

Role of nuclear medicine in cancer therapy

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Abstract

Nuclear medicine is a multidisciplinary field that develops and uses instrumentation and tracers (radio pharmaceuticals) to study physiological processes and non-invasively diagnose, stage, and treat diseases. Particularly, it offers a unique means to study cancer biology in-vivo and to optimize cancer therapy for individual patients. A tracer is either a radio nuclide alone, such as iodine-131 or a radiolabel in a carrier molecule such as F-18 in fluoro deoxyglucose, or other feasible radio nuclide attached to a drug, a protein, or a peptide, which when introduced into the body, would accumulate in the tissue of interest. Nuclear medicine imaging, including single-photon emission computer tomography and positron emission tomography, can provide important quantitative and functional information about normal tissues or disease conditions, in contrast to conventional, anatomical imaging techniques such as ultra-sound, computed tomography, or magnetic resonance imaging. For treatment, tumor-targeting agents, conjugated with therapeutic radio nuclides, may be used to deposit lethal radiation at tumor sites. This review outlines the role of nuclear medicine in therapeutic treatment of cancer.

1 Introduction

Nuclear medicine therapy is a cancer treatment that uses radioactive drugs that bind to cancer cells and destroy them. This therapy is an option for some people with neuroendocrine tumors, prostate cancer, meningiomas, thyroid cancer and lymphoma. It has proved to be successful in easing symptoms, improving quality of life and extending life. Nuclear medicine therapy is an approach to treating cancer that might be used with or after other treatment

options, such as chemotherapy and surgery. It won't usually lead to a cure unless combined with other therapies. But for many people it will control symptoms and shrink and stabilize the tumors, sometimes for years. Nuclear medicine therapy is sometimes the best option for people who no longer respond to other treatments.

What makes nuclear medicine therapy effective is the use of radioactive molecules as a drug (molecular radiotherapy). The drug recognizes tumor cells. It's injected intravenously, then circulates in the body, sticks to the tumor cells, delivers radiation directly and causes them to die. Some of the drug never attaches to cancer cells and keeps floating in the blood until the body gets rid of it, mostly in the urine. Over time, the radioactive drug stops giving off radioactivity and stops killing cancer cells. Nuclear medicine therapy is often repeated multiple times to achieve the most benefit.

Nuclear medicine therapy is also called peptide receptor radio-nuclide therapy (PRRT), targeted radiotherapy, radio-nuclide therapy, therapeutic nuclear medicine and a theranostic approach to treating cancer.