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Preparation and pre-clinical investigation of Ga-68 derivatives for radio-labeling with radioisotopes for positron emission tomography (PET)

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Gallium-68 (68-Ga) has been used experimentally in the staging of lymphoma and shows a great deal of promise in bone scanning. The main advantage of PET is that images provide quantitative information on tracer kinetics. Kinetic parameters that correlate with biologically defined processes can be calculated for the entire renal cortex or as pixel-based parametric images. Renal PET studies can be classified as functional (metabolic) imaging studies. Such as determinations of renal blood flow studies with ^{15}O labeled water, ^{13}N labeled ammonia, ^{64}Cu and ^{82}Rb pharmaceuticals. Other isotopes used in renal function imaging are ^{55}Co and ^{68}Ga. 68-Ga-PET is not only employed for imaging in the management of neuroendocrine tumors and neural crest tumors, but also for therapeutic use, where it complements present radiologic and scintigraphic procedures. Diagnosis and radiotherapy treatment planning for meningiomas (the second most common primary tumor of the central nervous system) in pertinent clinical setting is another potential use of 68-Ga-PET. Therefore, current experience tends to open a new horizon for the clinical utility of 68-Ga-PET imaging in future. Gallium-68 is a radioisotope and it is recommended as a radiotracer suitable for Positron Emission Tomography (PET) imaging. This article updates on the design, preparation and pre-clinical investigation of Ga-68 derivatives for radio-labeling with radioisotopes for Positron Emission Tomography (PET). The most relevant gallium-68 radionuclide specification is given.

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