

Chemistry of Contrast Media

Small Molecules

Labeling of (Bio)Molecules with Radiometals

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Learning Objectives:

- Have knowledge about the most important SPECT and PET metal ion radionuclides and their characteristics
- Be able to select the right radiometal for a (bio)molecule
- Be able to select the appropriate chelate for a particular radiometal
- Have knowledge about labeling conditions for the different radiometals in combination with chelates and (bio)molecules

Throughout history, metals and metal compounds have been used for treatment of various diseases, such as arthritis and cancer. However, the use of radiometals in radiopharmaceuticals for medical imaging is a relatively new area. Radiometals are of particular interest for the development of radiopharmaceuticals due to their broad range of nuclear properties (type of radiation, gamma ray or beta particle energy and half-life), and their rich coordination chemistry. In this teaching session the different radiometals that are used in practice will be discussed with respect to their physical characteristics. Both SPECT and PET tracers will be discussed and an overview will be given about the different radionuclides that are used mostly in clinical practice. Next, the different chelates that can be used to complex these radiometals will be discussed as well as how these chelates can be coupled to (bio)molecules. In addition, labeling conditions for the different radiometal-chelate combinations will be discussed. Finally, examples of clinical trials using these radiometals will be discussed.