Radiopharmaceuticals: Cancer Therapy

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Week 3

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AIM

The aim of this is paper is to make aware the reader about the technologies that exists that make the treatment of certain diseases such as cancer to be more efficient by the use of different approaches. In this particular case, we'll look into the dealings in regards to the radioactive substances and the science behind them that is being applied to treat diseases such as cancer. Radiopharmaceuticals, or medicinal radio compounds, are a group of pharmaceutical drugs containing radioactive isotopes. Radiopharmaceuticals can be used as diagnostic and therapeutic agents. Radiopharmaceuticals emit radiation themselves, which is different from contrast media which absorb or alter external electromagnetism or ultrasound. Radiopharmacology is the branch of pharmacology that specializes in these agents. The main group of these compounds are the radiotracers used to diagnose dysfunction in body tissues. While not all medical isotopes are radioactive, radiopharmaceuticals are the oldest and still most common such drugs. Radiation therapy was first used to treat cancer more than 100 years ago. About half of all cancer patients still receive it at some point during their treatment. And until recently, most radiation therapy was given much as it was 100 years ago, by delivering beams of radiation from outside the body to kill tumors inside the body.

Week 3

This week we'll look into one of the traditional forms or methodologies of treatment of cancer, termed as Chemotherapy, and too we shall understand the drawbacks of this methods compared to nuclear medicine treatment. Chemotherapy (often abbreviated to chemo and sometimes CTX or CTx) is a type of cancer treatment that uses one or more anti-cancer drugs (chemotherapeutic agents) as part of a standardized chemotherapy regimen. Chemotherapy may be given with a curative intent (which almost always involves combinations of drugs), or it may aim to prolong life or to reduce symptoms (palliative chemotherapy). Chemotherapy is one of the major categories of the medical discipline specifically devoted to pharmacotherapy for cancer, which is called medical oncology. The term chemotherapy has come to connote non-specific usage of intracellular poisons to inhibit mitosis (cell division) or induce DNA damage, which is why inhibition of DNA repair can augment chemotherapy. The connotation of the word chemotherapy excludes more selective agents that block extracellular signals (signal transduction). The development of therapies with specific molecular or genetic targets, which inhibit growth-promoting signals from classic endocrine hormones (primarily estrogens for breast cancer and androgens for prostate cancer) are now called hormonal

therapies. By contrast, other inhibitions of growth-signals like those associated with receptor tyrosine kinases are referred to as targeted therapy. Dosage of chemotherapy can be difficult: If the dose is too low, it will be ineffective against the tumor, whereas, at excessive doses, the toxicity (side-effects) will be intolerable to the person receiving it. The standard method of determining chemotherapy dosage is based on calculated body surface area (BSA). The BSA is usually calculated with a mathematical formula or a nomogram, using the recipient's weight and height, rather than by direct measurement of body area. This formula was originally derived in a 1916 study and attempted to translate medicinal doses established with laboratory animals to equivalent doses for humans. The study only included nine human subjects. When chemotherapy was introduced in the 1950s, the BSA formula was adopted as the official standard for chemotherapy dosing for lack of a better option. The efficiency of chemotherapy depends on the type of cancer and the stage. The overall effectiveness ranges from being curative for some cancers, such as some leukaemia’s, to being ineffective, such as in some brain tumors, to being needless in others, like most non-melanoma skin cancers.

Chemotherapy does not always work, and even when it is useful, it may not completely destroy the cancer. People frequently fail to understand its limitations. In one study of people who had been newly diagnosed with incurable, stage 4 cancer, more than two-thirds of people with lung cancer and more than four-fifths of people with colorectal cancer still believed that chemotherapy was likely to cure their cancer.