Coenen et al. EJNMMI Physics 2014, 1(Suppl 1):A79
http://www.ejnmmiphys.com/content/1/S1/A79

EJNMMI Research
a SpringerOpen Journal

MEETING ABSTRACT Open Access

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

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From PSMR14: 3rd Conference in PET/MR and SPECT/MR
Kos Island, Greece. 19-21 May 2014

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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 ^{147,149}Gd and ^{52g}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 ^{nat}Cr or Eu_2O_3. 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 ^{nat}Eu(d,x) and ^{nat}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 ^{nat}Eu(d,x)^{147,149}Gd reactions and up to 43.3 MBq/μAh and 61.8 MBq/μAh for ^{nat}Eu(p,x)^{147,149}Gd reactions, respectively, were calculated. Those were several times higher than for α- or ^{3}He induced reactions on highly enriched ^{144}Sm [2,3].

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

Production data of the SPECT nuclides ^{147,149}Gd and the PET nuclide ^{52g}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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Published: 29 July 2014

References

1. Buchholz M, Spahn I, Scholten B, Coenen HH: **Cross-section measurements for the formation of manganese-52 and its isolation with a non-hazardous eluent.** *Radiochimica Acta* 2013, **101**:491-9.
2. Denzler F-O, Rösch F, Qaim SM: **Excitation functions of a- and ^{3}He-particle induced nuclear reactions on highly enriched ^{147}Sm and ^{144}Sm: Comparative evaluation of production routes for ^{147}Gd.** *Radiochimica Acta* 1995, **69**:209-213.
3. Denzler F-O, Lebedev NA, Novgorodov AF, Rösch F, Qaim SM: **Production and radiochemical separation of ^{147}Gd.** *Appl. Radiat. Isot.* 1997, **48**:319-26.

doi:10.1186/2197-7364-1-S1-A79
Cite this article as: Coenen *et al.*: Towards authentically labelled bi-modal PET(SPECT)/MR-probes. *EJNMMI Physics* 2014 **1**(Suppl 1):A79.