

MEETING ABSTRACT

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# Towards authentically labelled bi-modal PET (SPECT)/MR-probes

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Application of radiolabelled, existing MRI probes using a suitable reporter group for multimodal PET(SPECT)/MRI imaging is limited due to the required alteration of the molecular structure and thus changing their *in vivo* properties. Radiolabelling of existing MRI contrast agents with PET(SPECT) isotopes of paramagnetic elements offers a simple way to address this issue. Therefore, new routes to the production of SPECT/PET-radionuclides <sup>147,149</sup>Gd and <sup>52g</sup>Mn were examined which can be applied for n.c.a. labelling of Gd(III) and Mn(II) MRI contrast agents. Additionally, Mn(II)-based complexes stable for *in vivo* application are to be synthesized.

Reaction cross sections and experimental thick target yields were measured by irradiation of <sup>nat</sup>Cr or Eu<sub>2</sub>O<sub>3</sub>. Integral yields were calculated from measured excitation functions. A radiochemical separation of Mn from Cr was developed based on cation-exchange chromatography [1].

Cross section data of the <sup>nat</sup>Eu(d,x) and <sup>nat</sup>Eu(p,x) reactions were measured up to 70.9 MeV and 44.8 MeV, respectively. Integral yields of up to 177.3 MBq/μAh and 81.6 MBq/μAh for <sup>nat</sup>Eu(d,x)<sup>147,149</sup>Gd reactions and up to 43.3 MBq/μAh and 61.8 MBq/μAh for <sup>nat</sup>Eu(p,x)<sup>147,149</sup>Gd reactions, respectively, were calculated. Those were several times higher than for α- or <sup>3</sup>He induced reactions on highly enriched <sup>144</sup>Sm [2,3].

With n.c.a. <sup>52</sup>Mn, also cross sections of co-produced <sup>48</sup>V, <sup>48,49,51</sup>Cr, <sup>52g</sup>Mn were determined in the energy range of 7.6 to 45 MeV. The production rates of <sup>52g,m</sup>Mn were measured from 8.2 to 16.9 MeV with up to 13.1 MBq/μAh which was separated from <sup>nat</sup>Cr by column chromatography.

Production data of the SPECT nuclides <sup>147,149</sup>Gd and the PET nuclide <sup>52g</sup>Mn were established. Different to Mn a practical isolation procedure for Gd is still required. Current work focuses on the radiolabelling of stable complexes of manganese (II) with the goal to develop PET/MRI tracers addressing molecular targets.

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