



For Immediate Release  
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## DEFINITIONS

### RADIOISOTOPE

The commonly understood periodic chart of the elements indicates and categorizes fundamental chemical features found among the listed elements. These features such as metal, non-metal, noble gas, etc., are governed by the number of protons in each element. In addition, each chemical element with a base number of protons is known to be a family of isotopes differing only in the number of associated neutrons. Some of the isotopes of each element are unstable, expressing radioactivity or radioactive change and decay. These isotopes are called radioisotopes. Naturally occurring radioisotope examples are potassium-40 and uranium-238.

### MEDICAL ISOTOPE

A medical isotope (or radioisotope or radionuclide) is a very small quantity of a radioactive material which is injected into a patient to detect, diagnose, treat or evaluate serious illnesses such as cancer and heart disease. Millions of these procedures are performed around the world each year, with approximately 70 to 80 percent of them using Technetium-99m (Tc-99m) derived from Molybdenum-99 (Moly-99 or Mo-99), which is produced in nuclear reactors.

### DIAGNOSTIC USES

The largest use of medical isotopes is for diagnosis of numerous maladies such as organ malfunction, heart disease, cancer, etc. Several primary 'workhorse' isotopes include Tc-99m, Iodine-131 (I-131), and Fluorine-18 (F-18). These are used to 'image' or 'see into' a patient for localization of abnormalities due to body or tissue function seeking aspects. When coupled with a carrier drug, the medical isotope is carried to the problem and viewed with external radiation detectors. Isotopes of interest commonly have gamma or x-ray radiation which can be detected outside the body.

### THERAPEUTIC USES

As in diagnostic uses, medical isotopes can be configured as implants or combined with carrier drugs which transport the radioisotope to diseased tissues such as thyroid cancer. By proper selection, the medical isotope decay radiation, commonly alpha or beta, can be used to kill the offending cells, bacteria, or viruses.

Brachytherapy is a form of cancer treatment where tiny "seeds" containing medical isotopes are accurately placed within and near a tumor. Brachytherapy is FDA approved and used for localized prostate cancer, liver cancer, head and neck cancers, gynecological cancers and others.

Radioimmunotherapy is a type of treatment where doctors inject antibodies that have isotopes attached like little backpacks. The antibodies (called monoclonal antibodies) then flow through the bloodstream and attach themselves to the cancerous cells. The energy from the medical isotopes is thus targeted straight to the cancer. This type of treatment is showing great promise for blood cancers such as leukemia, lymphoma, and multiple myeloma. Most Radioimmunotherapy treatments are still in clinical trials.

For further information, please visit the Citizens for Medical Isotopes web site: [www.medicalisotopes.org](http://www.medicalisotopes.org)

Citizens for Medical Isotopes is a US 501(c)3 organization established to educate and inform citizens about all aspects of medical radioisotopes including those used for nuclear medicine purposes, medical instruments/products sterilization, food irradiation and other purposes and to promote increasing the quantity, variety, availability and subsidy of United States produced medical radioisotopes for research, development, clinical trial and production purposes.

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