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Acknowledgement
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ERAPerMed

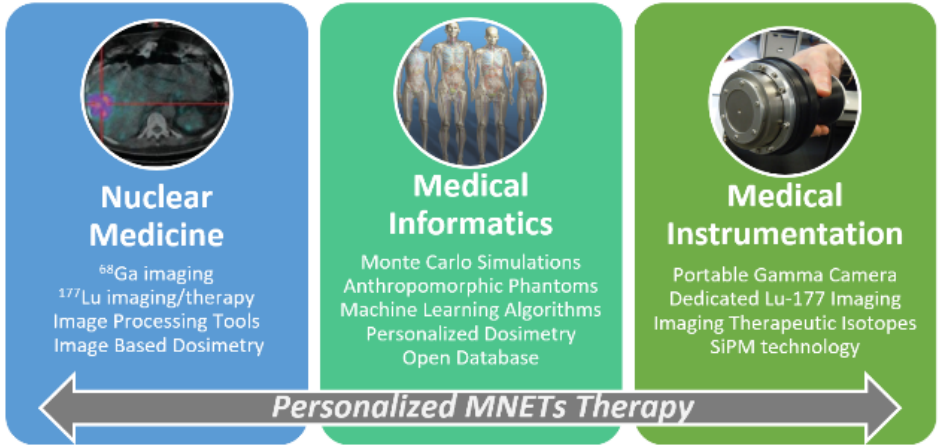
JOINT TRANSNATIONAL CALL FOR PROPOSALS (2019) FOR "PERSONALISED MEDICINE: MULTIDISCIPLINARY RESEARCH TOWARDS IMPLEMENTATION"

popeye

Personalized Optimization of Prognostic and thErapeutic protocols with Lu-177 for MNETs, through the development of advanced computational tools and a portable detection sYstEm

Objectives

POPEYE project uses advanced computational tools for the optimization of midgut neuroendocrine tumors (MNETs) treatment, towards the personalization of ^{177}Lu therapeutic protocols. MNETs constitute the largest group of gastrointestinal NETs and they are the second most-common small bowel malignancy. Establishing prognosis and guiding patients about the most appropriate course of therapy are both challenging. An interdisciplinary approach exploits established tools and novel developments to increase the early, effective diagnosis and the efficacy of ^{177}Lu radionuclide therapy.



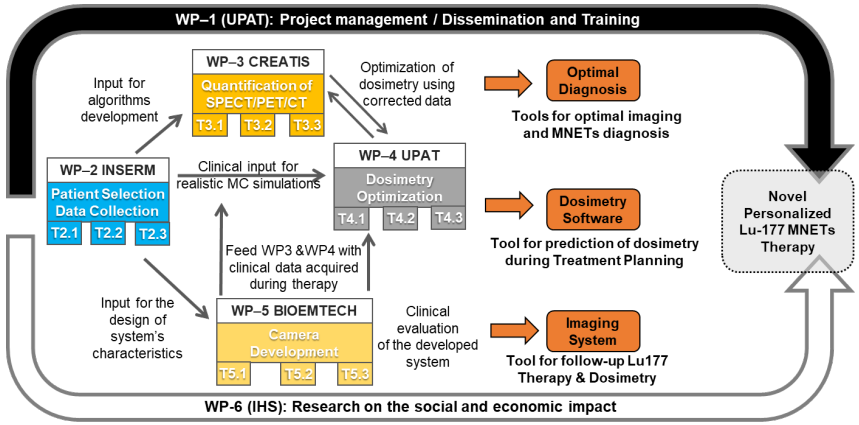
Consortium

POPEYE project uses advanced computational tools for the optimization of ^{177}Lu therapies, **towards the personalization of clinical protocols**. An interdisciplinary approach, **exploits** the *experienced knowledge* of the consortium members, **proposes** *novel software tools* for optimizing treatment plans and estimating dosimetry based on specific characteristics of each patient and **develops** *a unique portable imaging system* as a support guidance to the clinicians. ***Clinical experience***, ***Machine Learning techniques***, ***Monte Carlo simulations***, ***radiomics investigation*** and ***hardware engineering*** will be used to reach the main goal of the project as well as extended ***economic, ethical, legal*** and ***social aspects*** (**ELSA**) will be analysed for the practicability and acceptability of the optimized treatment approach.

Methodology & Workflow

POPEYE aims to address state-of-the-art challenges by:

- Using pre-treatment datasets for improving patients' selectivity based on radiomics extraction.
- Developing image processing algorithms using Machine Learning (ML) techniques for improving accuracy in diagnostic data.
- Optimizing the treatment plans of each individual patient, exploiting Monte Carlo (MC) simulations for accurate dosimetry assessment.
- Developing a novel portable gamma camera, allowing bedside whole-body patient imaging.
- Evaluating the developed open-software tools in clinical environment.
- Applying socio-economic research to optimize the impact of the project results in European health care system.



Clinical data derived from diagnostic (^{68}Ga) and therapy (^{177}Lu) procedures are used to optimize the quantification on SPECT/PET acquisitions and to accurately extract tumour radiomics. MC simulations incorporating ML techniques serve as gold standard and allows to estimate dosimetry on personalized treatment protocols. A well-established management & dissemination plan in combination with an extensive research on economic, ethical, legal and social aspects will allow to achieve ***POPEYE***'s final goal; *the clinical evaluation and exploitation of the proposed software & hardware tools, as a support guidance to the clinicians, to assess personalized MNETS diagnosis and therapy protocols*.