

The Potential for Cyclotron and Generator-produced Positron Emission Tomography Radiopharmaceuticals: An Overview

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Abstract : Cyclotrons in the energy range 10-30 MeV are widely used for the production of clinically relevant radionuclides used in positron emission tomography (PET) nuclear imaging. Positron emission tomography is a powerful nuclear imaging tool that produces high quality 3-dimensional images of functional processes of body. The advantage of PET among all other imaging devices is that it allows the study of an impressive array of discrete biochemical and physiologic processes, within a single imaging session. The number of PET scanner increases every year globally due to high clinical demand. However, not all PET centers can afford a cyclotron, due to the expense associated with operation of an in-house cyclotron. Therefore, current research has also focused on the development of parent/daughter generators that can reliably provide PET nuclides. These generators ($^{68}\text{Ge}/^{68}\text{Ga}$ generator, $^{62}\text{Zn}/^{62}\text{Cu}$, $^{82}\text{Sr}/^{82}\text{Rb}$, etc) can provide even short-lived radionuclides at any time on demand, without the need of an 'in-house cyclotron'. The parent isotope is produced at a cyclotron/reactor facility, and can be shipped to remote clinical sites (regionally/overseas), where the daughter isotope is eluted, a model similar to the $^{99}\text{Mo}/^{99\text{m}}\text{Tc}$ generator system. The specific aim for this presentation is to talk about the potential for both of the cyclotron and generator-produced PET radiopharmaceuticals used in clinical imaging.

Keywords : positron emission tomography, radiopharmaceutical, cyclotron, generator

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