

Cambridge ACED PhD Supervisors 2022

Name	University of Cambridge Department	Research Description
Professor Ludovic Vallier	Cambridge Stem Cell Institute, Surgery	<p>The Vallier's group based at the Jeffrey Cheah Biomedical Centre takes advantage of human pluripotent stem cells and primary organoids to generate cells with a clinical interest for disease modelling and cell-based therapy. More precisely, we investigate the molecular mechanisms controlling cell fate decisions during human development and exploit the resulting knowledge to produce liver cells including hepatocytes and cholangiocytes. The resulting cells are currently used to study liver disease and to identify new target gene for drug development.</p> <p>www.stemcells.cam.ac.uk/people/pi/vallier</p>
Dr Serena Nik-Zainal	Medical Genetics / Oncology	<p>Mutational-signatures are a read-out of the cellular abnormalities that arise in a cell as it turns from being normal to being malignant. Already, my team has shown that mutational signatures can be informative of DNA repair defects that may be targets for therapeutic intervention. Critical to the success of this proposal is our unique position as a pioneering team in comprehensive genomic characterisation and in clinical applications of mutational signatures. We are looking for a computational biology PhD candidate with interest in exploring genomic evolutionary perspectives and other molecular layers including the transcriptome and proteome in early cancer development. The candidate will work with cancer as well as large volumes of experimental data in order to understand the cellular mechanisms that go awry early in cancer development.</p> <p>https://medgen.medschl.cam.ac.uk/serena-nik-zainal/</p>
Dr Jamie Blundell	Oncology	<p>Can you use non-invasive sampling to predict someone's future risk of developing a cancer? To answer this question we combine evolutionary principles, genomics and mathematics to analyse unique collections of longitudinal blood samples collected from hundreds of thousands of healthy people before they develop disease. By zooming on the people who develop cancer, these samples enable us to rewind time by performing genomic analyses on blood samples collected years before the cancer was diagnosed. This provides a detailed genetic and epigenetic history of the disease, enabling one to identify the earliest signs of something going awry. We use these data to develop probabilistic forecasts of cancer risk from a blood sample to identify those most in need of intervention.</p> <p>www.oncology.cam.ac.uk/research/our-research/blundell</p>

Dr Daniel Munoz-Espin	Oncology	<p>My laboratory works in the fundamental processes and mechanisms related to cancer initiation and progression, with a particular focus on lung cancer and the tumour microenvironment. We are interested in processes like cellular senescence, plasticity, cancer stem cells and immunosuppression. Our laboratory has developed a variety of mouse models of lung cancer, including xenografts, orthotopic transplantation, and Kras-driven mouse models, together with mouse models and tools to manipulate cellular senescence, plasticity and the immune system. We use this knowledge to design and validate novel tools and strategies for the early detection of cancer and therapeutic interventions targeting early tumours, including premalignant lesions.</p> <p>www.oncology.cam.ac.uk/research/our-research/munoz-espin</p>
Dr Elizabeth Soilleux	Pathology	<p>The Soilleux laboratory works on novel ways to assess immune responses, assessing T-cell and B-cell receptor repertoires by means of novel laboratory and bioinformatic approaches. While much of our focus to date has been on coeliac disease and COVID-19, we recognise that microsatellite unstable cancers (colorectal, gynaecological, hepatobiliary) produce proteins containing point mutations, which are highly immunogenic. We are interested in using T-cell and B-cell receptor repertoire analysis to identify immune responses to microsatellite unstable cancers, focussing initially on immune infiltrates within the cancers themselves, and then applying the same knowledge and approach to blood samples. By this means, we intend to create a novel early diagnostic test that could be applied serially to patients with a known risk of microsatellite unstable cancers, to permit early detection and treatment of these cancers. This could both detect cancers earlier and avoid the need for more invasive diagnostic processes, such as endoscopy.</p> <p>www.path.cam.ac.uk/directory/elizabeth-soilleux</p>
Dr Walid Khaled	Pharmacology & Stem Cell Institute	<p>Our research is driven by the fact that we still have little understanding of how hundreds of identified genetic aberrations impact tissue homeostasis leading to tumour development. In particular, the early stages of pre-cancer development remain poorly understood. Yet, it has a huge potential to improve success rates of early detection, prevention and treatment of cancer. My laboratory works on defining the early cellular and molecular events that drive tumour initiation and development. In particular, we focus on how the cell of origin affects the differentiation trajectory of nascent tumour cells and dictates changes in the microenvironment thus enabling tumour growth and immune evasion. We utilise sophisticated mouse models, human samples and single cell genomics to tackle these problems with the ambition of applying this knowledge to develop new approaches for the early detection and prevention of epithelial cancers.</p> <p>www.phar.cam.ac.uk/research/Khaled</p>

Prof Stephen Morris	Public Health and Primary Care	<p>I am a health economist interested in the economics of cancer early detection. Decisions about whether or not to adopt cancer early detection programmes depend on their clinical effectiveness, and also their cost-effectiveness (whether or not they represent good value for money). This depends on the costs to the health system/society, and benefits to patients/families. I am interested in supervising PhD students who want to apply health economic methods to any area of cancer early detection, including modelling the cost, cost-effectiveness and budget impact of early cancer detection programmes, ascertaining preferences for early detection programmes using discrete choice experiments, accounting for overdiagnosis and for repeat screening over the lifetime, costs and benefits of risk-tailored screening versus age-based screening, and the economics of strategies for increasing uptake. I am happy to supervise projects related to any cancer and any type of early detection intervention.</p> <p>www.phpc.cam.ac.uk/people/pcu-group/pcu-senior-academic-staff/stephen-morris/</p>
Prof Paul Pharoah	Public Health and Primary Care	<p>The major focus of my research programme has been the genetic epidemiology of cancer with a specific interest in ovary and breast cancer. Current key interests of my group are the development of polygenic risk scores (PRS) and the identification of rare genetic variants in the non-coding genome that are associated with cancer risk. The genetic data to support the PRS work come from the international Ovarian Cancer Association Consortium that my group has curated over the past 15 years together with publicly-available data for genome-wide association studies for multiple phenotypes including data from UK Biobank. The rare variant project will utilise publicly-available exome and genome sequencing data from multiple sources including UK Biobank and the 100,000 Genomes Project.</p> <p>https://ccge.medschl.cam.ac.uk/dr-paul-pharoah/</p>
Dr Joshua Kaggie	Radiology	<p>Deuterium MRI is a new method for metabolic imaging that could enable sensitive metabolic imaging of cancers at early stages. Deuterium MRI tracks labelled deuterium metabolites that are either orally ingested or intravenously injected to monitor their conversion and eventually stage a cancer. For example, deuterium MRI can monitor the conversion of glucose to lactate, which is the basis of PET imaging due to the Warburg effect. Deuterium MRI is targeted as a inexpensive and safe method that either supplement or possibly rival PET imaging. This PhD can offer several routes of developing the student's skills and imaging methods, due to the need to develop new acquisition methods, analysis and interpretation of the data, and recruitment of patients into clinical studies, with the support of departmental researchers. The ideal candidate will have prior experience in engineering, programming, or clinical imaging, and must have strong analytical and communication skills.</p> <p>https://radiology.medschl.cam.ac.uk/about-us/departmental-staff/research-staff/dr-joshua-kaggie/</p>

Dr Luigi Aloj	Radiology	<p>Radionuclide imaging methods can provide sensitive tools for in vivo detection of the expression of biological targets in organs and tissues. These techniques can complement anatomical imaging for characterization of indeterminate lesions supporting early cancer diagnosis. One example of this approach is the use of positron emission tomography (PET) with fluorodeoxyglucose (FDG) to characterize indeterminate lung nodules identified on computed tomography (CT), allowing to identification of lesions that are more likely to be malignant to action. New applications of radionuclide imaging for early cancer detection, particularly with the use of PET, can cover areas of unmet clinical need. Recent advances in scanner technology, discovery of molecular targets that are specific to malignant transformation and development of novel radiolabeled high affinity ligands for cancer specific targets are research areas contributing to the expansion of these applications. Our group is interested in developing PET methods for this setting</p> <p>https://radiology.medschl.cam.ac.uk/about-us/departmental-staff/academic-staff/dr-luigi-aloj/</p>
Dr Tristan Barrett	Radiology	<p>My main research interest is prostate cancer, particularly using MRI to identify and characterise tumours. I led the first sodium-MR study in prostate patients and we are one of few sites worldwide performing clinical ¹³C-hyperpolarised MR in patients. My prostate MRI research has led to the introduction of 'front door' imaging, moving MRI earlier in the pathway, allowing biopsy planning and changing the paradigm of prostate cancer diagnostics - 11 of my papers were referenced in the 2019 NICE prostate cancer guidelines. I have recently published on Artificial Intelligence techniques to characterise prostate tumours and plan to link MRI data with biopsy tissue to identify radiogenomic markers of aggressiveness and use AI to answer key clinical questions at the intersection of interpretation, imaging and biopsy. I currently hold an ACED grant using AI to develop a dynamic predictive model for risk of prostate cancer progression on active surveillance (PROGRESS Prostate).</p> <p>https://radiology.medschl.cam.ac.uk/about-us/departmental-staff/academic-staff/dr-tristan-barrett/</p>

Prof Ferdia Gallagher	Radiology	<p>Our group develops and translates new clinical imaging methods for detecting cancer, allowing tumours to be discovered earlier and therefore improving patient survival. We use MRI and PET and are particularly interested in how alterations in tumour metabolism can differentiate normal tissue from malignancy. We administer key metabolites labelled with stable isotopes (carbon-13 or deuterium) to patients and volunteers, so we can image real-time metabolism. Using novel clinical tools such as Hyperpolarised MRI and Deuterium Metabolic Imaging, we can non-invasively image tissue metabolism with unprecedented sensitivity. We have also developed imaging methods to probe changes in the immune system as cancers proliferate, as well as exploring the interrelationship between imaging and other tools for early tumour detection such as circulating tumour DNA. As a group, we are multidisciplinary (physicists, chemists, biologists, and clinicians) and have a passion for discovering how new imaging techniques can be used to detect cancer earlier.</p> <p>https://radiology.medschl.cam.ac.uk/about-us/departmental-staff/academic-staff/professor-ferdia-a-gallagher/</p>
Prof Grant Stewart	Surgery	<p>In patients cured of solid cancers, surgery is by far the predominant curative treatment. But in order to identify patients with early enough cancer to enable this cure, better early detection approaches are needed. As Professor of Surgical Oncology at University of Cambridge I am interested in identifying methods of such early detection across cancers but my niche as a Consultant Urologist is in kidney cancer research which is a great model for making such advances. My group and close collaborators work on a range of early detection projects all of which have potential PhD projects. My areas of interest are: (a) screening for abdominal cancers, I run the world's only CT scan based screening study for abdominal cancers; (b) developing methods, clinical and/or molecular, of targeted cancer screening; (c) development of new biomarkers of early detection of kidney cancer using non-invasive biosamples such as urine.</p> <p>https://surgery.medschl.cam.ac.uk/staff/stewart/</p>