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#09-87 ISOLPHARM_EIRA: a new approach to create high purity radionuclides for nuclear medicine applications

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Radiopharmaceuticals are drugs containing radionuclides and are routinely used in nuclear medicine for diagnosis or therapy of different diseases, mainly cancer. The main difficulties for nuclear medicine to assume a wider role in clinical practice are the availability of diagnostic/therapeutic isotopes and a technique for their specific localization in diseased sites.
The radionuclides of interest are currently produced in cyclotrons or nuclear reactors, with associated issues such as highly enriched target costs, low reaction cross-section and consequently low produced activity, production of undesired long-lived radioactive wastes and contaminants, long and expensive chemical separation routes.
In this context, the ISOLPHARM project at INFN-LNL (Istituto Nazionale di Fisica Nucleare-Laboratori Nazionali di Legnaro) has the aim of producing high purity (no-carrier added) radionuclides for nuclear medicine applications. By means of the Isotope Separation On-Line (ISOL) technique, both traditional and innovative radionuclides from many different regions of the nuclide chart will be produced with high specific activities, going beyond the state of art of the radiopharmaceuticals research.
The availability of such isotopes can potentially open the possibility of developing a new generation of radiopharmaceuticals, based on nuclides never studied so far, because of their production difficulties with traditional techniques. One of such nuclides is certainly Ag-111, that is regarded as a very promising radionuclide for therapy. Its decay properties make it, without any doubt, a very good candidate for internal radiotherapy. It is a β- emitter with medium half-life (7.45 d), convenient β- energy and medium tissue penetration (average β energy 360 keV and average tissue penetration 1.8 mm) and low percentage of associated γ-emission.
The ISOLPHARM_EIRA project have three main goals, based on the application of the ISOLPHARM method to the production of Ag-111 radionuclides as radiopharmaceuticals precursors: (i) test production of Ag-111 using standard techniques (thermal neutron irradiation of a sample of natural Pd) and its quality control, (ii) synthesis and characterization of chelators, linkers and targeting agents, (iii) biological characterization on cells, scaffold production and 3D cell cultures. The final goal of the project is the first in vitro and in vivo studies.
It this contribution I will present the first results of the Ag-111 production studies at the LENA reactor labs and its quality control system.

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