

Prospective on medical radioisotopes production at ELI-NP

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Radioisotopes applications in nuclear medicine are in the field of both diagnosis (oncology, cardiology and neurology) and therapy (oncology). Molecular imaging probes, a special class of radiopharmaceuticals, targets specific biochemical signatures associated with disease and allow for non-invasive imaging on the molecular level. Because changes in biochemistry occur before diseases reach the advanced stage, molecular imaging probes make it possible to locate and stage disease, track the effectiveness of drug, treat disease, monitor response, and select patients to allow for more personalized diagnosis and treatment of disease. Based on the same biochemical processes, radionuclide systemic therapy is a powerful method to eradicate disseminated tumour cells and small metastases.

Thus, to improve the differential diagnosis, prognosis, planning and monitoring of cancer treatment, new functional radiopharmaceuticals based on relevant bioactive molecules and promising medical radioisotopes have to be developed and evaluated. The potential interest of a given radio-isotope in medicine depends on a number of factors: the specific decay properties of the radio-isotope to be used; physical and biological half-life (which must be long enough to reach the target but short enough to avoid unnecessary radiation exposure); elemental/chemical properties (purification, post-processing and radiolabelling of bioactive molecules); pharmaceutical formulation constrains; and the ease of production (specific activity, cost effectiveness, availability).

As one of the alternative route for production of emerging/promising radioisotopes for nuclear medicine, ELI-NP will employ (g, n) nuclear reaction to produce such radioisotopes, with relevant quantity and quality. Prospective radioisotopes to be produced by (g,n) reactions simulations of the target geometry and estimation of activity of some radioisotopes of interest for nuclear medicine will be presented.

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