



## Cyclone-30

Medical Cyclotron Facility Cyclone-30 Became Operational at Variable Energy Cyclotron Centre (VECC), Kolkata.

- With increasing number of Indians diagnosed with cancer every year, the cyclotron machine will produce radioisotopes for nuclear imaging specifically for cancer detection.
- Cyclone-30 is the biggest cyclotron in India for medical application. This will be third cyclotron at VECC. The other two are – K130 Cyclotron operating since 1977, K500 Superconducting Cyclotron which accelerated internal beam in 2009.

### VARIABLE ENERGY CYCLOTRON CENTRE

- It is a premier R & D unit of the Department of Atomic Energy, Government of India dedicated to carry out frontier research and development in the fields of Accelerator Science & Technology, Nuclear Science (Theoretical and Experimental), Material Science, Computer Science & Technology and in other relevant areas.

### RADIOISOTOPES

- Radioisotopes are the unstable form of an element that emit radiation to transform into a more stable form.
- Radiation is easily traceable and can cause changes in the substance it falls upon. These special attributes make radioisotopes useful in medicine, industry and other areas. E.g.:
  - technetium isotope ( $^{99m}\text{Tc}$ )- used to identify blocked blood vessels.
  - Carbon isotope ( $^{14}\text{C}$ )- used to determine archaeological chronologies.

### RADIOPHARMACEUTICALS

- Radiopharmaceuticals are unique medicinal formulations containing radioisotopes which are used in major clinical areas for diagnosis and/or therapy.

### CYCLOTRON

- It is a device used to accelerate charged particles like protons,  $\alpha$ -particles, etc, to very high energies.
- It makes use of the magnetic force on a moving charge to bend moving charges into a semicircular path between accelerations by an applied electric field.
- The applied electric field accelerates electrons further in a magnetic field region.
  
- The Cyclone-30 facility will be used:
  - To produce  $^{18}\text{F}$  (Fluorine-18 isotope) for the preparation of [ $^{18}\text{F}$ ] Fluorodeoxyglucose (FDG), a radio-pharmaceutical used by Board of Radiation & Isotope Technology (BRIT).
  - For production of Germanium-68, Palladium-103 and other isotopes.
  - Studies related to installation of Iodine isotope [ $^{123}\text{I}$ ] production target,
  - material study target and
  - Accelerator Driven System target.

- This facility will provide for affordable radio isotopes and related radiopharmaceuticals for the entire country especially, for Eastern India.
- It will also have export potential for Germanium-68/Gallium-68 generator for in-situ production of Gallium-68 and Palladium-103 isotopes, used for breast cancer diagnosis and prostate cancer treatment, respectively.
- At present, many radioisotopes are imported while some are produced in nuclear research reactors such as the Apsara at the Bhabha Atomic Research Centre (BARC), and remaining in cyclotrons facilities run by large private hospitals. For instance, the country imports radioisotopes Germanium-68/Gallium-68 that accurately diagnoses breast cancer, and Palladium-103 to detect and treat prostate cancer.
- The addition of Cyclone-30 will increase the availability of radioisotopes and bring down the cost of treatment.

PDF Refernece URL: <https://www.drishtias.com/printpdf/cyclone-30>

