Postdoctoral Training Fellow in Computational Imaging
Candidate Information

April 2024

The Institute of Cancer Research

About our organisation

We are one of the world's most influential cancer research institutes with an outstanding record of achievement dating back more than 100 years. We are world leaders in identifying cancer genes, discovering cancer drugs and developing precision radiotherapy. Together with our hospital partner The Royal Marsden, we are rated in the top four centres for cancer research and treatment worldwide. As well as being a world-class institute, we are a college of the University of London.

We came second in the league table of university research quality compiled from the Research Excellence Framework (REF 2021). We have charitable status and rely on support from partner organisations, charities, donors and the general public. We have more than 1000 staff and postgraduate students across three sites – in Chelsea and Sutton.

Computational Imaging, Radiotherapy and Iaging

The Blackledge Lab is based at the Institute of Cancer Research (ICR) in London, England. The lab was founded in 2019 with a focus on understanding the interface between medical imaging and computational science in oncology. In particular they aim to develop techniques that monitor imaging changes that inform on patient response and toxicity following radiotherapy. Our enthusiastic team of scientists are passionate to translate their research into clinically practical solutions in order to ensure that patients can benefit from emerging computational techniques. We actively engage with commercial partners to transfer our research into clinical tools.

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Soft tissue sarcomas (STS) are heterogeneous tumours for which choice of treatment is guided by sub-type and grade. Tumour heterogeneity plays a pivotal role in the evolution of cancer cells, fostering resistance and diminishing treatment efficacy. However, there are no established biomarkers for monitoring heterogeneous changes in STS, making radiotherapy (RT) adaptation based on heterogeneity impractical. Tissue biopsies are specific but prone to sampling errors and cannot monitor the same region over time. Blood markers lack the tumour intrinsic and spatial information needed to locate early RT resistance.

Quantitative magnetic resonance imaging (qMRI) offers exceptional visual characterization of the tumour microenvironment. However, due to a lack of appropriate tools, imaging response biomarkers ignore heterogeneity opting instead to measure averages across the tumour volume (Winfield, 2019). Studies have tried to improve this through AI-generated "habitat maps", which identify tumour subregions within qMRI that display visually similar properties (Blackledge, 2019). However, this approach does not assess heterogenous *change* at a regional (voxel) level, and there remains uncertainty as to whether the heterogeneity observed accurately reflects tissue differences.

Harnessing a unique dataset from a trial we lead at the RMH (AIMS-RT), the postdoc will develop a novel Bayesian pipeline for deriving dynamic habitat maps from qMRI. This will offer key insights into regional changes occurring in STS during RT. Importantly, the approach will fully characterize the *uncertainty* in image co-registration, which can be incorporated into downstream Bayesian correlation studies. By repurposing the technology, they will also be able to identify whether the changes seen on qMRI correlate with heterogeneity seen on digital pathology of macro-block tissue sections in the same patients. Gold standard definitions of cellular heterogeneity are currently provisioned by pathologist assessment, but the recent uptake of Digital Pathology programmes has spurred huge advanced in AI-assisted quantification.

Our mission
is to make the
discoveries that
defeat cancer.

Our values

The ICR has a highly skilled and committed workforce, with a wide variety of roles, each requiring different skills. But whether you work as a researcher, or work as part of our corporate team, your work and behaviour is underpinned by these six values. They are what bring us together as one team - as 'One ICR'.

Pursuing excellence

We aspire to excellence in everything we do, and aim to be leaders in our field.

Acting with Integrity

We promote an open and honest environment that gives credit and acknowledges mistakes, so that our actions stand up to scrutiny.

Valuing all our people

We value the contribution of all our people, help them reach their full potential, and treat everyone with kindness and respect.

Working together

We collaborate with colleagues and partners to bring together different skills, resources and perspectives.

Leading innovation

We do things differently in ways that no one else has done before, and share the expertise and learning we gain.

Making a difference

We all play our part, doing a little bit more, a little bit better, to help improve the lives of people with cancer.

"

Our values set out how each of us at the ICR, works together to meet our mission – to make the discoveries that defeat cancer. They summarise our desired behaviours, attitudes and culture – how we value one another and how we take pride in the work we do, to deliver impact for people with cancer and their loved ones."

Professor Kristian Helin
Chief Executive

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Job description

Department / division:	Radiotherapy and Imaging
Pay grade / staff group:	Scientific Professional
Hours / duration:	Full time (35 hours per week), Monday to Friday. Fixed term contract for 0.5 years
Reports to:	Matthew Blackledge
Accountable to:	
Main purpose of the job:	To develop Baysian registration tools

Duties and responsibilities:

To develop research tools using a bespoke Python platform (https://osirixgrpc.github.io/osirixgrpc/), that allow spatial registration of MRI scans acquired at different time-points.

To develop Beysian techniques for imaging data analysis, including correlation studies with histopathology data

To help supervise and advise PhD students within the lab.

To prepare scientific papers and abstracts for submission to prestigious journals and conferneces.

To actively engage in scientific discussion and idea generation within the team as a whole.

General

All staff must ensure that they familiarise themselves with and adhere to any ICR policies that are relevant to their work and that all personal and sensitive personal data is treated with the utmost confidentiality and in line with the General Data Protection Regulations

Any other duties that are consistent with the nature and grade of the post that may be required.

To work in accordance with the ICR's Values.

To promote a safe, healthy and fair environment for people to work, where bullying and harassment will not be tolerated.

This job description is a reflection of the present position and is subject to review and alteration in detail and emphasis in the light of future changes or development.

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Person specification

Education and Knowledge

A PhD in medical physics or equiavalent.	Essential
Cancer Imaging	Essential
MRI Physics	Essential
Cancer Biology	Desirable

Skills

Medical image processing	Essential
Writing papers and conference abstracts	Essential
Python coding	Essential
Basic scientific statsitics	Essential
Bayesian probability theory	Desirable

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Benefits

We offer a fantastic working environment, great opportunities for career development and the chance to make a real difference to defeat cancer. We aim to recruit and develop the best – the most outstanding scientists and clinicians, and the most talented professional and administrative staff.

The annual leave entitlement for full time employees is 28 days per annum on joining. This will increase by a further day after 2 years' and 5 years' service.

Staff membership to the Universities Superannuation Scheme (USS) is available. The USS is a defined benefit scheme and provides a highly competitive pension scheme with robust benefits. The rate of contributions is determined by USS and details of the costs and benefits of this scheme can be found on their website. If staff are transferring from the NHS, they can opt to remain members of the NHS Pension Scheme.

We offer a range of family friendly benefits such as flexible working, a parents' group, and a maternity mentoring scheme. Other great benefits include interest free loans for discounted season tickets for travel and bicycle purchases, access to the NHS discounts website, a free and confidential Employee Assistance Programme which offers a range of well-being, financial and legal advice services, two staff restaurants, and access to a gym and sporting facilities at our Sutton site.

Further information

You may contact Matthew Blackledge for further information by emailing matthew.blackledge@icr.ac.uk. This job description is a reflection of the current position and is subject to review and alteration in detail and emphasis in the light of future changes or development.