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ORAL PRESENTATION - ^{44,43}Sc and ⁴⁷Sc as matched pair for theranostic approach to peptide receptor radionuclide therapy

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Recently, great effort is put in development of personalised treatment, including precise diagnoses and therapy using the same molecular targeting vectors. Scandium radioisotopes give opportunity to obtain PET/CT images using 44Sc (τ1/2 = 3.92 h) and 43Sc (τ1/2 = 3.89 h) and to treat tumours with a low energy β−particles using 47Sc (τ1/2 = 3.35 d). The aim of our work was to developed simple production procedures of those radionuclides and to compare 4xSc-DOTATATE labelling efficiency.
Highly enriched 44CaCO3, 47TiO2 and super pure natCaCO3 were used as a target materials. 44Sc was obtained in 44Ca(p,n)44Sc and 43Sc in 40Ca(α,p)43Sc reaction in Joint Research Centre (Ispra, Italy), while 47Sc was produced in research reactor "Maria"(Świerk, Poland) in 47Ti(n,p)47Sc reaction. CaCO3 targets were dissolved in HCl and an ion exchange resin Chelex 100 was used to separate 44/43Sc from target material. The irradiated 47TiO2 was dissolved in HFconc (80 oC). An anion exchange bed, Dowex® 1X8, was used to separate 47Sc from 47Ti. For additional purification of 47Sc, cation exchange column Dowex® 50WX4 was used. 4xSc-DOTATATE was synthesised with different amounts of the peptide and in different pH.
The separation on the Chelex 100 and Dowex® 1X8 resins are efficient. We received high yield of DOTATATE labelling with the three radionuclides. For 15 nmol of the bioconjugate the labelling yield exceed 99%. We checked also the possibility of peptide labelling with 44Sc without target separation using C18 Sep-Pak® column for purification of the 44Sc-DOTATATE.
The three radionuclides can be produced in amount of several GBq. The proposed production procedures are simple and fast. The synthesis and purification procedure can be simplified using C18 Sep-Pak® columns. The 44,43Sc and 47Sc matched pair gives opportunity to further development of peptide receptor radionuclide therapy.

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