- **There are many different methods for cancer treatment that includes:**

1. **Surgery**
2. **Chemotherapy**
3. **Radiotherapy**

- Radiation is frequently combined with chemotherapy if a tumor is too complex or is entrenched in other tissue and cannot be removed surgically. Surgery,

- Unfortunately, in certain cases, the cancer is too advanced or complex to respond to any method of treatment.

In these cases, radiotherapy may be used for palliative treatment to;

- **Shrink tumors**
- **Reduce pressure**
- **Reduce pain for a better quality of life.**

Percutaneous Tumor Ablation

- These procedures are used for the treatment of different body tumors and it uses different energies like thermal energy, laser energy and microwave energy to produce thermal energy which is used to ablate the tumors, under guidance of different radiological modalities (US – CT – MRI) these procedures includes:

a- Radio Frequency Ablation (RFA)

b- Laser Ablation

c- Percutaneous Microwave Coagulation Therapy (PMCT)

d- Percutaneous cryoablation

5- Brachytherapy and Teletherapy

Two types of radiation treatment exist:

1. **The internal radiation type termed (brachytherapy).**
2. **The external beam types termed (Teletherapy).**

The (brachytherapy)Internal radiation includes the insertion of low-intensity radioactive nuclides inside the body placed in close proximity to the tumor or cancerous tissue. Prostate cancer is one common candidate for this type of treatment.

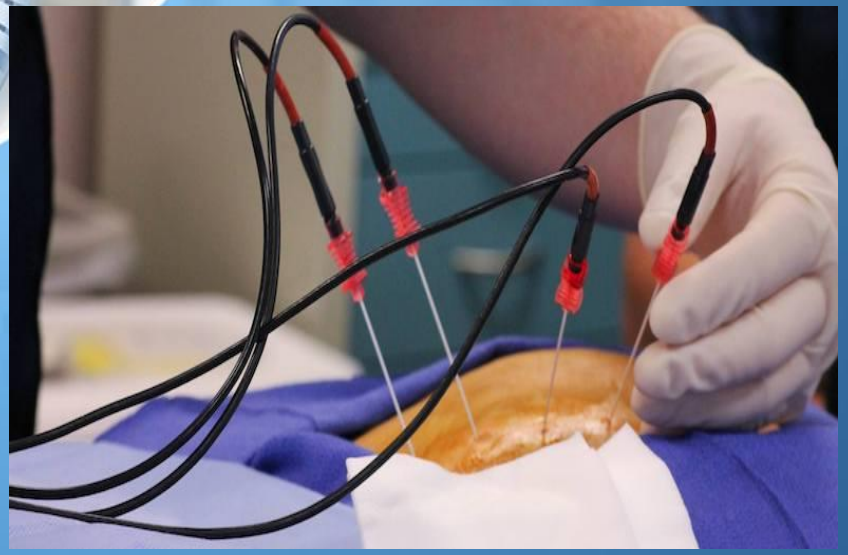
The Teletherapy is the application of external beam radiation, which historically has been of three types: x-ray type units, cobalt-60 gamma ray, and linear accelerator.

The linear accelerator

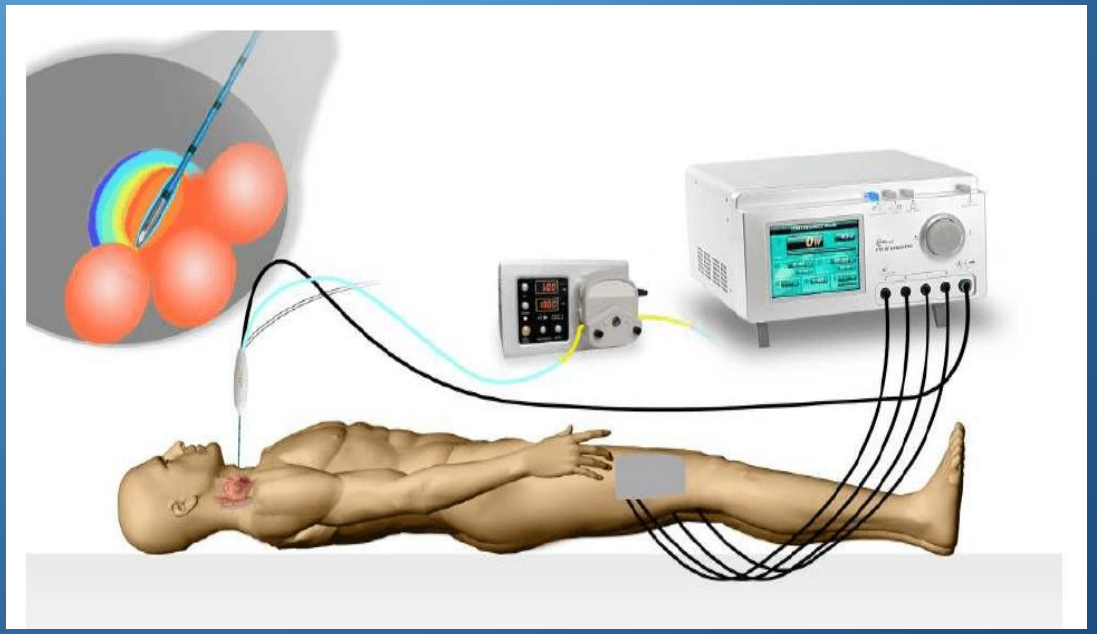
- The linear accelerator emits x-rays or beam of electrons is capable of producing high-energy x-rays when a target (anode) is placed in the path of the accelerating high-energy stream of electrons emitted from the filament (cathode).
- The energy range of emitted x-rays is controlled by high voltage applied to the accelerating electron beam striking the target or anode, in a similar manner to that of a general diagnostic-type x-ray tube.

- This same equipment, by removing the anode or target out of the electron beam, is also capable of projecting a beam of electrons of selected energies directly onto the site of tissue being treated. The energy of this emitted electron beam is controlled by the applied voltage.
- The projection of these electrons directly on the cancerous tissue is more effective in the treatment of shallow or superficial tissue than higher-energy x-rays or gamma rays. Electron beam type energy will penetrate tissue only to the depth of the superficial cancer and therefore will not affect or damage the deeper underlying healthy tissue.
- Deep seated cancers, however, are best treated by high-energy x-rays as produced by the linear accelerator or high-energy gamma rays emitted from cobalt units. This high-energy radiation is distributed directly to the cancerous tissue lying deep within body parts with the least possible damage to surrounding normal tissue.

Linear accelerator



Radiofrequency Ablation



Nuclear Medicine (NM)

- Nuclear medicine involves the use of radioactive materials called radiopharmaceuticals in the study and treatment of various medical conditions and diseases.

- Specific radiopharmaceuticals termed tracers are introduced into the body by injection, inhalation, and/or orally to evaluate specific organs and metabolic functions.
- These tracers concentrate in specific organs that permit them to emit gamma radiation that is measured by a gamma or scintillation camera. Based upon the intensity of the signal, the function of a particular organ can be determined.

Clinical Applications of NM

- Nuclear medicine applications are growing through advances in digital imaging and more efficient radiopharmaceuticals. Because select radionuclides will concentrate in specific organs or tissues, different types of radionuclide tracers can be used to evaluate these organs, organ systems, and various physiologic functions.
- One of the most commonly used radionuclides is technetium 99m (99mTc).
- Different forms of technetium are used for studies of the brain, heart, kidney, liver, and skeletal system.

Nuclear Medicine Gamma Camera

Chapter Two

Radiological Examinations

Conventional x-ray Examinations

Indications

1. Diagnose broken bones or joint dislocation
2. Demonstrate proper alignment and stabilization of bony fragments following treatment of a fracture.
3. Guide orthopedic surgery, such as spine repair/fusion, joint replacement and fracture reduction.
4. Look for injury, infection, arthritis, abnormal bone growths, bony changes seen in metabolic conditions.
5. Assist in detection and diagnosis of bone cancer.
6. Locate foreign bodies in soft tissues around or in bones.

Patient preparation for Conventional x-ray Examinations

Most plain x-ray examinations require no special preparation.

1. Ask Patient to remove some or all of his clothes and wear a gown during the exam.
2. Ask patient to remove jewelry, eye glasses and any metal objects that might interfere with the x-ray image.
3. 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 so as not to expose the fetus to radiation. If any x-ray is necessary, precautions will be taken to minimize radiation exposure to the baby.