

## [<sup>89</sup>Zr]ZrOx/Cl preparation based on commercial cassette base, synthesis module.

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### **Background:**

[<sup>89</sup>Zr]Zirconium is one of the emergent isotope due to the favorable PET imaging characteristics ( $\beta$ +max 0.395 MeV; 22.7%) and half-life ( $T_{1/2}$ 78.4h) ideal to labeling Antibodies. Monoclonal antibodies (MAbs) are the most approved biopharmaceutical in the world with a multiple and selective targets. The immunoPET can facilitate the approval for new MAbs and can help on patient selection. Due of this needs a robust production, purification and labelling procedure should be optimized on automatic modules in order to minimize the operator dosimetry and increase the reproducibility.

Aim of this work is based on easy modification of automatic, cassette base, commercial module in order to dissolve and purify the [<sup>89</sup>Zr]Zirconium in both formulation currently used from sputtered target. The single use cassette reducing the possibility to accumulate metal impurities in the purification step due to missing cleaning step mandatory on synthesis modules based on fixed tubes technology .

### **Methodology:**

A Eckert&Ziegler cassette base module were used to set up an automatic dissolution and purification procedure.

The Sputtered [<sup>89</sup>Y]Yttrium targets were bombarded on TR-19 cyclotron at 12.5 MeV without degrader at different current 20-60  $\mu$ A for a variable time 30-240 minutes. The coins were transferred on dedicated coated hotcell and finally insert on a EZAG module in order to dissolve and purify the [<sup>89</sup>Zr]/[<sup>89</sup>Y] material in a single use cassette. A 2 N HCl solution was used to dissolve the target material, the solution was transfer to ZR resin (Triskem) and recovered on vial in oxalate or chloride form .

Ten sputtered target were processed after bombardment and final impurities profile were evaluated by  $\gamma$ -spettrometry and by ICP-MS .

### **Conclusion:**

What we described on this work is one of the possible way to optimize the [<sup>89</sup>Zr]Zirconium production starting from [<sup>89</sup>Y]Yttrium sputtered target, with a simple and single use cassette recovery process based on EZAG module to minimize the impurities.

**Primary author:** CAZZOLA, Emiliano (Sacro Cuore Hospital)

**Co-authors:** Dr AMICO, Jonathan (Sacro Cuore Hospital); Dr PERUZZI, Daniele (Sacro Cuore Hospital); GORGONI, Giancarlo (Sacro Cuore Hospital); Dr KEPPEL, Giorgio (INFN-LNL Istituto di Fisica Nucleare-Legnaro National Laboratories); Dr AZZOLINI, Giorgio (INFN-LNL Istituto Nazionale di Fisica Nucleare- Legnaro National Laboratories)

**Presenter:** CAZZOLA, Emiliano (Sacro Cuore Hospital)