

Postdoctoral Position in medical physics (M/F)

“Deep Learning for radiation therapy toxicity assessment in radiation therapy”

The hosting structure

Institut Curie

The Institut Curie (IC), founded by Marie Curie in 1909, is a comprehensive cancer centre accredited by OEI employing more than 3500 researchers, physicians, medical physicists and nurses all dedicated to the fight against cancer. IC has therefore a long-standing history of basic and translational radiation research and is a major player in the research and fight against cancer. One objective of the IC is also to develop basic research and to use the knowledge produced to improve the diagnosis, prognosis, and therapeutics of cancers as part of the continuum between basic research and innovation serving the patient. This position will be associated with a research project led by Institut Curie, whose goal is to develop new radiation therapy methods and their application to innovative treatments such as FLASH radiotherapy. This is an exciting opportunity to join the radiation therapy research activities in Orsay, within both the hospital and the research center.

Context

Laboratory

The Laboratory of Translational Imaging in Oncology (LITO) is a research unit (U1288) supported by Inserm (= French NIH) and Institut Curie, the first cancer center in France (<https://www.lito-web.fr/>). LITO includes approximately 30 researchers, including physicists, engineers, physicians, pharmacists, and technologists. The Orsay Proton therapy Center (CPO), founded in 1991, is part of the radiation oncology department at Institut Curie hospital group, which is one of the European-wide recognition as a Comprehensive Cancer Center of excellence.

Position

Radiotherapy is currently one of the main techniques used for the treatment of cancer. During the last thirty years, numerous technical advances have allowed to considerably improve the conformation of the irradiations to the specific characteristics of each tumour and to reduce their side effects. Nevertheless, the tolerance of healthy tissues remains the main limitation of this type of treatment, especially in the case of particularly radiosensitive patients, such as children, or radioresistant tumours for which the control of the side effects of radiotherapy remains a major therapeutic challenge. The development of innovative approaches that reduce the sensitivity of healthy tissues to irradiation while maintaining the efficacy of the treatment on the tumour is therefore of crucial importance for the progress of the efficacy of radiotherapy. Recently, pioneering work at the Institut Curie demonstrated that ultra-high dose rate irradiation or spatially fractionated radiotherapy could have a major healthy tissue sparing effect while preserving anti-tumour efficacy.

Within the radiation oncology department and LITO team based at the Institut Curie- Hospital Orsay (91), the medical physics' team is recruiting a postdoctoral fellow, with a strong interest in translational research on cancer treatment. As part of the activities of this project, the applicant would be expected to leverage machine and deep learning for predicting patient response to treatment as well as radiation therapy toxicity, especially in the context of innovative radiotherapy techniques (FLASH, protons, VHEE).

The tasks will include:

- Using radiomics and machine/deep learning to predict patient response to cancer treatment, with a focus on incorporating uncertainty calculations and model explainability/interpretability methods.

- Analyzing large, high-quality datasets using innovative image-registration, machine learning, and dose characteristics (dose-based radiomics), to develop mathematical models that could be used to predict and avoid key morbidity/toxicity endpoints in radiotherapy treatment planning.
- Conduct thorough evaluations and validations of the developed algorithms using clinical datasets.
- Contribute to the documentation and dissemination of research findings through reports and presentations.

Candidate Profile

The candidate must hold a PhD preferably in data science, within AI applications and/or developments in radiotherapy/medical physics, or a related discipline • Preferred expertise and experience in one or more of the following areas: programming skills (MATLAB, Python, C++, TensorFlow, PyTorch) multivariate statistics, machine learning, deep learning and explainable AI. You will also be expected to have experience in working as part of a multidisciplinary team.

All our opportunities are open to people with disabilities

Contract information

Type of contract: *Fixed-term contract.*

Starting date: *as soon as possible*

Duration: *24 months*

Working time: *full time- number of days*

Remuneration: according to the current grids

Benefits: Collective catering, reimbursement of transportation fees up to 70%, supplementary health insurance

Location of the position: *Orsay*

Reference: *not to be completed*

Contact

Please apply by e-mail (CV + application letter + references/support letter) to ludovic.demarzi@curie.fr

Deadline for application: 30th Dec 2024

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and is dedicated to the highest standards of research integrity.*