atom**; X-rays are generated from the interaction of the high-energy electrons that come from the cathode and then anode

Types of radiography using X-rays

(1) Plain X-rays

(2) Computed Tomography (CT)

(3) Fluoroscopy

(4) Mammography

(5) Angiography