Introduction

A dual beam line (BL) RDS 111 cyclotron for radionuclide production was installed at the National Autonomous University of Mexico in 2001. One of the BL’s was upgraded to Eclipse HP in 2008 and the second BL was recently upgraded (2011) with the option for the irradiation of solid targets for the production of metallic radioisotopes.

Automatic and manual operation of the solid target system is possible from the cyclotron control software and the graphical user interface (GUI) shows the status of all involved parameters.

Materials and methods

$^{nat}$Zn or $^{nat}$Ni targets were prepared by electrodeposition of ZnCl$_2$ or Ni(NO$_3$)$_2$ on gold disk.

The radiochemical separation was achieved using cation-exchange chromatography.

Micro-derenzo phantom and mice with subcutaneously growing C6 xenografts microPET images were acquired using a microPET scanner (Focus 120 Concorde Microsystem).

Results

Acceptance test of the system was performed by irradiating the gold disk for 2h at 40µA without apparent signal of damage. The solid target system have been tested successfully producing Ga and Cu radioisotopes by irradiating electrodeposited targets of Zn and Ni, respectively. Nevertheless the success, some problems:

- Poor cooling-water system
- Difficulty for irradiation of foils
- Although not common, target jamming after bombardment

At the beginning the most common problem with the Zn-targets was due to poor quality electrodeposition but now it is under control.

At the end, $^{nat}$Zn targets were bombarded (10 to 40 µA) 1 h

$^{nat}$Ni targets were bombarded (5 µA) 30 min

Conclusions

A solid target system was fitted onto an existing self-shielded 11 MeV cyclotron. In our experience the system is capable to produce useful quantities of metallic PET radionuclides for preclinical applications, mainly limited by the manual removal of the target that increases radiation exposure to personnel.

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