

CERN-MEDICIS : a dedicated isotope mass separation facility for medical research

We will provide in this presentation recent progresses made in the availability of radionuclides for medical application based on developments of the production methods using ion beam and separation technologies. MEDICIS is an extension of the ISOLDE class A laboratory at CERN. It is a facility dedicated to the production of radionuclides for research in the medical field. It comprises an irradiation station located in the beam dump of the HRS target station, a remote handling system, an isotope mass separation system and a simple radiochemistry laboratory (Fig 1) [1]. It receives on average 50% of the 1.4 GeV protons delivered by the Proton Synchrotron Booster (PSB). It was commissioned with Radioactive Ion Beams (RIBs) in 2017. MEDICIS has operated for the past 5 years in batch mode, with targets irradiated in a station located at the HRS beam dump, and with external sources provided by MEDICIS cyclotrons and nuclear reactors partners, notably during the Long Shutdown (LS2). Additional features of the facility include the MELISSA laser ion source, radiochemistry on implanted radionuclides and an online gamma-ray spectroscopy implantation monitoring. In 2022, we introduced Key Performance Indicators (KPI) to monitor the operation of the facility for collected efficiencies, the optimization of the radiological risks and evaluate impact of possible modifications of the station, paralleling for instance LHC's integrated luminosity. Its scientific programme is defined with the MEDICIS Collaboration, has been focused on preclinical biomedical research, and has met with a recent highlights, notably with the elaboration of projects of clinical relevance exploring high molar activity grade radionuclides possibly translated in radiotherapeutics, notably in targeted radioligand theranostics [1,2]. It also recently triggered a new European network, PRISMAP, for the development of high purity grades radionuclides for medical research across Europe [3].

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[1] Stora T., Prior J O., Decristoforo C, MEDICIS-promed: Advances in radioactive ion beams for nuclear medicine, *Frontiers in Medicine*, 9 (2022) DOI:10.3389/fmed.2022.1013619

[2] <https://medicis.cern/>

[3] <https://prismap.eu/>

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