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**MEDICAL PHYSICS**

**ANSWERS**

1. **WHAT ARE RADIOACTIVE TRACERS? *A radioactive tracer like, radiotracer or radioactive label is a chemical compound in which one or more atoms have been replaced by a radionuclide so by virtue of it’s radioactive decay. It can be used to explore the mechanism of chemical reactions by tracing the path that the radioisotopes follows from reactant to products.***

Radiolabeling or radio tracing is this the radioactive form of isotopic labeling.

Radio isotopes of hydrogen ,carbon, phosphorus, sulfur, and iodine have been used extensively to trace the path biochemical reactions . A radioactive tracer can be used to track the distribution of a substance within a natural system such as a cell or tissue or as a flow tracer to track fluid flow. Radioactive tracer are used to determine the location of fractures created by hydraulic fracturing in natural gas production.

Radioactive tracers are made up of carrier molecules that are bounded tightly to a radio active atom. These carrier molecules vary greatly depending on the purpose of the scan. Some tracers employ molecules that interact with a specific protein or sugar in the body and can even employ the patient's own cells.

**QUESTION 2 ANSWERS**

**APPLICATIONS OF TRACERS IN MEDICINE**

NUCLEAR MEDICINE: It is a medical specialty that uses RADIOACTIVE tracers (***radiopharmaceuticals***) to assess the bodily functions and to diagnose and treat disease specially designed cameras allow doctors to track the path of these radioactive **tracers** . **SINGLE PHOTON EMISSION COMPUTED** ***TOMOGRAPHY( SPECT) AND POSITRON EMISSION TOMGRAPHY( PET) scans are the TWO MOST COMMONN IMAGING modalities in nuclear medicine***. E.g.: in cases where doctors need to know the exact source of intestinal bleeding, they may radiolabeling( add radioactive atoms ) to a sample of red blood cells taken from the patient. They then re-inject the blood and use a SPECT scan to follow the path of the blood in he patient. Any accumulation of radioactivity in the intestines informs doctors of where the problem lies.

* For most diagnostics studies in nuclear , radio active tracers is **administered to a patient by INTRAVENOUS INHECTION**
* **INHALATION**
* **ORALLY**
* **DIRECT INJECTION INTO ORGANS**

**NB: The mode of tracer administration will depend on the disease process that is to be studied.**

**Diagnostics techniques in nuclear medicine use radioactive tracers which emits gamma Ray’s from within body . These tracers are generally short- lived isotopes linked to chemical compounds which permits specific physiological processes to be scrutinized. They can be given to me injection, inhalation or orally.**

**In hydraulic fracturing, radioactive tracers isotopes are injected with hydraulic fracturing fluid to determine the injection profile and location of created fractures. Tracers with different half- lives are used for each stages of hydraulic fracturing. The most commonly used tracers include:**

* **Antimony -124**
* **Bromine -82**
* **Iodine -125**
* **Iodine-131**
* **Iridium-192.**