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Thanks for taking the time to review this paper.

DRAFT

Nuclear Medicine
By
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For a person suffering from disorders of the heart, lungs, bladder, or other organ, physicians can take a three-dimensional, fully accurate picture of the ailing organ to gain information about diagnosis and treatment. Although this sounds similar to x-rays or magnetic resonance imaging (MRIs), which take still pictures of our anatomy, these pictures differ because they actually show the organ while functioning. During this imaging, physicians oftentimes can detect abnormalities and, subsequently, thwart off the onset of disease. This medical specialty is called **nuclear medicine**. Nuclear medicine is the use of radiopharmaceuticals, which contain a minute amount of radioactive material known as a radioisotope, to diagnose or treat abnormalities or diseases in the human body.

In practically every hospital in the United States there is some type of nuclear medicine division. Yet, even though one out of three people who are hospitalized are diagnosed or treated with nuclear medicine techniques, the medical specialty is relatively unknown among most populations. States may want to become more familiar with nuclear medicine since they may eventually, if not already, be regulating the practices of nuclear medicine physicians and technologists in their local clinics and hospitals.

A nuclear medicine procedure involves medical personnel administering a radiopharmaceutical (which comes in the form of a liquid, capsule or powder) to a patient either orally, by injection or through inhalation. The radioisotope travels to the targeted organ, bone or tissue and, once there, will emit a tiny amount of radiation. A special camera positioned outside the body can take pictures of the organ and record the information on computer. The pictures taken by the camera allow nuclear physicians to clearly view the organs and obtain information

about them that may be impossible to obtain using other medical techniques. They are used to diagnose or identify Alzheimer's disease, arthritis, coronary artery disease, tumors, blood cell disorders, lung ailments, and many other conditions. The radioisotopes used in diagnostic procedures have very short half lives (the amount of time required for half of the radioisotope to decay) so they result in a very low radiation exposure to the patient.

Early detection is not nuclear medicine's only benefit. In addition to it's diagnostic advantages, nuclear medicine is also used for treatment of diseases and has been found therapeutic for thyroid cancer, blood cell disorders and relieving pain in bone cancer patients.

The U.S. Department of Energy (DOE) is a supplier of a number of radioisotopes used in medical research and in clinical nuclear medicine. The department also helps fund medical research involving radioisotopes at universities and national laboratories across the country. Currently, the manufacture of radioisotopes is waning. DOE produces about 10 percent of the reactor-produced isotopes needed in nuclear medicine procedures. The closure of many nuclear reactors, and the scaling back of operations in others, has reduced radioisotope production. It's believed that without these isotope production facilities, nuclear medicine, and its patients, could suffer. In addition, reduced isotope production in the United States could cause a reliance on foreign sources for radioisotopes. To combat this issue, the Los Alamos Neutron Science Center in New Mexico is undergoing upgrades so that production of research isotopes there can continue. Among the radioisotopes produced at this facility are copper-67, germanium-68, silicon-32 and strontium-82, all of which have significant scientific and medical applications. Furthermore, for fiscal year 2000, DOE has proposed a $2.5 million Advanced Nuclear Medicine Initiative to support the research that will lead to a projected 17-20% yearly increase in demand for radioisotopes.

Even with the possible shortage of radioisotopes, more than 14 million nuclear medicine examinations are performed annually in the United States. There are approximately 2,700 full-time equivalent nuclear medicine physicians and 14,000 certified nuclear medicine technologists nationwide. Since these medical personnel use radioisotopes in their procedures, they must adhere to either state or federal regulations that govern the use of radioactive materials to ensure safety for all involved. Thirty-one states are authorized, or intend to be authorized, to assume regulatory control for certain types of man-made radioactive materials, such as radioisotopes. These states are called "Agreement States" and they have a written understanding with the U.S. Nuclear Regulatory Commission (NRC) stating that they have adequate programs in place to protect public health and safety. The remaining 19 states are under direct NRC regulation.

Presently, the NRC is looking to revise its nuclear medicine inspection program to focus on the safety of the nuclear medicine procedures of its licensees. Through a pilot program, the NRC hopes to closely assess the performance of licensees in several areas, including worker safety, safekeeping of radioactive material, authorized use of radioactive material and compliance with physician's written orders when administering radiopharmaceuticals. For many licensees, such as hospitals and universities, the NRC's modified regulations will entail a shift from federal to state regulation. If current NRC regulations are eased, states may be able to write regulations more specific to populace needs. The Conference of Radiation Control Program Directors supports the suggestion that some states could take more regulatory control over the use of reactor-generated byproduct material. By doing this all radiation programs could be incorporated under a single state agency.