Nuclear Medicine guest investigation lecture

ANSWER (1) *Positron emission Detector*.

Generally , a medical tracer is formed in a cyclotron where high speed particles are bombarded to normal atoms to make the normal atoms radioactive . This tracer then is converted to a biological molecule using a biological molecule synthesiser . The tracer is injected into the subject's body and the radio active atom loses its radio activity by emitting a subatomic particle called positron(which has positive charge). This positron when combines with an electron produces gamma rays These gamma rays travel in opposite direction and is detected by a **PET scanner.** So basically , its a multidimensional detector which detects the incoming photons as a result of positrons emitted from radio-labeled sites. Its generally a ring like structure consisting of various solid state photo detectors which can be further attached with a scintillator and then its arranged in ring array. Conversely, many photodetectors can be arranged to form a scintillator array which can be further lined up to form a PET detector module . These multiple modules then can be arranged in various positions to locate radio -emission from the body. **[1]**

ANSWER (2) *Concept of Positron.*

The positron is an anti-matter particle of electrons . Having the charge of positive electron volt. (spin=1/2 and mass equivalent to that of an electron). The radionuclides atoms when decays actually produces positrons when they collide with an electron produces gamma rays and neuclie(annihilation) . Generally they are produced by positron emissive radioactive decay (through weak interactions), or by pair production from a sufficiently energetic photon which is interacting with an atom in a material. They can also be emitted in cyclotron when a accelerated hydrogen ion hits the atom. **[2]**

ANSWER (3) Nuclear Medicine

In Nuclear medicine , a radiopharmaceutical is injected to the subject's body and its concentrated towards the disease area. For diagnosis of the internal fibre, these radiopharmaceuticals emit radiations which should be detected externally. Thus ,due to the radio activity of the the tracer, doctors are able to get various images of a particular biological module. Hence they are able to interpret the depth of the disease and how it will be cured. Positron emission tomography(PET) is particular way of carrying out the process of nuclear medicine along with other methods such as CT (computed tomography) , single photon emission computed photography (SPECT). **[3]**

ANSWER (4) Accelerate Hydrogen Ions.

Generally, the hydrogen ions are accelerated by a cyclotron(particle accelerator) or a nuclear reactor in which there is change in flux of neutrons. These days generally in the labs and the hospitals , various cyclotrons are used to bombard fast moving particles with normal atoms which results in the production of radioactive species. A positively charged particle can be accelerated to high energy by using high oscillating electric field by using magnetic field.The electric field is maintained horizontally by D- shaped magnets and a vertical magnetic field is engaged by using North to south filed of a powerful magnet . The combination of an oscillating field and the magnetic filed increases the acceleration of the hydrogen ion in a circular path and with each circular path the velocity of the ion increase with the radius its covering. Finally its thrown out of the D - magnet couple towards he target. **[4],[5]**

References:

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