P-307 Study and Development of a $^{90}Sr/^{90}Y$ Cation Exchange Generator at IPEN/CNEN-SP – Production and Quality Control Evaluation

Barrio, Graciela[1], Osso Jr, João Alberto[11]
Diretoria de Radiofarmácia, Instituto de Pesquisas Energéticas e Nucleares (IPEN/CNEN), São Paulo, Brasil

Objectives: The objective of this work is to present the behavior of a $^{90}Sr/^{90}Y$ cation exchange generator [1,2] and the quality control for determination of ^{90}Sr impurity in ^{90}Y eluted from the generator.

Methods: The cation exchange chromatographic generator employed the resin Dowex 50W-X8 (100-200 mesh), H^+ form and the loading solution consisted of a solution of $^{90}SrCl_2$ (111 MBq, POLATOM) in 1 mol.L^{-1} HCl. The elutions of ^{90}Y were performed with 0.03 mol.L^{-1} Ethylenediamine tetraacetic acid (EDTA) solution at pH=4.5. EDTA was further destroyed by heating the eluted sample with concentrated HNO_3 and $HClO_4$ till dryness followed by the addition of diluted HCl. For the quality control it was employed the Extraction Paper Chromatography (EPC) [3] associated with the use of a liquid scintillator counter (Hydex 300SL) for the beta scintillation counting. PC-88A and 8-hidroxiquinoline (oxime) were employed as complexants for ^{90}Y. The use of oxime was a new proposal and the pH of the sample was prior adjusted to 6-10. A few microliters of these solutions were spotted in a 3 MM Whatman paper strip and ran using 0.9 % NaCl solution as the solvent. The retention factor (R_f) of different species was evaluated: the pair $^{90}Sr/^{90}Y$ in equilibrium and the ^{90}Y-EDTA before and after the destruction.

Results: FIG 1 shows the elution yields for the generator (1A) and the EPC migration pattern of ^{90}Y-EDTA (1B) and ^{90}Y after the EDTA destruction (1C). Initially, the generators were eluted with 0.003mol.L^{-1} EDTA with larger elution volumes and low yields. The concentration of EDTA was changed to 0.03mol.L^{-1}, decreasing the elution volumes and increasing the elution yields. The generator had the same behavior along the 9 months of use with average elution yields of 85%. It can be seen that EPC can be used for the evaluation of ^{90}Sr, using both PC-88A and oxime as Y complexants and that the use of oxime can also evaluate the proper destruction of EDTA because of different R_f values in this system. Evaluation of old ^{90}Y samples eluted showed that the level of ^{90}Sr was lower than 0.003%.

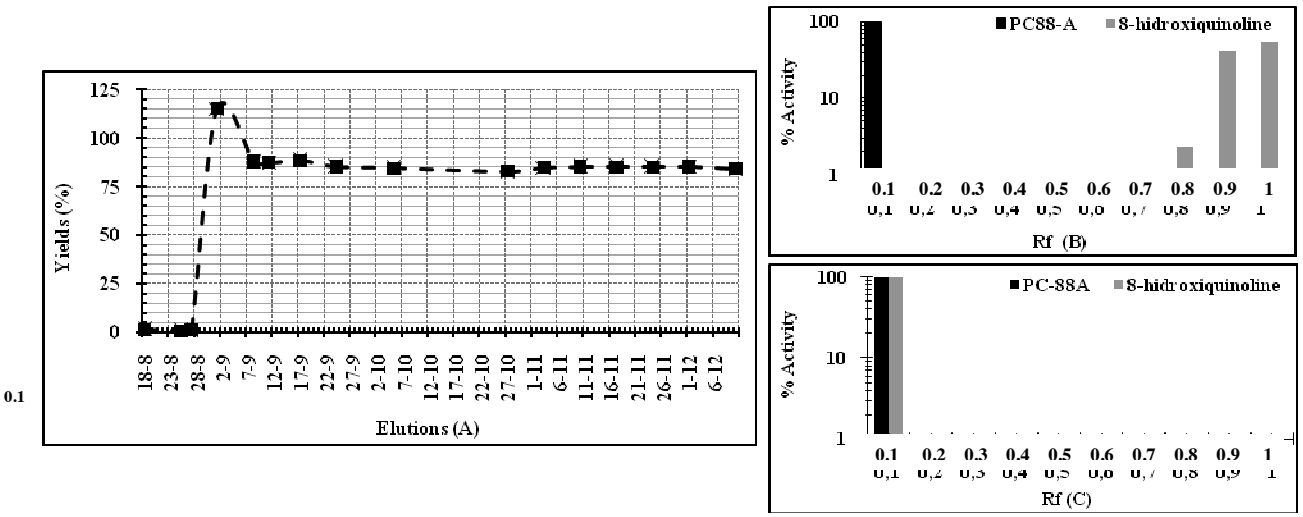

Figure 1. Elution yields for $^{90}Sr/^{90}Y$ generator (A) and EPC of ^{90}Y-EDTA (B) and destroyed 90Y-EDTA (C).

Conclusion: A methodology for the preparation of $^{90}Sr/^{90}Y$ generators was developed using the cation exchange technique. An evaluation of the level of ^{90}Sr in ^{90}Y samples performed by EPC technique was fast and reproducible that can be used with freshly eluted ^{90}Y samples. These analytical technique offer an effective solution to one of main issues in the use of ^{90}Y-based radiopharmaceuticals for cancer therapy.

Research Support: The authors wish to acknowledge IAEA for support and CNPq for granting a fellowship for this work.

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