Radioactive Metal Complexes as Agents for Positron Emission Tomography

Michael J. Welch

Division of Radiological Sciences, Mallinckrodt Institute of Radiology,
Department of Radiology, Washington University School of Medicine

The field of positron emission tomography (PET) has expanded dramatically over the last decade. The number of centers carrying out clinical PET has increased well over 200 in the United States. Many new radiolabeled compounds are being investigated as imaging agents. These include agents labeled with the positron emitting radionuclides 45Ti, 60Cu, 61Cu, 64Cu, 66Ga and 86Y. These radionuclides have half-lives ranging from 20 min (60Cu) to 16 h (86Y). Several of these nuclides (64Cu, 66Ga and 86Y) can be delivered to imaging centers from a central production facility. All of these radionuclides can be produced on small biomedical cyclotrons that are being installed in hospitals and distribution facilities largely to distribute the radionuclide 18F. Techniques to the high yield production of all of the nuclides listed above have been developed.

Small molecules, peptides and antibodies have been labeled with the metal radionuclides. Agents to image tissue hypoxia, tissue receptor status, as well as tumor antigen levels, are being evaluated in animal models and in human populations.

Evaluation of new radiolabeled agents has been simplified by the development of high resolution small animal PET scanners that are now commercially available. The applications of these scanners in the evaluation of new radiopharmaceuticals will be discussed.

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