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**MLS 314 ASSIGNMENT**

**Question 1: What are radioactive tracers?**

A radioactive tracer is a chemical compound in which one or more atoms have been replaced by a radionuclide so by virtue of its radioactive decay can be used to explore the mechanism of chemical reactions by tracing the path that the radioisotope follows from reactant to products. It is a radioactive element or compound added to a material to monitor the material’s distribution as it progresses through a system. The use of a radioactive tracer is called radio labeling, which is one form of isotopic labeling.

**Question 2: Application of tracers in medicine**

**Brief introduction**

A tracer, which is a radioactive material is put into a patient’s body, given either orally (food or drink) or by injection (most times). Tracers can be used to diagnose or treat. The tracers obtain information when radiation is emitted from inside the human body. The tracers trace the paths of various biochemical molecules in our bodies i.e. obtain functional information about the bodies’ workings. The area where radioactive tracers are used in medicine to assess bodily functions and to diagnose and treat diseases is called Nuclear medicine. Some commonly used tracers are tritium, carbon-11, oxygen-15, iodine-123 and technetium-99 which is the most commonly used radioactive tracer.

Radioactive tracers can be used in medicine to create images that describes the emission of radiation by the tracers in the human body and this is known as Emission tomography. This is further divided into two which are Single-photon emission computed tomography (SPECT) and Positron emission tomography (PET). These two are the two most common applications of radioactive tracers in nuclear medicine. I am going to be talking about SPECT.

**Single-Photon Emission Tomography**

A gamma emitting radioactive isotope is injected into a patient via the blood stream and a gamma detector can be used to measure the intensity of the gamma radiation. SPECT imaging instruments provide three-dimensional (tomographic) images of the distribution of radioactive tracer molecules that have been introduced into the patient’s body. The 3D images are computer generated from a large number of projection images of the body recorded at different angles. SPECT images have gamma camera detectors that can detect the gamma ray emissions from the tracers that have been injected into the patient. Gamma rays are a form of light that moves at a different wavelength than visible light. The cameras are mounted on the rotating gantry that allows the detectors to be moved in a tight circle around a patient who is lying motionless on a pallet.

Unlike x-ray techniques such as CT scans, SPEC and PET create images that describe the biochemistry of the region of interest. They paint a better picture of what is taking place in the region in term of its functionality.