Medical Research Council

SUMMER 2021

MRC Investigators and Directors

Directory of research programmes at MRC Institutes and Units

Foreword

I am delighted to introduce you to the exceptional researchers at our MRC Institutes and Units – **the MRC Investigators and their Directors**.

In November 2020, MRC established the new title of **"MRC Investigator"** for Programme Leaders (PL) and Programme Leader Track (PLT) researchers at MRC Institutes and Units. These individuals are world-class scientists who are either strong leaders in their field already (PLs) or are making great strides towards that goal (PLTs). Based on what they have achieved in their research careers so far, the title will no doubt become synonymous with **scientific accomplishment**, **impact** and **integrity**.

MRC endeavours to do everything it can to support its researchers at all career stages. For this reason, we chose not to distinguish between levels of seniority within the new title. We believe this will be an advantage to junior leaders on the Programme Leader Track. Having been in their position earlier in my career, I appreciate the need for a researcher's CV to stand out amongst the numerous applications that funders and employers receive.

The MRC Institute and Unit **Directors** are outstanding and experienced scientists. As well as leading their own research programmes, they also ensure that their Institute or Unit it is achieving its mission by recruiting and developing excellent researchers with specialist and transferable skills that can be applied to carrying out ground-breaking medical research at their establishment.

To support the MRC Investigators and Directors in advancing medical research, MRC provides core funding to the MRC Institutes and University Units where they carry out their work. These establishments cover a huge breadth of medical research from molecular biology to public health. As you will see from the directory, the MRC Investigators and Directors are making considerable advances in their respective fields through their innovative and exciting research programmes. Their accomplishments have been recognised beyond MRC and many have been awarded notable prizes and elected to learned societies and organisations.

As well as being widely recognised within the scientific and academic communities, the well-established and newer title of "Director" and "MRC Investigator", respectively, are a signal to the public of the expert-level status of these individuals. The values and mission of MRC include disseminating knowledge and promoting dialogue with the public about medical research and their affiliation with MRC should bestow confidence and trust in the information our MRC Investigators and Directors provide.

I hope that all who read and use this directory will enjoy finding out about the brilliant researchers we fund at our MRC Institutes and Units. I encourage you to connect with them to collaborate and discover more.

Professor Fiona Watt
Executive Chair of the
Medical Research Council

MRC Units and Institutes

The MRC has a mission to support research and training with the aim of maintaining and improving human health. To address important scientific opportunities and health needs, we support mission-focused Institutes*, Units and Centres. These establishments carry out ground-breaking research including innovative methodology and technology development.

Institutes – very long-term flexible multidisciplinary investments

Units – more focused investments established for as long as needed to support a scientific need and/or deliver a research vision

Both are mission-focused and carry out ground-breaking research including innovative methodology and technology development. Developing strategically driven initiatives, led by an expert scientific Director, can help promote novel, high risk approaches, cooperative research programmes, or the development of shared infrastructure.

They are all expected to recruit and, in partnership with the HEIs and other organisations, develop outstanding researchers with specialist and transferable skills for academic research, the health services and the national economy. They work in partnerships to ensure maximal knowledge transfer for health benefit.

In any field, the need for these support mechanisms will change over time. Successful research progress may mean that approaches are quickly integrated into HEI research in the area, or that a unit or centre has to change its form and direction.

*This booklet features researchers from our Institutes that are solely funded by MRC and does not include our partnership Institutes: Health Data Research UK, The Francis Crick Institute and UK Dementia Research Institute. These are major MRC investments and strategic partnerships but as independent organisations that are co-funded by other funding bodies, with their own identity and branding, the MRC Investigator title is not applicable.

Institutes

Institutes adopt broad multidisciplinary approaches to address major challenges in health-related research often requiring ground breaking methodology and technology development.

They are provided with sustained support and state-of-the-art facilities over a long period of time. This allows the use of highly innovative and risky approaches across a flexible range of disciplines, that would not be feasible in a university setting, to tackle crucially important and complex issues over long periods of time.

Institutes attract and develop outstanding students and early career scientists from the UK, and internationally, providing in-depth, advanced research training and a broad multidisciplinary research environment.

Units

Units are set up to meet specific needs, for example, to provide scientific leadership in key research fields, or to tackle important research questions where the need cannot easily be addressed through grant funding. This can be because the research area calls for:

- **Strong and distinctive scientific leadership**
- **Close coordination across disciplines and activities**
- **Development of methods and technologies**
- **Support for the development of novel or higher risk programmes and capabilities.**

Units attract and develop outstanding students and early career programme leaders from the UK and internationally and often have a major impact through developing future research leaders in their specialist areas.

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MRC Epidemiology Unit

MRC Human Genetics Unit

MRC Human Immunology Unit

MRC Integrative Epidemiology Unit

MRC Laboratory for Molecular Cell Biology

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MRC Metabolic Diseases Unit

MRC Mitochondrial Biology Unit

MRC Molecular Haematology Unit

MRC Oxford Institute for Radiation Oncology (OIRO)

MRC Population Health Research Unit

MRC Prion Unit

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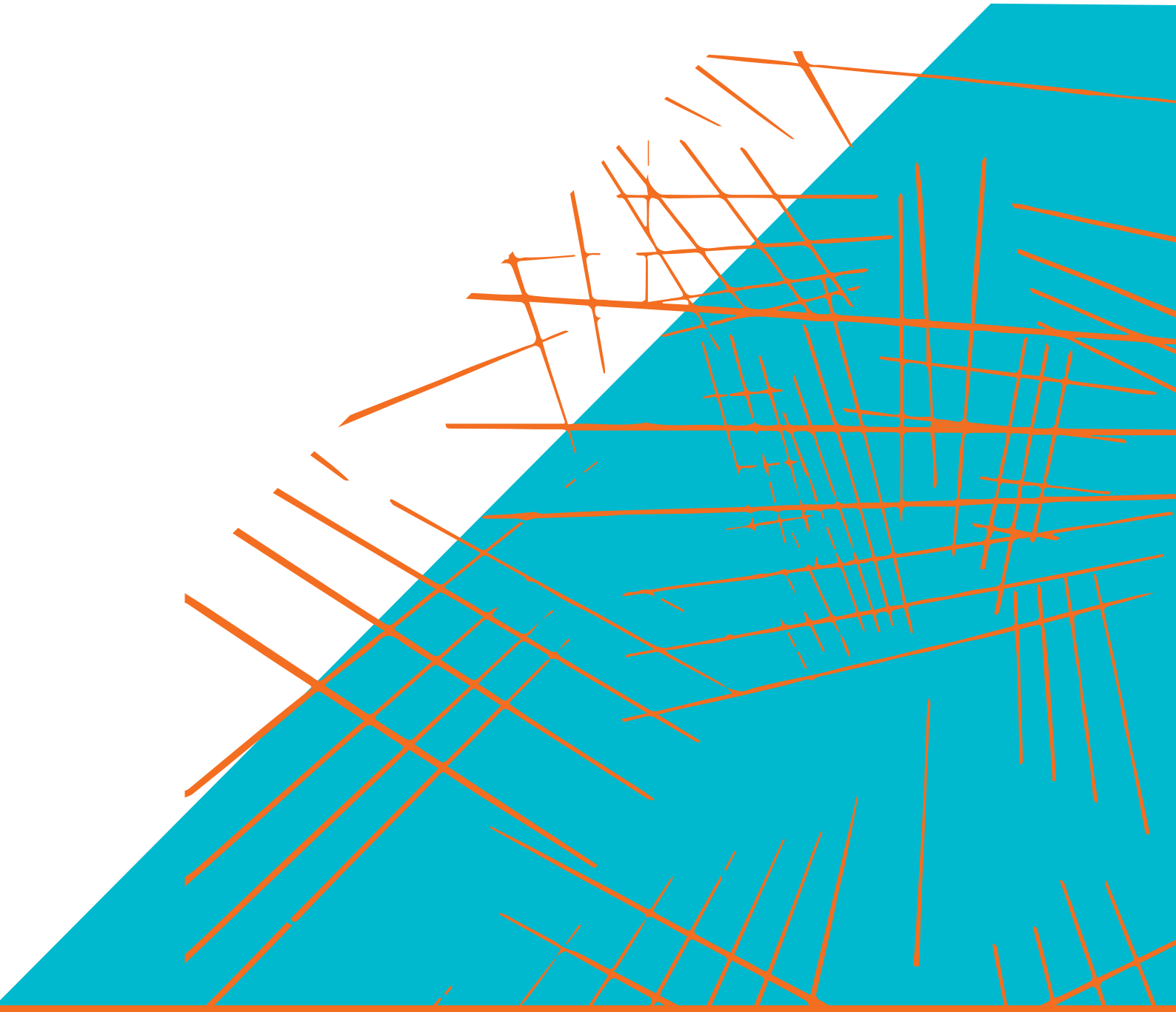
MRC Unit for Lifelong Health and Ageing

MRC Unit, The Gambia at LSHTM

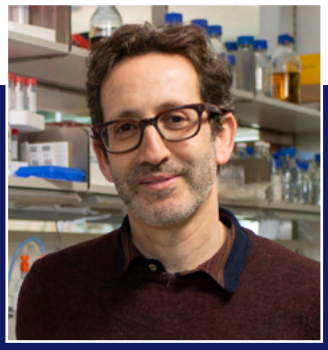
MRC University of Glasgow Centre for Virus Research

MRC/CSO Social and Public Health Sciences

MRC/UVRI & LSHTM Uganda Research Unit



Dr Buzz Baum (CELL BIOLOGY DIVISION)



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Buzz Baum studied Biochemistry at St Catherine's College, Oxford. He worked on the yeast cell division cycle during his PhD (1993-1997) with Paul Nurse at Cancer Research UK, then on fly cell shape with Norbert Perrimon at Harvard Medical School as a post-doc. In 2001 he was awarded a Royal Society Fellowship to return to the UK as a group leader. In 2007 his team moved to UCL's MRC Laboratory for Molecular Cell Biology. In 2020, he moved to the MRC-LMB in Cambridge where he now has his lab.

Research Interests

My team is interested in the generation of biological form. The most extraordinary and fundamental of all morphogenetic processes is cell division, when, in the space of a few minutes, all the component parts of the cell must be moved apart and precisely partitioned into two daughter cells. While our focus was always on eukaryotic cells, it has recently become clear that many aspects of the division process have been conserved over billions of years of evolution and have their origins in archaea. This means that by studying division in *Sulfolobus*, an experimentally tractable archaeal relative of eukaryotes, we can strip away much of the confounding complexity to get at core aspects of the division machinery. Ultimately, we hope this work will shed light on the process by which the eukaryotic cell emerged from the symbiosis of an archaeal cell and its bacterial partner – something that remains one of the great outstanding mysteries in the history of life on earth.

Dr Simon Bullock (CELL BIOLOGY DIVISION)

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Between 1995-1999, Simon Bullock completed his PhD on mouse development supervised by Dr Rosa Beddington FRS (MRC National Institute for Medical Research, London). Between 1999-2004 he did post-doctoral work with Dr David Ish-Horowicz FRS on cytoplasmic mRNA localisation (Cancer Research UK, London Research Institute). He has been a Group leader in the Cell Biology Division at MRC LMB since 2004. His other achievements include winning the Lister Institute Research Prize (2008) and being elected a member of EMBO (2015).

Research Interests

My lab's overarching goal is to elucidate how microtubule-based motors orchestrate intracellular trafficking. We address this problem by combining reconstitution of transport complexes *in vitro* with genetic dissection of cargo trafficking in *Drosophila* and mammalian cells. In the past we have discovered key mechanisms governing the assembly and activity of the dynein motor machinery, as well as novel links between impaired transport and neurological dysfunction in ageing and disease. We have also developed CRISPR tools that greatly facilitate functional analysis in flies. Our future plans include:

(i) characterising novel players in intracellular trafficking that we recently identified in biochemical and genetic screens

(ii) reconstituting the machinery for differential mRNA localisation

(iii) elucidating the disease relevance of interactions between neurodegenerative disease-associated peptides and the axonal transport machinery.

Dr Emmanuel Derivery (CELL BIOLOGY DIVISION)

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Emmanuel Derivery was trained in France (Ecole Normale Superieure de Lyon) and did his PhD between the Curie Institute and the Laboratoire d'Enzymologie et Biochimie Structurales in Paris working on actin dynamics in cells. He then moved to Geneva to work in the lab of Marcos Gonzalez Gaitan to study microtubule dynamics during fly development. He then moved to the LMB to start his own lab.

Research Interests

Asymmetric cell division is the process by which one cell divides into two daughter cells that have different fates. Asymmetric division is the hallmark of stem cells, in which one daughter cell specialises to perform a specific function in the organism, while the other becomes another stem cell that keeps the ability to divide. We are interested in understanding how cell fate determinants segregate asymmetrically during asymmetric division. Our approach is highly pluridisciplinary, from reconstituted cytoskeleton systems *in vitro*, high-end quantitative imaging of trafficking *in vivo* during development, to analysis of morphological phenotypes in adult flies, relying on theoretical physics to bridge these different scales. We also develop novel imaging and bioengineering tools.

Dr Ramanujan Hegde (CELL BIOLOGY DIVISION)

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Ramanujan Hegde earned his MD and PhD from UCSF in 1999, completing his thesis work in the laboratory of Vishwanath Lingappa. He then started his own research group at the US National Institutes of Health, becoming Senior Investigator in 2008. In 2011, Hegde moved to the MRC Laboratory of Molecular Biology in Cambridge, where he is currently a Programme Leader and Joint Head of the Cell Biology Division. He is a member of EMBO and a Fellow of the Royal Society.

Research Interests

My lab has two interrelated goals. The first is to understand the mechanistic principles underlying membrane protein localisation and maturation. The second is to understand the quality control pathways that deal with inevitable errors during protein biogenesis. The group uses biochemical, cell biological, and structural approaches to identify and functionally reconstitute the machineries underlying these basic cellular pathways. Highlights from our work include:

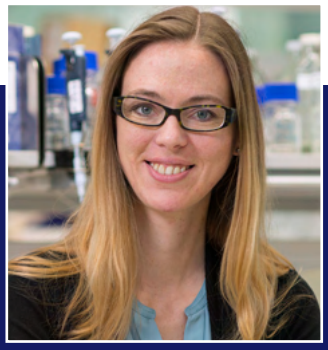
(i) the identification and mechanistic dissection of pathways for membrane protein targeting, insertion and folding

(ii) demonstration that protein mis-localisation can lead to neurodegeneration

(iii) discovery and analysis of several quality control pathways that dispose of mislocalised proteins

(iv) mechanistic insights into how cells detect and resolve ribosomes that stall during translation.

Dr Madeline Lancaster (CELL BIOLOGY DIVISION)



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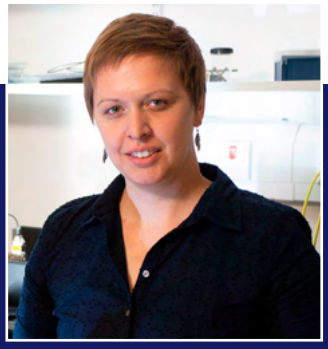
Madeline Lancaster studied biochemistry at Occidental College, Los Angeles, USA, before completing a PhD in 2010 in biomedical sciences at the University of California, San Diego, USA. She then joined the Institute of Molecular Biotechnology of the Austrian Academy of Sciences (IMBA) in Vienna, Austria as a postdoctoral researcher where she developed cerebral organoids, before joining the LMB in 2015 to start her own research group.

Research Interests

Research in my lab focuses on human brain development using stem cells to generate brain organoids that allow modelling of human brain development *in vitro*. We study the most fundamental differences between human brain development and that of other mammalian species. We also study cellular mechanisms underlying neurodevelopmental disorders such as autism and intellectual disability. The human brain is greatly expanded, even when compared with our closest living relatives, the other great apes. This size increase relates to numbers of cells, notably neurons, that make up the brain, with the human brain containing approximately 60 billion more neurons than chimpanzees or gorillas. We are interested in how this mind boggling increase in neuron number comes about during development. To study this, we use brain organoids, 3D self-organising tissues derived from pluripotent stem cells. We are comparing organoids from different species, combined with genomic and transcriptomic analyses to uncover the genetic events responsible for early brain expansion.

Dr Kate McDole (CELL BIOLOGY DIVISION)



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Kate McDole is a Group Leader at the MRC Laboratory of Molecular Biology. Her lab explores the morphogenesis of the early mouse embryo using a combination of advanced light-sheet microscopy, biology, computational methods and biophysics. She did her PhD with Yixian Zheng at Johns Hopkins studying cell fate establishment in the pre-implantation mouse embryo and a post-doc with Philipp Keller at HHMI Janelia applying light-sheet microscopy to study early post-implantation mouse development.

Research Interests

Development begins with a single cell that will give rise to all of the different cell types, tissues, and organ systems in the body. How cells organize to build tissues and how those tissues are sculpted to form organs is largely unknown. We use the mouse embryo to study how mechanical forces shape complex three-dimensional structures out of simple cell populations. We use cutting-edge light-sheet microscopy, biochemical techniques, computational methods, genetics and biophysics to dissect the role of forces during development. We are able to follow changes in cell fate, visualise the organisation of tissue structures, and measure the forces involved in shaping those structures. Starting with the endoderm, we are examining how and where forces are generated to turn a relatively simple, single cell layered structure into the primordial gut tube, as well as how this process is coordinated with the development of neighbouring germ layers such as the heart tube and neural ectoderm.

Dr Elizabeth Miller (CELL BIOLOGY DIVISION)

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Elizabeth Miller did her PhD in Biochemistry at La Trobe University (Melbourne, Australia) studying plant vacuolar targeting. She then did a post-doc at UC Berkeley (USA) studying the mechanisms of cargo selection during protein secretion. She joined the faculty at Columbia University (USA) in 2005. In 2015, she joined the Cell Biology Division at MRC LMB. Her work focuses on protein quality control within the secretory pathway.

Research Interests

Secretory and membrane proteins account for a third of the eukaryotic proteome, and play important roles in tissue organisation, nutrient uptake and cell-cell communication. To function in these roles, each protein must be correctly folded, post-translationally modified and delivered to the appropriate compartment. Our long-term aim is to understand the cellular decision making that governs protein quality control in the context of intracellular transport. Ongoing efforts aim to define mechanisms of pre-emptive quality control of membrane proteins, and to dissect the protein-protein interaction network that drive cargo selection and vesicle formation. Our goal is to bridge the gap between the molecular details of protein synthesis, cargo selection and vesicle assembly, and how these machineries are tuned to match the specific physiological needs of a cell.

Dr Sean Munro (CELL BIOLOGY DIVISION)

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Sean Munro completed his PhD (Cambridge, 1983-1987) on the function of heat shock proteins and on the retention of BiP in the endoplasmic reticulum. Postdoc (Harvard, 1987-1989) on interferon receptors. Tenure-track, and then tenured, group leader at MRC LMB from 1989 to the present. His work has included protein retention in the Golgi, cannabinoid receptors, glycosylation, doubting lipid rafts, the role of Rab and Arf GTPases, and vesicle tethering. Since 2012, Head, and since 2019 Joint Head, of the Division of Cell Biology at MRC LMB.

Research Interests

My lab studies the Golgi apparatus, the main sorting station in the secretory pathway, and in particular how organelles display identity cues that allow their recognition by incoming transport vesicles. This identity is largely established by small GTPases that recruit distinct sets of peripheral membrane proteins, including tethers that capture transport vesicles. At the Golgi, these tethers include a set of large coiled-coil proteins called 'golgins'. We have used ectopic vesicle capture by individual golgins to investigate their specificity, identify vesicle adaptor proteins, and analyse the content of the captured vesicles. This approach has identified subsets of vesicles and their contents, including components of intra-Golgi vesicles that contribute to the sorting of Golgi residents. Understanding how specific golgins capture specific subsets of vesicles, and how this contributes to membrane traffic *in vivo*, is currently the major focus of our work.

Dr John Stuart O'Neill (CELL BIOLOGY DIVISION)

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After studying biochemistry in Oxford (1998-2002), John O'Neill worked on circadian rhythms during his PhD (Cambridge, 2002-2006). Between 2006-2011 he engaged in postdoctoral research at MRC LMB (Cambridge), CSBE (University of Edinburgh), and MRL-IMS (Cambridge), before starting his independent group in 2011. His research programme at LMB began in 2013.

Research Interests

Most organisms display ~24-hour cycles in their biology. In humans and other animals, these circadian rhythms result from daily timing mechanisms in every cell that function like a biological clock; allowing our physiology to anticipate and prepare for the differing demands of day and night. Normally our biological clock is fine-tuned each day by the schedule we keep, particularly the timing of meals and light exposure. Incoherent timing cues, as occurs during shift work or jet-lag, disrupts our biological clock and increases the risk of chronic illnesses such as type II diabetes, cardiovascular disease and some cancers. Delineating the molecular mechanisms that impart daily rhythms to our biology is important for understanding human health and may provide new insights into the prevention and treatment of many diseases. Our research is focused on understanding the fundamental mechanisms of daily cellular timekeeping and how circadian regulation of biological function is achieved.

Dr Katja Röper (CELL BIOLOGY DIVISION)

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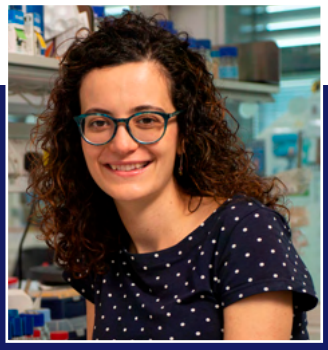
Katja Röper gained a degree in Biochemistry in Berlin before embarking on a PhD in Cell Biology at the University of Heidelberg, studying apical protein trafficking and asymmetric cell division in the mouse neuroepithelium. She then moved to Cambridge, UK, to learn flies as a model system and has remained a Drosophilist ever since. Her lab at the MRC-LMB studies the dynamic behaviour of epithelial tissues during organ morphogenesis, in particular the formation of tubular organs.

Research Interests

Epithelia constitute one of the major tissue types in all animals and form the basic building blocks of tubular organs in both vertebrates and invertebrates. We want to dissect how simple epithelial sheets deform in a highly concerted manner to turn into complex tubular tissue shapes. We use the formation of the tubes of the salivary glands in *Drosophila* embryos and human renal organoids as our main model systems. Changes in the shape of neighbouring cells, as well as cell rearrangements are the major drivers of tissue formation. Cell shape changes are driven by the intracellular cytoskeleton. Coordination between neighbouring cells allows concerted tissue-scale changes in shape, mediated through cell-cell adhesion receptors. My lab's core interest is how cell shape is determined by the cytoskeleton and how cells are coordinated with one another to determine organ shape and how such morphogenetic behaviours are kick-started by transcriptional patterning and mechanical feed-back.

Dr Marta Shahbazi Alonso (CELL BIOLOGY DIVISION)



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Marta Shahbazi is a Programme Leader Track researcher at the MRC Laboratory of Molecular Biology. She obtained her PhD in 2013 at the Spanish National Cancer Research Centre. During her PhD she studied how microtubules regulate cell-cell adhesion in epidermal stem cells. In 2014 she joined the laboratory of Professor Magdalena Zernicka-Goetz at the University of Cambridge as a post-doctoral fellow, to study mammalian embryo development at implantation. She joined the LMB in February 2020.

Research Interests

Pluripotent stem cells have the unique capacity to generate all the cell types of an organism. In the embryo, they undergo concomitant changes in shape and identity to set the foundation of the body plan. What are the molecular mechanisms that coordinate shape and identity? And once a well-defined tissue architecture is acquired, how does it modulate pluripotent stem cell identity, differentiation and fate? To address these questions our group focuses on epithelial tissue determinants and their contribution to stem cell fate. Our final aim is to understand the molecular basis of human embryogenesis, and how the exquisite coordination between fate and shape is affected when development fails. To achieve this aim we deconstruct molecular mechanisms while reconstructing tissues from embryonic stem cells. We anticipate these studies will uncover the molecular rules that direct embryo development and tissue regeneration.

Dr Alexandru Radu Aricescu (NEUROBIOLOGY DIVISION)

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Following undergraduate and MSc degrees in biology and molecular biology at the University of Bucharest, Romania, Alexandru Aricescu moved to the UK where he completed a PhD in neurobiology at University College London. After postdoctoral training in structural biology, he established his research group at the University of Oxford in 2007 with support from an MRC Career Development Award. In 2016 he became a Professor of Molecular Neuroscience. He has led a research programme at the MRC-LMB in Cambridge since 2017.

Research Interests

Neuronal circuits are the biological substrates for all aspects of brain function such as learning, memory, thought, speech and consciousness. The synapses, connecting points between neurons, are continuously remodelled in response to novel experiences and hold the key to understanding how these circuits work. My research group employs a combination of structural biology methods including electron cryo-microscopy, tomography and X-ray crystallography, in order to define in high-resolution the architecture of neurotransmitter receptors, their supra-molecular assemblies and, eventually, whole synapses. We link structural work with neuronal physiology and pharmacology, in order to provide fundamental mechanistic insights into basic neurobiology and to aid the design of better modulators of neurotransmission. We also use structural information to devise molecular tools that can promote the repair of neuronal circuits damaged in neurological disorders, aiming to restore their physiological functions.

Dr Anne Bertolotti (NEUROBIOLOGY DIVISION)

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Anne Bertolotti did her PhD at Strasbourg University with Pierre Chambon and Laszlo Tora. She then completed postdoctoral work with David Ron at the Skirball Institute, NYU Medical Center, NY, USA funded by HFSP and EMBO fellowships (1998-2000). Between 2000-2006 she was an INSERM Investigator. She has been a Programme leader at the MRC LMB since 2006. Her awards and honours include: Fellow of the UK National Academy of Medical Sciences (2017); Hooke Medal (2014); EMBO member (2013); EMBO Young Investigator (2005).

Research Interests

My research focuses on protein quality control in cells, which represent the cellular defence systems against potentially harmful proteins, such as the ones accumulating in neurodegenerative diseases. I was one of the pioneers of the mammalian unfolded protein response and discovered a pathway by which cells maintain proteasome homeostasis. My lab also identified mechanisms underlying the deposition of misfolded proteins in neurodegenerative diseases and contributed to a dogmatic shift in this field with the discovery that mutant SOD1 aggregates propagate indefinitely just like prions. My lab uses pluridisciplinary approaches to study protein quality control systems, and identifies strategies to manipulate their function for potential therapeutics relevant to many age-related diseases. One of the strategies consists of selective inhibition of a phosphatase, an important advance because phosphatases were thought to be undruggable.

Dr Albert Cardona (NEUROBIOLOGY DIVISION)

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Albert Cardona completed his biology degree (2000) and PhD (2005) at University of Barcelona. Between 2005-2008 he was a software engineer (Institute of Neuroinformatics (INI) ETH/University of Zurich) with R.J. Douglas, a postdoc (UCLA) with V. Hartenstein and Visiting scientist (INI; Max Plank Institute-CBG; HHMI Janelia). Between 2008-2019 he led groups at INI and HHMI Janelia, held a lecturer post and then Reader post (2017-present) at University of Cambridge. He has led a research programme at MRC LMB since 2019.

Research Interests

My lab studies the relationship between neural circuit structure and function, and strives to do so at the scale of whole brains. On the basis of a known synaptic wiring diagram, or cellular connectome, we monitor the behavior and circuit dynamics, and formulate models that can explain how the circuits produce the observed behaviors, and then test these models experimentally. For our research, we have developed in collaboration open source software tools (Fiji, TrakEM2, CATMAID) to handle volume electron microscopy imagery and to map the neural wiring diagrams contained within, as well as tools for the analysis of 4D neural activity. Our main organism of study is the larval fruit fly (*Drosophila*), where we study the genetic and neural circuit basis of learning and memory, and how the brain subsystems together orchestrate behavioral responses. We are now developing a comparative connectomics approach, sampling whole-brain connectomes across the phylogenetic tree.

Dr Benjamin Falcon (NEUROBIOLOGY DIVISION)

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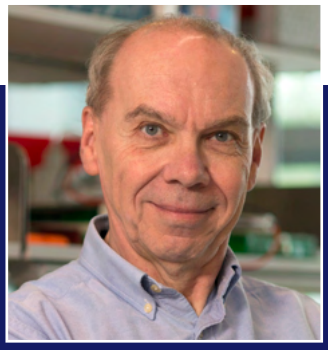
Benjamin Falcon obtained his BSc from University College London. He completed his PhD with Michel Goedert at the MRC Laboratory of Molecular Biology, investigating the prion-like properties of tau protein. During his postdoc with Michel Goedert and Sjors Scheres, he determined cryo-EM structures of assembled tau from human brain. Continuing at the LMB, he established his own lab in October 2019. Dr Falcon was awarded the Brenner Prize by the MRC LMB and the Rising Star Award by Alzheimer's Research UK.

Research Interests

We work to understand the molecular basis of protein assembly into amyloid in neurodegenerative disease. The formation of amyloid within neurons and, in some cases, glia plays a causal role in neurodegenerative disease. Amyloids arise in disease-specific brain regions, from where they appear to propagate (spread and amplify) within connected brain networks, ultimately leading to extensive and characteristic patterns of neurodegeneration. The mechanisms of amyloid formation, propagation and toxicity are largely unknown. We aim to describe these mechanisms by determining the *ex vivo* structures and *in situ* molecular interactions of amyloids. This approach will uncover conserved and divergent mechanisms by which the brain influences and responds to distinct amyloid structures in different diseases. An understanding of these mechanisms may provide successful strategies for the diagnosis and treatment of neurodegenerative diseases, which currently do not exist.

Dr Michel Goedert (NEUROBIOLOGY DIVISION)



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Michel Goedert obtained an MD from the University of Basel and a PhD in Pharmacology from Cambridge University. Following a postdoctoral stay, he became a Programme Leader at the LMB in 1987. Between 2003 and 2016, he was also Head (sole or joint) of the Neurobiology Division. He is a member of EMBO, a Fellow of the Royal Society and a Fellow of the Academy of Medical Sciences. Recent awards include: Brain Prize (2018); Royal Medal of the Royal Society (2019); Rainwater Prize for Outstanding Innovation in Neurodegenerative Research (2020).

Research Interests

Abnormal filamentous inclusions characterise many human neurodegenerative diseases, including Alzheimer's and Parkinson's. The formation of filaments or their mere presence is believed to result in the propagation of inclusions and neurodegeneration. Our work showed that the intracellular filaments of these diseases are made of either tau or alpha-synuclein. In collaboration with Sjors Scheres from the LMB's Structural Studies Division, we are using electron cryo-microscopy to determine the structures of pathological amyloid filaments from the brains of individuals with tau and alpha-synuclein proteinopathies. We hope that this work will tell us more about the mechanisms underlying filament formation and neurodegeneration in human brain.

Dr Ingo H Greger (NEUROBIOLOGY DIVISION)

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Ingo Greger obtained his PhD in 1998 from the University of Oxford, where he worked on mechanisms of gene expression in Nick Proudfoot's lab. In 1999, he started to work on AMPA glutamate receptors in Ed Ziff's lab at the NYU School of Medicine/HHMI. He continued investigating AMPA receptors whilst a Royal Society fellow at the MRC LMB in Cambridge, from 2003-2006. He is currently an MRC investigator at the LMB, where his lab studies AMPA receptor operation at various levels of complexity.

Research Interests

My lab aims to understand the mechanisms underlying AMPA glutamate receptor signalling at various levels of complexity. These glutamate-gated ion channels mediate information transfer and synaptic plasticity, instruct the formation of neuronal circuits, and are central drug targets. In one line of research, we use a combination of cryo-EM, molecular dynamics simulations and patch clamp electrophysiology to reveal structural pathways leading to receptor activation. We also study how therapeutic ligands tune channel gating, and seek to develop improved modulators. Secondly, to understand how AMPA receptors contribute to learning, we investigate their dynamics and sub-synaptic organisation at hippocampal synapses. Towards this goal, we utilise brain slice electrophysiology, super-resolution light microscopy and cryo-ET. Our ultimate aim is to describe the principals of AMPA receptor operation that underpin their pivotal role in learning at the angstrom- and nanoscales.

Dr Michael Hastings (NEUROBIOLOGY DIVISION)

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Michael Hastings did his BSc and PhD in Marine Biology at the University of Liverpool Port Erin Marine Biological Station, Isle of Man. After a PGCE (University of Manchester), he joined Joe Herbert as a post-doc in the Anatomy Department, Cambridge. After promotions to Junior and then full Lecturer and finally Reader in Neuroscience, he joined the MRC LMB in 2001 as Group Leader. He was joint Head of Neurobiology with Michel Goedert in 2013 and became sole Head in 2016. He was Elected FMedSci. (2008) FRS (2010).

Research Interests

Circadian rhythms are endogenously generated daily cycles of behaviour and physiology that adapt us to the 24h world. Most apparent in sleep and wakefulness, they pervade every level of our biology, driven by local tissue-based clocks. These clocks are coordinated by a central hypothalamic clock, the retinorecipient suprachiasmatic nucleus (SCN). Circadian maladaptation is a common feature of, and likely exacerbates, an extensive range of neurological, psychiatric and metabolic diseases. Insight into circadian mechanisms will therefore draw the fundamental dimension of time firmly into our understanding of health and disease. My work aims to understand the cell-autonomous circadian clock, how the neurons and astrocytes of the SCN interact to amplify and stabilise the timing signal, and then how the signal is transmitted to the brain to control circadian behaviour and physiology. We use a range of molecular genetics, real-time imaging and behavioural approaches to achieve these goals.

Dr Gregory Jefferis (NEUROBIOLOGY DIVISION)

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Gregory Jefferis studied at Cambridge before obtaining his Neuroscience PhD at Stanford with Professor Liqun Luo. He returned to Cambridge as a Wellcome Fellow before joining the LMB in 2008. Dr Jefferis also directs the Wellcome-funded Drosophila Connectomics Group in the Cambridge Department of Zoology as part of an international collaboration. He received the Royal Society's 2019 Francis Crick medal.

Research Interests

Our research focuses on the neural circuit basis of behaviour using the *Drosophila* olfactory system as the main model. We aim to uncover fundamental principles of circuit organisation and function. There are three main research areas:

(1) sexually dimorphic circuits

(2) valence i.e. what features of brain organisation make some stimuli being innately attractive or repulsive

(3) learning and memory.

In addition, we are major developers of tools for circuit mapping, especially connectomics. Our group was the first to identify widespread sex differences in the fly brain neuroanatomy and to uncover a sex-specific switch in connectivity and information flow in an animal brain. Recent work has combined electron microscopy whole brain connectomics with *in vivo* physiology and behaviour to show how learned behaviour depends on recruitment of innate circuits.

Dr Harvey McMahon (NEUROBIOLOGY DIVISION)

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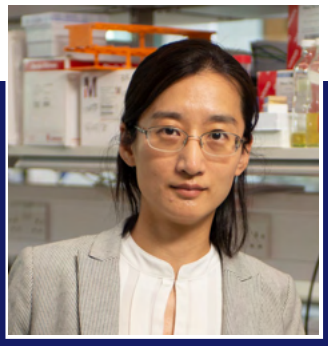
Harvey McMahon completed his BA Mod in Biochemistry achieving first class honours at Trinity College, Dublin (1983-1987) and PhD entitled 'Glutamate neurotransmitter: new insights into the release mechanism' with Professor David Nicholls at Dundee University, Scotland (1987-1990). He then held postdoctoral positions at Dundee University, Dundee, Scotland (1900-1991) and in Professor Thomas Südhof's lab at HHMI, USA (1991-1995). He has been at MRC LMB since 1995.

Research Interests

In my present position my research group initially started by combining structural and functional approaches to clathrin-mediated endocytosis to determine how this process works at a molecular level. With time we became interested in how proteins could effect membrane bending. This naturally led us into defining novel mechanisms of vesicle budding (leading to us defining new endocytic pathways) and to the study of how many different pathways of vesicle trafficking can be coordinated. Thus we now study protein networks from a cell biologist's point of view. We have also recently been deciphering how membrane fusion can possibly occur with proteins that can effect membrane curvature stress at an appropriate focus point. We are now extending our findings into areas of neurodegeneration and proteostasis.

Dr Jing Ren (NEUROBIOLOGY DIVISION)



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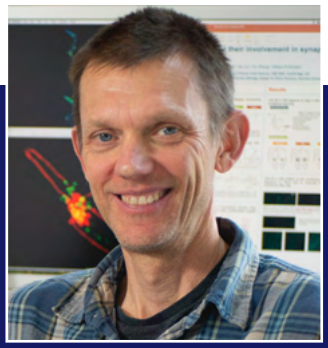
During her PhD under the supervision of Dr Minmin Luo, Jing Ren discovered medial habenula neurons co-released glutamate and acetylcholine. From 2013 to 2019, she did postdoctoral research in Dr Liqun Luo's lab at Stanford University and revealed that the dorsal raphe contains parallel serotonin sub-systems, which lays the foundation for integrating anatomical, neurochemical, physiological, and behavioural functions of the serotonin system. She has been a Programme Leader Track researcher at the MRC LMB since Jan 2020.

Research Interests

Our team focuses on bridging the huge gap between the abnormalities of the serotonin system and the vulnerability to mental illnesses. The serotonin system is the most frequently targeted neural system for treating mental illnesses. It innervates nearly all brain regions and has been implicated in modulating almost every human behaviour. In contrast, the serotonin system originates from a very small proportion of neurons. How is the serotonin system organised to manage such a broad range of modulation? We recently revealed that there are anatomically defined parallel serotonin sub-systems that exert different influences on distinct behavioural functions of mice. Furthermore, we elucidated the molecular architecture of these sub-systems. Now we are working on: How is the organisation of the serotonin system determined during development, and how do disruptions in these developmental programs alter this organisation, and thereby possibly contribute to the pathology of mental illnesses?

Dr William Schafer (NEUROBIOLOGY DIVISION)



wschafer@mrc-lmb.cam.ac.uk

William Schafer completed undergraduate study at Harvard University in Biology (summa cum laude 1986). He did his PhD in Biochemistry at UC Berkeley (1991) in Jasper Rine's lab studying protein prenlyation of Ras and yeast mating pheromones. He then did a postdoc with Cynthia Kenyon at UCSF researching monoamines and behaviour. He became Assistant/Associate Professor at UCSD, Division of Biology in 1995-2006 and Programme Leader at MRC LMB in 2006. In 2019 he was also made a full Professor (part-time) at KU Leuven.

Research Interests

The relationship between genes, neurons and behaviour is a fundamental problem in neuroscience. We are using the nematode *C. elegans*, with its small and completely mapped neuronal connectome, to identify fundamental principles of nervous system function at the molecular and circuit levels. At the molecular level, we are particularly interested in identifying the molecules responsible for ionotropic sensory transduction, which underlies the senses of touch, hearing and pain, and discovering how they couple sensory stimuli to the control of neuronal activity. At the circuit level, we have focused on understanding how monoamine and peptide neuromodulators, often acting extrasynaptically, control brain states and mediate neural plasticity and learning. We are also applying network science approaches to probe the structures of synaptic and extrasynaptic connectomes, with the aim of understanding conserved computational principles implemented in larger and more complex brains.

Dr Rebecca Taylor (NEUROBIOLOGY DIVISION)

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Rebecca Taylor studied Natural Sciences at the University of Cambridge, before undertaking a PhD in Genetics at Trinity College, Dublin. She then joined Professor Andy Dillin's lab at the Salk Institute, La Jolla, USA as a postdoctoral researcher, moving to the University of California, Berkeley, before joining the MRC LMB as a Group Leader in 2014.

Research Interests

Misfolded proteins accumulate with age, leading to the onset of age-associated diseases that include neurodegenerative and metabolic disorders. One underlying causative factor may be a decline in protective cellular stress responses. Focusing on the endoplasmic reticulum unfolded protein response (UPR), we are interested in why this decline occurs, how it leads to disease, and how the loss of stress responses can be remedied to improve health. In particular, recent work suggests that stress responses can act to initiate inter-tissue communication that allows protective responses to spread from neuronal to other cells. This links the detection of stressful environments with integrated, whole-organism defensive responses. Using the nematode *C. elegans*, as well as cell culture models, we are investigating the ways in which neurons detect stress, the means by which stress responses are communicated between cells, and how interventions in this process might be utilised to treat disease.

Dr Marco Tripodi (NEUROBIOLOGY DIVISION)

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Marco Tripodi did his PhD at the University of Cambridge. During his PhD, he characterised mechanisms of motor circuits assembly and the molecular underpinnings of activity-dependent dendritic remodelling. During his postdoctoral fellowship with Professor Silvia Arber he developed viral strategies to manipulate neural circuits and characterised fundamental aspects of the spinal network controlling locomotion. He is an MRC investigator at the MRC Laboratory of Molecular Biology in Cambridge.

Research Interests

One of the major tasks that the nervous system faces is that of linking perception to action. We perceive the world around us through our senses and we use this information to select the most appropriate set of actions. My research group investigates three key aspects of this process:

(1) How do animals produce a map of the surrounding world that can be used to direct movements?

(2) Which neuronal populations are involved in directing movements towards salient positions on this map?

(3) Which neuronal elements integrate incoming sensory inputs and cognitive variables into the motor plan?

Answering these questions is essential if we are to understand how we produce purposeful movements and, importantly, why we fail to do so upon injury or disease. We investigate these questions by using and developing a variety of methodologies. These include mouse genetics, viral strategies for circuit tracing and functional manipulation, *in vivo* electrophysiology, optogenetics and behavioral analysis.

Dr Marta Zlatic (NEUROBIOLOGY DIVISION)

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Marta Zlatic carried out her PhD and post-doc with Professor Michael Bate at Cambridge University, investigating neural circuit development. In 2009 she was appointed a Group Leader at the HHMI Janelia RC to study the circuit basis of behavior. In 2019 she was appointed a Programme Leader at the MRC Laboratory of Molecular Biology. Zlatic has received the FENS/Hertie Eric Kandel Young Neuroscientist Prize 2017, The Royal Society Francis Crick Medal 2020 and has been elected an EMBO Member in 2020.

Research Interests

My lab aims to understand the circuit mechanisms of learning and action-selection and address the following fundamental questions: Which learning algorithms are used by brains and how are they implemented? What determines how quickly and how well an animal learns? How are actions selected based on the learned information? What does a memory trace look like at a cellular, synaptic, and molecular level? To address these questions my lab is combining comprehensive brain-wide analysis of structure and function in the tractable *Drosophila* larva. The lab is generating comprehensive synaptic-resolution neuron connectivity maps; neuron activity maps before, during, and after learning; neuron-gene expression maps; and developing models constrained with these datasets. Using an exquisite genetic toolkit for selective manipulation of individual cell types, my lab is testing the models' predictions about the roles of specific circuit motifs in learning and action selection.

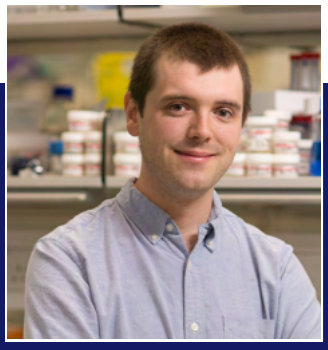
Dr Mariann Bienz (PROTEIN AND NUCLEIC ACID CHEMISTRY DIVISION)

Mariann Bienz did her PhD on tRNA-mediated decoding with Eric Kubli at the University of Zurich (1981). She did postdoctoral work at LMB, initially with John Gurdon, funded by an EMBO Long-Term Fellowship and an Advanced Postdoctoral Fellowship from SNSF. In 1986 she moved to the University of Zurich to start her own group and became Associate Professor (1989). In 1991 she returned to MRC LMB as a Group Leader and became the first female Head of Division in 2007 (Cell Biology) and 2008 (PNAC). She is currently Deputy Director and drives strengthening and widening female leadership at LMB.

Research Interests

Wnt signalling cascades are ancient cell communication pathways that operate throughout the animal kingdom to control cell specification during embryonic development and homeostasis in adult tissues. Wnt proteins signal through nuclear beta-catenin to promote transcriptional switches, or through various non-canonical cytoplasmic effectors to control cell shape and movement. Importantly, activated beta-catenin is a potent oncogene in many types of cancers, including intestinal cancer. My group's work is aimed at discovering new therapeutic targets for treating cancer through better understanding of Wnt/beta-catenin signalling. We have uncovered mechanisms that govern the assembly and function of multiprotein complexes, such as the Wnt enhanceosome and Wnt signalosomes, which transduce Wnt signals to beta-catenin. In collaboration with Caroline Dean (John Innes Centre), my group are currently exploring whether polymerisation of vernalisation proteins could confer protein-templated heritable epigenetic silencing, to control early spring flowering of plants after prolonged cold spells in winter.

Dr Gerard Crossan (PROTEIN AND NUCLEIC ACID CHEMISTRY DIVISION)



gcrossan@mrc-lmb.cam.ac.uk

Gerry Crossan leads a programme in the Division of Protein and Nucleic Acid Chemistry, MRC LMB. He is also a Fellow at Sidney Sussex College, Cambridge. He studied medicine before undertaking a PhD and has been a group leader at the LMB since 2018.

Research Interests

The work of my lab focuses on understanding how genetic information is faithfully passed between generations. We aim to understand how the unique developmental processes, which are essential to generate functional gametes, threaten genome stability. We are particularly interested in how the earliest primordial germ cells maintain genome stability and how this is affected by extensive epigenetic changes. We hope that this will not only provide us insights into human infertility but also how germ line mutations arise and are normally counteracted.

Dr Philipp Holliger (PROTEIN AND NUCLEIC ACID CHEMISTRY DIVISION)

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Philipp Holliger leads a research programme on chemical and synthetic biology at the MRC Laboratory of Molecular Biology in Cambridge, UK. He graduated from the Swiss Federal Institute of Technology (ETH) Zürich with Steven A Benner. He then moved to Cambridge for his PhD and a postdoctoral fellowship with Sir Gregory Winter. In 2000, he joined the faculty at the MRC Laboratory of Molecular Biology where he was tenured in 2005. In 2015, he was elected to membership of EMBO.

Research Interests

The work of our group is aimed at a better understanding of the fundamental principles and chemical logic that shape genetic systems and enable heredity and evolution, two of the defining hallmarks of life. Specifically, we ask how the capacity to store and propagate information - life's first genetic system - arose and why information storage and propagation in biological systems is based on just two types of nucleic acids, DNA and RNA. Is the chemistry of life's genetic system based on chance or necessity? Does it reflect a 'frozen accident', imposed at the origin of life, or are DNA and RNA functionally superior to simple alternatives? Finally, we are also interested in studying RNA self-replication as a key transition in the origin of life and the role that the primordial environment may have played in the emergence of life's first genetic system.

Dr Leo James (PROTEIN AND NUCLEIC ACID CHEMISTRY DIVISION)

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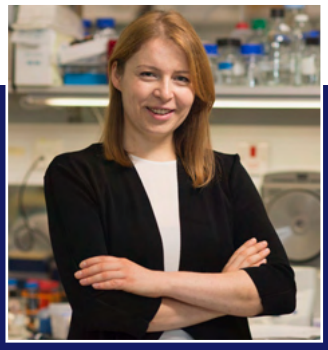
Leo James received his Ph.D. from Cambridge University in 2000 and completed postdoctoral research with Professor Dan Tawfik and Sir Greg Winter, on antibody structure, function and evolution. In 2007, Leo established a lab at the LMB studying host-pathogen interactions using a broad range of *in vitro* and *in vivo* techniques. He is currently a programme leader in the Protein and Nucleic Acid Chemistry division at MRC LMB.

Research Interests

Our research programme is aimed at understanding how pathogens infect cells and the mechanisms cells use to prevent infection. We have discovered a unique antibody receptor called TRIM21 that is found inside every cell and which coordinates a system of intracellular humoral immunity. We are investigating how TRIM21 prevents infection by intercepting viruses, bacteria and pathogenic proteins inside the cell and targeting them for rapid degradation. We are using this knowledge to guide the development of 'TrimAway', a technology which exploits TRIM21 for the rapid and specific degradation of cellular proteins. We also investigate how viruses like HIV overcome our cellular defences; recent work includes identifying the HIV capsid interface used to recruit import cofactors and discovering that there are dynamic pores in the capsid that are used to import nucleotides for DNA synthesis.

Dr Patrycja Kozik (PROTEIN AND NUCLEIC ACID CHEMISTRY DIVISION)



pkozik@mrc-lmb.cam.ac.uk

Patrycja Kozik was appointed as a Group Leader at the MRC Laboratory of Molecular Biology in 2019. Patrycja completed her BSc degree at the Jacobs University Bremen and obtained her PhD from the University of Cambridge, Cambridge Institute for Medical Research. She was then awarded a Sir Henry Dale Wellcome Postdoctoral Fellowship to carry out a collaborative project between the Curie Institute in Paris and at the Broad Institute of Harvard and MIT.

Research Interests

Our overall goal is to understand molecular mechanisms involved in orchestration of immune responses by dendritic cells (DCs). DCs are key players in the initiation of T-cell mediated immune responses against pathogens and tumours as well as in maintenance of peripheral tolerance (T cell deletion). Both induction of immunity and maintenance of tolerance, rely on the unique capacity of DCs to present exogenous antigens on MHC class I molecules, a process termed cross-presentation. We are interested in the signalling events, membrane trafficking pathways, and transcriptional programmes that control cross-presentation and the outcome of DC:T cell interactions. We employ proteomics, transcriptomics and CRISPR-Cas9-based genetic screening strategies to identify the players involved and to build a detailed picture of the molecular events that occur in DCs exposed to healthy, infected, or cancerous cells.

Dr Andrew McKenzie (PROTEIN AND NUCLEIC ACID CHEMISTRY DIVISION)

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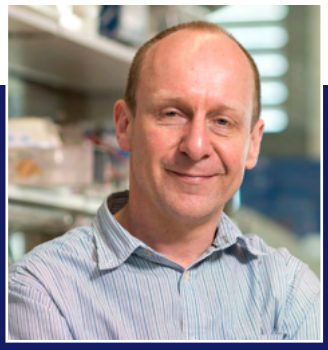
Andrew McKenzie has been a Programme Leader at the Medical Research Council Laboratory of Molecular Biology (LMB) since 1994 and Joint Head of the PNAC Division from 2013. Prior to taking up his appointment at the LMB, he was a postdoctoral fellow at the MRC National Institute for Medical Research (UK) and subsequently a postdoctoral at DNAX Research Institute (USA). He was elected as a Fellow of the Royal Society in 2017, and a Fellow of the Academy of Medical Sciences in 2011.

Research Interests

Regulation of the immune system is fundamental to protecting the host from infection whilst constraining autoimmunity, undesirable inflammation and immunopathology. Immune dysregulation can lead to diseases such as asthma and allergy, autoimmunity and leukaemia. We discovered group 2 innate lymphoid cells (ILC2) as significant new participants in immune regulation through their cytokine secretion. ILC2 belong to a larger family of ILC that develop from lymphoid precursors that also give rise to the T and B cell lineages. We aim to identify the transcriptional pathways that regulate this differentiation and gain molecular insight into cell commitment. ILC2 localise predominantly at mucosal surfaces where they act as critical sentinels for tissue damage and infection, at the interface of innate and adaptive immunity. Our goal is to determine the cellular and molecular pathways that regulate ILC during homeostasis and disease, and how they might be targeted therapeutically in humans.

Dr Felix Randow (PROTEIN AND NUCLEIC ACID CHEMISTRY DIVISION)



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Felix Randow has been a Programme Leader at MRC LMB since 2003. In 2014 he was awarded a Wellcome Trust Senior Investigator award. Between 2013-2017 he was the Director of Research, University of Cambridge, Department of Medicine. His training includes positions as a Research Fellow (Harvard Medical School, 1997-2002) and Dr. rer.nat (PhD, summa cum laude, Humboldt University Berlin, 1993-1997). In 2019 he was elected into the Academy of Medical Sciences and in 2018 he was elected to Membership of EMBO.

Research Interests

My research group is interested in finding out how cell-autonomous immunity protects against bacterial infection. We are particulary interested in the role of anti-bacterial autophagy and of cellular attempts to coat bacteria with polyvalent arrays of host proteins, for example poly-ubiquitin and GBPs, that transform bacteria into anti-bacterial and pro-inflammatory signalling platforms.

Dr Julian Sale (PROTEIN AND NUCLEIC ACID CHEMISTRY DIVISION)

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Julian Sale leads a programme in the Division of Protein and Nucleic Acid Chemistry, MRC LMB. He is also a Fellow and Francis Crick Lecturer, Gonville and Caius College, Cambridge and Executive Editor of Nucleic Acids Research, OUP. He trained in medicine, qualifying in 1991 and gaining MRCP in 1994. Following MRC Clinical Training and Clinician Scientist Fellowships he was appointed a group leader at LMB in 2003.

Research Interests

My lab seeks to understand how cells deal with impediments to DNA replication, such as base damage and secondary structures, and the ensuing consequences for the stability of the genome and epigenome. We have had a longstanding interest in translesion synthesis and the specialised DNA polymerases that promote replication of damaged and structured DNA at the expense of introducing mutations. Currently, we are focusing on dissecting the mechanisms by which DNA secondary structure formation drives mutagenesis, epigenetic change and genome evolution and function in cancer cells and the human population.

Dr John Sutherland (PROTEIN AND NUCLEIC ACID CHEMISTRY DIVISION)

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John Sutherland studied chemistry at the University of Oxford as an undergraduate, and then carried out his doctoral work there with Jack Baldwin. He stayed in Oxford first as a Junior Research Fellow and then as a University Lecturer in Organic Chemistry. In 1998 he took a chair in Biological Chemistry at Manchester, and in 2010 moved to the MRC Laboratory of Molecular Biology in Cambridge as a Programme Leader.

Research Interests

My research concerns the origin of life – how did chemistry initiate biology and to what extent did it shape its basic structure and function? My research to date has focused on establishing prebiotically plausible syntheses of the building blocks of the informational, catalytic and compartment–forming macromolecules crucial to life, and my group is now seeking to establish how these building blocks could have become linked together. My major contribution has been to show how amino acids, ribonucleotides, lipid precursors and core metabolites are the products of a reaction network based on the reductive homologation of hydrogen cyanide and some of its derivatives. The network does not produce a plethora of other compounds, however, which suggests that biology did not select all of its original building blocks, but was simply presented with a specific set as a consequence of the chemistry of hydrogen cyanide and that set turned out to work.

Dr Ana Tufegdzic Vidakovic (PROTEIN AND NUCLEIC ACID CHEMISTRY DIVISION)

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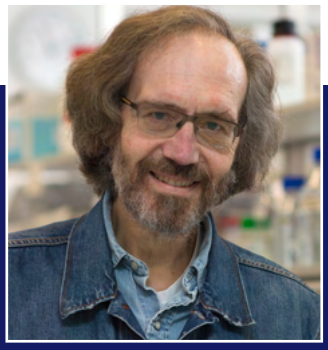
Ana Tufegdzic Vidakovic completed her PhD at the University of Cambridge, Cancer Epigenetics. She has held a postdoc position at the Francis Crick Institute, London researching Transcription after DNA damage.

Research Interests

Gene transcription is an essential cellular process. Yet, RNA polymerase II (RNAPII) is constantly faced with challenges on its way across the gene. One of the main roadblocks to transcription are different types of DNA damage, which cause RNAPII stalling and prevent forward transcription. Several pathways have evolved to resolve stalled RNAPII – we focus on understanding the mechanistic basis of these processes and relationships between them. Triggering these events on normally transcribing RNAPII complexes would be detrimental and incompatible with life. We investigate how cells direct these responses only at RNAPII molecules 'in trouble', at the correct time and place.

Dr Roger Williams (PROTEIN AND NUCLEIC ACID CHEMISTRY DIVISION)



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Roger Williams is a group leader at MRC LMB. His PhD and postdoctoral work involved X-ray crystallography at the University of California, Riverside. As a postdoctoral fellow at Cornell University Department of Chemistry, he carried out computational chemistry. He focused on protein crystallography of enzymes of nucleotide metabolism at Rutgers University. In 1991, he joined the MRC in Cambridge, where he has studied structural principles of signaling complexes on lipid membranes.

Research Interests

Eukaryotic cellular stress responses are tempered by growth factors and other signals from surrounding cells in multicellular organisms. Our research programme involves the mechanisms whereby these cellular signals regulate mammalian cells. Phosphoinositide 3-kinases (PI3Ks) modify lipid membranes and the modified phospholipids produced by the enzymes serve as second messengers and sorting signals, and they are important for cell response to environmental cues. PI3Ks are part of a larger family that also includes PI3K-related protein kinases (PIKKs). We study the structures, dynamics and functions of PIKKs and related pathways in cellular signalling, sorting and nutrition. We use X-ray crystallography, electron cryo-microscopy (cryo-EM) and hydrogen-deuterium exchange mass spectrometry (HDX-MS) to marry structures with dynamics.

Dr Joe Yeeles (PROTEIN AND NUCLEIC ACID CHEMISTRY DIVISION)

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Joe Yeeles completed a PhD in Mark Dillingham's lab at the university of Bristol where he studied prokaryotic double-stranded DNA break repair. Joe then moved to the USA for a postdoc in Ken Marians' lab focusing on the *Escherichia coli* DNA replication machinery, before returning to the UK for a second postdoc in John Diffley's lab, where he reconstituted the initiation of DNA replication with purified budding yeast proteins. Dr Yeeles started his lab at the MRC Laboratory of Molecular Biology in June 2016.

Research Interests

Work in my laboratory is focused on discovering the mechanisms that underpin faithful chromosome replication in eukaryotic cells. The molecular machinery that performs this crucial function is collectively termed the replisome. We use a combination of sophisticated biochemical reconstitution of electron cryomicroscopy (cryo-EM) to investigate replisome structure and mechanism, with an emphasis both on the basic functioning of the replisome and how the replisome responds to obstacles such as DNA damage. Recently we have discovered the mechanism by which leading-strand replication is started at origins, determined how the replisome responds to DNA damage in both template strands and reconstituted regulated replication fork restart by translesion DNA synthesis. Additionally, using cryo-EM we have revealed the structure of the Fork Protection Complex, a key modulator of replisome function, bound to the replicative CMG helicase.

Professor David Barford (STRUCTURAL STUDIES DIVISION)

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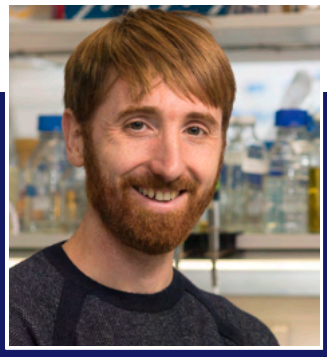
David Barford completed his DPhil at the University of Oxford. After a year at the MRC PPU in Dundee University he was appointed Cold Spring Harbor Laboratory Fellow in 1991. In 1994 he returned to Oxford as a University Lecturer and Fellow of Somerville College before being appointed joint head of the Section of Structural Biology, Chester Beatty Laboratories, Institute of Cancer Research, London in 1999. In 2013 Dr Barford moved to MRC LMB and was appointed as joint head of the Division of Structural Studies in 2015.

Research Interests

Our research is focused on understanding the mechanisms and regulation of chromosome segregation in mitosis. During the cell cycle, accurate chromosome segregation ensures that both daughter cells produced during mitosis inherit the correct complement of chromosomes. Errors in this process cause aneuploidy leading to cancer and developmental defects. We aim to determine the molecular mechanisms and regulation of sister chromatid segregation through structural and mechanistic studies of the complexes that mediate this process, including the anaphase-promoting complex (APC/C), kinetochores and budding yeast spindle pole body (centrosome).

Dr John Briggs (STRUCTURAL STUDIES DIVISION)



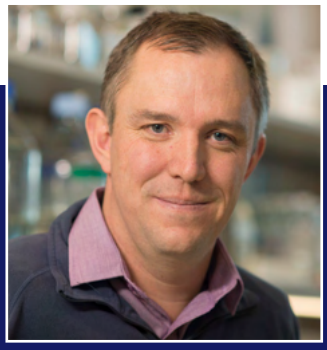
jbriggs@mrc-lmb.cam.ac.uk

John Briggs completed his DPhil in Structural Biology at Oxford University, UK in the Lab of Stephen Fuller, where he performed cryo-electron microscopy of retroviruses. After a postdoc in Munich, in 2006 he set up his own research group at the European Molecular Biology Laboratory, Heidelberg. His lab moved to the MRC LMB in January 2017.

Research Interests

My group studies the structure and the molecular assembly mechanisms of important enveloped viruses such as HIV-1, influenza A virus and SARS-CoV-2, primarily using cryo-electron microscopy approaches. We also apply these methods to study the structure and assembly of cellular trafficking vesicles including clathrin and COPI coated vesicles. As part of our research we develop and optimise new methods for cryo-electron tomography and computational image processing.

Dr Andrew Carter (STRUCTURAL STUDIES DIVISION)



cartera@mrc-lmb.cam.ac.uk

Andrew Carter studied Biochemistry at Oxford University. He obtained his PhD with Dr Venki Ramakrishnan at the MRC Lab of Molecular Biology (LMB), working on how antibiotics bind to the ribosome. He was part of the team which contributed to Venki's 2009 Nobel Prize. In 2003 Andrew joined the lab of Professor Ron Vale at UCSF to work on dynein. He set up his own lab in the LMB Structural Studies division in 2010. He is a fellow of Clare College, a Wellcome Investigator and a member of EMBO.

Research Interests

Cell organisation and internal movement depends on motor proteins. My lab studies cytoplasmic dynein and its cofactor dynactin. The 2.4MDa dynein/dynactin complex was, until recently, the least understood of all the cytoskeletal motors. Our interest focuses on how a single dynein carries almost all of the minus-end-directed microtubule transport in our cells. It is becoming clear that there is a large family of cargo adaptors that contain long coiled coils and can activate dynein's long distance movement. We used cryo-electron microscopy (cryoEM) to show how these adaptors recruit dynein to the filament of actin-related protein (Arp1) in dynactin. We revealed how formation of this complex activates dynein. We also discovered that dynactin can recruit two dyneins side-by-side resulting in a faster moving complex. Our future goal is to understand how the core dynein/dynactin/adaptor complexes are recruited to the many cargos that depend on dynein for their transport.

Professor Julian Gough (STRUCTURAL STUDIES DIVISION)

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Julian Gough did joint hons Maths and Physics at the University of Bristol, followed by a PhD at Cambridge University with Cyrus Chothia at the LMB, where he subsequently took a position as a research associate. He was a PMMB fellow at Stanford University with Michael Levitt and then a RIKEN Scientist at the Genome Sciences Centre in Tokyo, then a visiting scientist at the Pasteur Institute in Paris. He was Professor at the University of Bristol where he was in Computer Science for 10 years before becoming an MRC Investigator in 2017.

Research Interests

My research interests are primarily in cell reprogramming and phenotype prediction. My work is data-driven and computationally-led, although I seek to validate my computational work experimentally via collaboration and on a small scale in my own lab. I often work with very large datasets and my bioinformatics work generally aims to be predictive rather than descriptive, which is key. In the past I have generated many bioinformatics tools and resources and applied them to research on molecular and genomic evolution. I now focus my interest on developing and using computational tools: to predict protocols for direct cell reprogramming, such as transcription factor combinations; and to predict phenotypes from genetic data of individuals, such as SNP arrays or full genome sequencing.

Dr Richard Henderson (STRUCTURAL STUDIES DIVISION)

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Richard Henderson's research trajectory began with protein crystallography using X-ray diffraction, then electron crystallography especially on bacteriorhodopsin, and most recently single particle electron cryomicroscopy (cryoEM). He completed his PhD at Cambridge University (1970, MRC LMB) and was subsequently a Postdoctoral Fellow (1970-73, Yale University). He has worked at the MRC Laboratory of Molecular Biology since 1973 researching membrane proteins and structural biology techniques.

Research Interests

My current research focus is on making improvements in structural biology methods. Having graduated from X-ray crystallography of 3D protein crystals and electron crystallography of 2D crystals, before realising that the true power of electron cryomicroscopy (cryoEM) arises from recording images with the highest possible quality, my current focus is on making further improvements in cryoEM. One area involves developing an affordable 100 keV cryoEM, which requires investment in better detectors. I am also interested in other electron-optical improvements such as chromatic-aberration correctors and quarter-wave phase plates.

Dr Jan Löwe (Director)

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Jan Löwe completed his PhD at the Max-Planck Institute in Martinsried with Robert Huber. He then joined the MRC Laboratory of Molecular Biology as an EMBO long-term fellow in 1996, becoming a group leader in 1998. He won a Leverhulme Prize for Biochemistry in 2002, the EMBO Gold Medal in 2007 and has been elected a Fellow of the Royal Society in 2008 and of Germany's Leopoldina in 2013. He has been an Honorary Professor at Cambridge University since 2018.

Research Interests

My group focuses on the structure and function of key proteins in the cytoskeleton of bacteria, using tools of modern cell and structural biology. Among the molecules I am studying, many of which act as filament-driven motors, are the complex structures involved in bacterial cell division and bacterial DNA segregation.

Dr Garib Murshudov (STRUCTURAL STUDIES DIVISION)

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Garib Murshudov completed his PhD at the Institute of Crystallography, Moscow, USSR on Crystallography and Crystallophysics. In 1993 he joined the Chemistry Department of the University of York as a postdoc. In 2001 he was awarded a Wellcome Trust Senior Fellowship and established a Computational Crystallography group. In 2011 he joined MRC Laboratory of Molecular Biology as leader of the Computational Structural Biology group. Since 2001 he is a fellow of Royal Statistical Society. In 2019 he was elected a member of EMBO.

Research Interests

The aim of the Computational Crystallography group is to develop state-of-the-art tools for the analysis of experimental data in structural biology. The group develops several widely used software tools, including: the maximum likelihood refinement program – REFMAC5; model building, visualisation and validation program – COOT; comparative macromolecular structure analysis program – ProSMART; description of ligands – AceDRG. Our current main focus is on the development of Bayesian statistical techniques for the fitting and validation of atomic models against single particle cryo-EM maps.

Dr Kelly Nguyen (STRUCTURAL STUDIES DIVISION)

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Kelly Nguyen completed her PhD with Dr Kiyoshi Nagai at the MRC-Laboratory of Molecular Biology (MRC-LMB) in 2014. During her PhD, she applied biochemistry and structural methods to study the mechanism of the spliceosome, a large protein-RNA complex which catalyses pre-mRNA splicing. In 2016, she was awarded a Miller Research Fellowship to work with Professors Eva Nogales and Kathleen Collins at UC Berkeley on the human telomerase holoenzyme. She has been a group leader at the MRC-LMB since 2019.

Research Interests

My current research aims to understand the molecular mechanism of telomere maintenance and how telomere dysfunction gives rise to diseases and cancer in humans. Linear eukaryotic chromosomes are capped with large nucleoprotein structures called telomeres, which play key roles in chromosome end-protection and thus maintaining genome stability. The inherent incomplete genome replication problem causes telomeres to gradually shorten with successive cell divisions. Critically short telomeres lose their protective capability, triggering cellular senescence or apoptosis. Most cancer cells prolong proliferation by upregulating telomerase, an RNA-containing reverse transcriptase, which compensates for the telomere loss by synthesizing telomeric repeats *de novo*. We employ an integrated biochemical, structural and functional approach to study the structures of macromolecular complexes involved in telomere maintenance, which will be essential for therapeutic studies against cancers and ageing.

Dr Lori Passmore (STRUCTURAL STUDIES DIVISION)

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Lori Passmore is a Group Leader at the MRC Laboratory of Molecular Biology in Cambridge. She studied Biochemistry at the University of British Columbia in Vancouver Canada, and received her PhD from The Institute of Cancer Research in London, working with David Barford on the Anaphase Promoting Complex (APC/C). She performed post-doctoral work on eukaryotic translation initiation at the MRC LMB with Venki Ramakrishnan and Richard Henderson. She started her lab in 2009.

Research Interests

My laboratory focuses on understanding the mechanisms of protein complexes involved in regulating gene expression. We use an integrated approach combining structural, biochemical and functional studies, aiming to reconstitute multi-protein complexes and their activities, and to determine their high-resolution structures to understand their mechanisms. We have provided insights into the complexes that add and remove poly(A) tails from mRNAs (CPF/CPSF, Ccr4-Not, Pan2-Pan3) and complexes involved in repair of DNA crosslinks (the Fanconi anaemia pathway). My lab also developed new supports for cryo-EM that reduce radiation-induced specimen motion to improve resolution.

Dr Venki Ramakrishnan (STRUCTURAL STUDIES DIVISION)

Venki Ramakrishnan completed his PhD in physics at Ohio University and was a Grad Student of Biology at UC San Diego. He held a Postdoctoral Fellow position at Yale University and a Staff Scientist position at Brookhaven National Laboratory. He was a Professor at the University of Utah before joining the LMB as a group leader in 1999.

Research Interests

My research focuses on the structure and function of ribosomes.

Dr Christopher Russo (STRUCTURAL STUDIES DIVISION)

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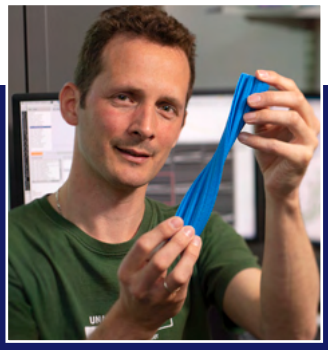
**Born in Detroit Michigan, Chris Russo attended the University of Notre Dame where he studied electrical engineering and philosophy.
He then went to graduate school at Harvard and MIT, where he studied physics and medicine under Jene Golovchenko (Physics, Engineering) and Daniel Branton (Biology). There he developed a way to create nanopores in graphene with atomic precision. He then moved to the MRC Laboratory of Molecular Biology to work on developing new methods for electron cryomicroscopy.**

Research Interests

My lab is focused on studying the physical phenomena that currently limit electron imaging in biology. Using the insights gained from studying these limits, we develop new devices, instruments and methods to improve the imaging power of the electron cryomicroscope. We use these scientific and technological advances to study the mechanisms of biomolecular structures and complexes.

Dr Sjors Scheres (STRUCTURAL STUDIES DIVISION)



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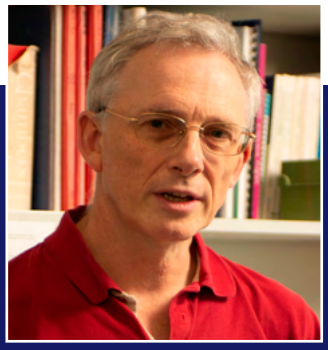
Sjors Scheres studied Chemistry at Utrecht University, The Netherlands, where he also obtained his PhD in protein crystallography. He was a post-doc at the CSIC National Center for Biotechnology in Madrid, before he started his group at the LMB in 2010.

Research Interests

My group has two research lines: We develop methods for cryo-EM structure determination and implement these in our software RELION; we then apply these methods to structure determination of amyloids from human brain. I designed and implemented a Bayesian framework for cryo-EM structure determination, which has become the most widely used approach to cryo-EM structure determination in the field. We have used our software for structure determination of ribosomes, spliceosomes, gamma-secretase and other complexes in collaborations with various research groups. Recently, using new microscopy hardware with Thermo Fischer Scientific, we accomplished true atomic resolution reconstruction for the test sample apoferritin. Since 2016, we have used our own methods of helical reconstruction to solve atomic structures of amyloids in human brain tissue, in collaboration with the Goedert group (MRC-LMB). In 2017, we reported the structures of tau filaments that were extracted from the brain of an individual with Alzheimer's disease. We have since applied the same techniques to amyloid filaments from multiple diseases.

Dr Christopher G Tate (STRUCTURAL STUDIES DIVISION)



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Chris Tate obtained his PhD in membrane protein biochemistry from the University of Bristol (1989). He moved to the University of Cambridge (Department of Biochemistry) and after being awarded a research fellowship (1992) at Girton College (Cambridge) he moved to the MRC-LMB, initially to work in Richard Henderson's group and then as an independent group leader. In 2007, he co-founded the GPCR drug discovery company Heptares Therapeutics (now Sosei Heptares), which specialises in structure-based drug design.

Research Interests

My current research focuses on the structure and function of G protein-coupled receptors (GPCRs) using a combination of structural biology (X-ray crystallography and cryo-EM), biophysics and pharmacology. Past work has described the molecular details for binding of agonists, partial agonists and inverse agonists to the β_1-adrenoceptor, adenosine A_{2A} receptor and serotonin 5-HT_{1B} receptor, when the receptor is in either an inactive state or active state coupled to a G protein, G protein mimetic or arrestin. The structures also identified the allosteric mechanism of the G protein-induced increase in agonist affinity and how this differs from the effects of arrestin coupling, giving insights into biased agonism. We have also determined the first structure of a fungal GPCR which will help the development of anti-fungal drugs. Future work will address the structures of native GPCR oligomers and how they interact in cells with other membrane proteins such as transporters and enzymes.

Professor Luis Aragón (EPIGENETICS SECTION)

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Luis Aragón is the Head of the Cell Cycle Group at the MRC London Institute of Medical Sciences (LMS) and a Professor of Genetics at Imperial College London. He was educated in Great Britain and earned his Ph.D in Molecular Biology from the University of East-Anglia. He did his postdoctoral studies in Alan Wolffe's laboratory at National Institutes of Health in Bethesda. He spent one year at Queen Mary University London as a Lecturer before joining the MRC LMS. He became an EMBO member in 2013.

Research Interests

Research in my laboratory is focused on the function of the three eukaryotic SMC complexes; cohesin, condensin and Smc5/6. Structural Maintenance of Chromosomes (SMC) complexes are sophisticated machines capable of remodelling chromosome architecture during the essential processes of the cell cycle. They form ring-shaped structures and use of ATP hydrolysis to fuel their manipulation in order to change the topology of chromatin fibers. This ability allows SMC complexes to alter local chromatin structure cooperatively to ensure that higher-order manipulation of chromosomes is achieved as required during distinct cellular processes. We use biochemical and biophysical techniques on purified proteins to investigate mechanisms of SMC complex function, and combine these *in vitro* approaches with studies in yeast and human cells to gain an understanding of the function of these protein complexes inside eukaryotic cells.

Dr Alexis Barr (EPIGENETICS SECTION)

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Alexis Barr completed her PhD (2006-10) with Fanni Gergely at the CRUK Cambridge Institute, investigating centrosome function. She then completed postdoctoral research (2010-18) with Chris Bakal at the Institute of Cancer Research, London, investigating mechanisms controlling cell cycle entry. In September 2018, she started the Cell Cycle Control team at the MRC-LMS at Imperial, with the help of a CRUK CDF, to investigate proliferation-quiescence decisions in health and in cancer.

Research Interests

Normal development and tissue homeostasis require strict control of cell cycle entry. Loss of cell cycle control underpins hyperproliferative diseases, such as fibrosis and cancer. The aim of the Cell Cycle Control team is to understand the signalling networks that control the transitions between quiescent and proliferating cell states and how perturbation of these networks can drive tumorigenesis and tumour relapse. To achieve our aims, we use quantitative single-cell imaging, proteomics and mathematical modelling to understand the mechanisms that regulate entry into, maintenance of, and exit from, quiescent states.

Professor Dame Amanda Fisher (EPIGENETICS SECTION)

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Dame Amanda Fisher completed her PhD at the University of Birmingham. She then carried out postdoctoral research at National Institutes of Health, Bethesda USA after which she received a tenure track position at ICRF London and was a Guest Researcher at IGBMC Strasbourg France.

Research Interests

My group study how cellular identity is established, progressively changed during differentiation, and transmitted through cell division. We also examine how environment exposures, including those encountered in utero, can impact the developing epigenome and thereby influence the health of offspring during their lifetime and across generations.

Professor Jesús Gil (EPIGENETICS SECTION)

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Jesús Gil obtained his PhD in 2000 at the Universidad Autónoma in Madrid. Between 2000 and 2005, he carried out postdoctoral work with David Beach (UCL), Gordon Peters (CRUK LRI) and Scott Lowe (CSHL). Since November 2005 he leads the Cell Proliferation Group at the MRC London Institute of Medical Sciences (MRC LMS). Since 2013 he is a Professor at Imperial College where it heads the Department of Molecular Sciences at the Institute of Clinical Sciences.

Research Interests

The goal of my lab's research programme is to understand the molecular mechanisms behind the implementation and regulation of senescence. To this end, we use different models of senescence. Our experimental approaches integrate information from functional screenings, cellular and molecular biology, high-throughput microscopy, genomics and proteomics that we aim to translate to disease-relevant mouse models. There are three general questions that we are aiming to address:

(1) What are the epigenetic mechanisms controlling senescence?

(2) What are the regulation, composition and functions of the senescence secretome?

(3) How can we target senescent cells for therapeutic benefit in cancer and aging?

Overall, we expect that our research would result in a better knowledge of how senescence impacts ageing, cancer and other diseases, opening possibilities to manipulate it for therapeutic advantage.

Professor Petra Hajkova (Interim Director) (EPIGENETICS SECTION)

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Petra Hajkova is a senior Group Leader at the MRC London Institute of Medical Sciences (LMS) and Professor of Developmental Epigenetics at Imperial College London. Following an MSc degree at the Charles University, Prague and PhD studies at the Max Planck Institute for Molecular Genetics, Berlin, Petra trained with Azim Surani in Cambridge as a Wellcome Trust postdoctoral fellow. Since 2009 Petra has been a group leader at the MRC LMS. She is currently Epigenetics Section Chair and Interim Director of MRC LMS.

Research Interests

Epigenetic memory is directly implicated in the stability of acquired cell fate. The processes of epigenetic reprogramming that lead to de-differentiation or to a reversal of cell fate are thus intimately linked with the erasure of various epigenetic marks including DNA methylation and histone post-translational modifications. Our laboratory investigates the molecular mechanisms implicated in these processes with a view that understanding of the underlying biology will open up routes to efficient manipulation of cell fate *in vitro* and *in vivo* (in regeneration and wound healing). Current *in vitro* reprogramming systems are characterised by low efficiency and high heterogeneity; we thus focus on processes that occur *in vivo* in the course of normal embryonic development. In particular, we study mouse zygotes and developing germ line (primordial germ cells, PGCs) as experimental systems that feature global erasure of DNA methylation as well as overall remodelling of chromatin structure.

Dr Harry Leitch (EPIGENETICS SECTION)

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Harry Leitch heads the Germline and Pluripotency group at the MRC London Institute of Medical Sciences (LMS) and is an Academic Clinical Lecturer in Genetics at Imperial College London. He completed an MB/PhD at the University of Cambridge under the supervision of Azim Surani and Austin Smith. Following medical school, he moved to London to continue academic clinical training working alongside Petra Hajkova's lab. He established his group in the Epigenetics section of LMS in 2018.

Research Interests

Our lab studies the germline cycle *in vivo* in mammalian embryos, and also *in vitro* using primary culture systems and pluripotent stem cell models. We are particularly interested in how pluripotency is regulated during this cycle and how germ cell development is coordinated with the major germline epigenetic reprogramming events. We also study how defects in early germline development can lead to severe forms of infertility or, conversely, the development of germ cell tumours. In particular we are using human pluripotent stem cells to functionally validate findings from genomic investigations undertaken in infertile patients and to establish *in vitro* disease models of germline dysfunction. We aim to expand this approach to study a broad range of early developmental disorders in children, with the hope that a better understanding of the underlying biology might lead to better treatment options.

Professor Boris Lenhard (EPIGENETICS SECTION)

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Boris Lenhard did his undergraduate studies in molecular biology at University of Zagreb, Croatia (1990-1994), where he also obtained his PhD in biochemistry in 1999, working on enzyme function and evolution. As a postdoc at Karolinska Institutet, Stockholm, Sweden (2000-2002) he changed focus to computational biology of gene regulation. Prior to Imperial and MRC LMS, he led research groups at Karolinska Institutet (2002- 2005) and University of Bergen, Norway (2005-2011).

Research Interests

My group works on computational genomics of transcription and gene regulation. It has discovered principles of genomic organisation of long-range regulatory elements and their target genes, rules of differential responsiveness of genes to long-range regulation, and the role of topologically associating domains in it. It proposed the Genomic Regulatory Block (GRB) model for the organisation of regulatory landscape around genes involved in development and morphogenesis. We made fundamental discoveries regarding the structure and function of promoters, features of vertebrate promoter architectures and their specialisation, and widespread overlap of independent architectures at promoters used in different biological contexts. Recently, we developed a 1000x more sensitive variant of CAGE, and used it to study promoters in mammalian germline and early embryo. The group has authored widely used bioinformatics resources, such as the JASPAR database of transcription factor matrix profiles.

Dr Enrique Martinez-Perez (EPIGENETICS SECTION)

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Enrique Martinez-Perez did his PhD at the John Innes Centre (Norwich, UK, 2001) studying meiosis in cereal crops. He did postdoctoral research at Stanford University (USA, 2001-2006) on meiosis in *C. elegans*. He was a BBSRC David Phillips Fellow at the University of Sheffield from 2006 and moved to the MRC London Institute of Medical Sciences (LMS) in 2009 for a Programme Leader Track position. He has led his programme at LMS since 2015 and became a Reader in Chromosome Biology at Imperial College in 2018.

Research Interests

Our group aims to understand the molecular mechanisms that ensure accurate chromosome segregation during meiosis, the specialised cell division programme that produces haploid gametes from diploid germ cells. Defects in this process cause infertility and are a leading cause of miscarriages and birth defects in humans. Using the nematode *C. elegans* as a model organism and a combination of experimental approaches, our research focuses on how conserved cohesin complexes and HORMA-domain proteins control the structure and function of meiotic chromosomes. We also investigate the quality-control mechanisms that monitor pairing and recombination between homologous chromosomes, as these events are required for correct chromosome segregation during the meiotic divisions. Finally, we are investigating how cohesin contributes to normal organism development by controlling 3D genome organisation, as mutations in cohesin are a cause of Cornelia de Lange syndrome.

Professor Matthias Merkenschlager (EPIGENETICS SECTION)

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Matthias Merkenschlager is an MD (Munich) PhD (London). His post-doc was in molecular immunology (Strasbourg). He joined the LMS in 1993.

Research Interests

My group's research explores gene regulatory mechanisms that drive mammalian cell type specification. We investigate the relationship between 3D genome organisation and gene expression, based on our discovery that cohesin associates with CTCF to form chromatin loops that affect transcription. 3D gene control is a fundamental biological mechanism and relevant to understanding cohesin mutations in human development and cancer. We also study the functions of disease-related transcription factors, including the Runx and Ikaros families.

Dr Michelle Percharde (EPIGENETICS SECTION)

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Michelle carried out her undergraduate degree at the University of Cambridge followed by a PhD in stem cell biology and reprogramming at Imperial College, London. In 2013, she moved to UCSF and carried out her postdoctoral training with Professor Miguel Ramalho-Santos focusing on chromatin and transposon regulation in development. She started the Chromatin and Development Group at the MRC LMS in September 2018 and in May 2019 was awarded one of the first UKRI Future Leaders Fellowships.

Research Interests

A particular focus of my lab is to explore the roles of transposable elements (TEs) in development and disease. While much work has focused on the role of protein-coding genes in early development, much less is known about the parts of genome that do not code for single-copy proteins, including TEs. These elements make up nearly half of the human genome, and gained their name from their ability to mobilise and 'copy and paste' themselves into new places in our DNA. Uncontrolled TE activity can cause mutations in DNA, and has been associated with diseases such as cancer. Interestingly, despite their potentially dangerous nature, many TEs are paradoxically expressed in normal embryo development, and previous work reveals that they can play essential roles in developmental processes. The group aims to understand how TEs are regulated in normal cells, how their expression is disconnected from pathology during development, or how TEs might become de-repressed in disease.

Professor David S Rueda (EPIGENETICS SECTION

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David Rueda graduated in 1997 in Chemistry (EPFL) and obtained his PhD (2001) on spectroscopy of methanol. As a postdoc (Michigan), he developed single-molecule approaches to study the dynamics of small RNA enzymes. He joined Wayne State University in 2005 to expand his research interests to the dynamics of DNA and RNA-protein complexes. He moved to London in 2012, where he continues to investigate the single-molecule dynamics of protein-nucleic acid complexes at the molecular and cellular level.

Research Interests

The Single Molecule Imaging Group develops and applies single-molecule imaging approaches to study how structural dynamics regulate fundamental biological processes involving proteins and nucleic acids across scales (from molecules to cells). We are particularly interested in elucidating various mechanistic aspects of DNA and RNA processing, such as chromatin structure and remodelling, DNA replication and repair, and RNA transcription, splicing and localisation. Single-Molecule Microscopy reveals the structural dynamics of individual molecules, otherwise hidden in ensemble-averaged experiments, thus enabling us to directly observe key reaction intermediates, even when short-lived or at low levels.

Dr Peter Sarkies (EPIGENETICS SECTION)

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Peter Sarkies did his PhD in the lab of Dr Julian Sale at the MRC Laboratory of Molecular Biology in Cambridge where he became fascinated by epigenetic gene regulation. He then moved to Eric Miska's lab at the Gurdon Institute, also in Cambridge. In Eric's lab he started working on epigenetic regulation by small RNAs, and also became interested in how epigenetic pathways such as small RNAs evolve across species. He started his lab at the LMS in 2014.

Research Interests

I'm fascinated by the connections between epigenetic gene regulation and evolution. My lab is investigating two aspects of this connection. First, we are using laboratory evolution with nematode worms to investigate whether epigenetic changes ('epimutations') contribute to divergence within populations, independent of DNA sequence changes. Second, epigenetic mechanisms evolve extraordinarily rapidly. We are characterising the diversity of epigenetic mechanisms across species and in cancer, and attempt to uncover the reasons behind this diversity.

Dr Karen Sarkisyan (EPIGENETICS SECTION)

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Karen Sarkisyan did his PhD on fluorescent proteins development with Konstantin Lukyanov and Alexander Mishin in Moscow and then worked on protein evolution with Fyodor Kondrashov in Barcelona and Vienna. He then moved to London in 2018 to start a new lab, focusing on synthetic biology, bioluminescence-based technologies and protein engineering. Karen is a founder of several biotech startups.

Research Interests

My research group creates molecular technologies for fundamental research and for engineering of organisms with new behaviours. In the next few years, we will be focusing on development of new approaches to protein design, through generation of high-quality genotype-phenotype datasets for proteins and application of emerging machine learning techniques to predict new functional proteins *in silico*. We will also be working on the development of technologies for autonomous bioluminescence and engineering organisms capable of communicating with light.

Dr Mikhail Spivakov (EPIGENETICS SECTION)

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Mikhail Spivakov graduated from Moscow State University and did a PhD in developmental epigenetics at Imperial College London. Mikhail then joined EMBL on an EIPOD fellowship to work with Ewan Birney (EMBL-EBI, near Cambridge) and Eileen Furlong (EMBL Heidelberg) on the regulatory logic and variation of gene enhancers. In 2012, Mikhail started his own research group at the Babraham Institute in Cambridge, moving to MRC LMS in 2018. Mikhail is an Honorary Senior Lecturer at Imperial College.

Research Interests

Our group aims to understand how DNA regulatory elements such as gene enhancers regulate cellular transcriptional programmes, and how their function is modified by natural genetic variation. This is important because genetic variation at enhancers is known to underlie both rare and common diseases. Our particular interest is in human primary cells as models, and we use genetic variation at enhancers as both tools ('nature's perturbation experiments') and objects of study. Our analyses span multiple scales, from pairwise enhancer-promoter interactions to cis-regulatory networks, from single cells to cell populations, and from single individuals to population cohorts. We combine experimental and computational approaches in our work, capitalising on our previous studies of promoter-enhancer relationships, organisation of DNA regulatory elements and population genomics. Our ultimate goal is to generate comprehensive functional models of gene control 'logic' underlying cellular decisions.

Professor Juan M Vaquerizas (EPIGENETICS SECTION)

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Juanma Vaquerizas received his PhD (2008) from the Spanish National Cancer Centre and Universidad Autónoma de Madrid where he worked on the characterisation of the human transcription factor repertoire. After postdoctoral training with Nick Luscombe at EMBL–European Bioinformatics Institute, focusing on the study of dosage compensation in *Drosophila*, Juanma was awarded a Max Planck Research Group at MPI-Muenster in 2012. Since 2019, Juanma is Programme Leader at the London Institute of Medical Sciences.

Research Interests

My group is interested in elucidating how the two-meter long molecule of DNA in our cells is encapsulated in a few micron nucleus while all the regulatory mechanisms that make our genomes work properly keep doing so. To do so, we employ experimental and computational techniques that allow us to monitor genome-wide aspects of gene and genome regulation, such as transcription, chromatin accessibility and chromatin architecture. Our work focuses mainly in two areas:

(1) Early embryonic development. This is a critical developmental stage that has allowed us to discover specific mechanisms that determine how chromatin architecture emerges at the awakening of the genome.

(2) Disease. Chromatin architecture is critical for the correct regulation of gene expression, and mutations in elements controlling this organisation lead to developmental disorders and cancer. We have developed experimental and computational approaches to examine changes in chromatin organisation in diseased cells.

Dr Tobias Warnecke (EPIGENETICS SECTION)

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Tobias Warnecke obtained his PhD working with Laurence Hurst at the University of Bath, where his work focused on genome evolution and sources of selection at synonymous sites. In 2010, he moved to the CRG in Barcelona to work with Fyodor Kondrashov and Ben Lehner at the intersection of molecular evolution and systems biology. In October 2013 he started his own lab focusing on chromatin evolution at the LMS.

Research Interests

My research interests lie broadly in the realm of molecular evolution and its mechanistic underpinnings. Our current focus is on understanding the evolution of chromatin architecture from a comparative perspective. We try to understand the diverse ways in which systems of gene expression can be organized and the role that ubiquitous chromatin proteins such as histones play in that process. We often make use of non-model organisms to gather orthogonal insights, in particular archaea. Beyond chromatin, we have also studied an eclectic collection of other phenomena, including sickle cell phenotypes in deer, the fitness landscapes of RNAs, and the role of chaperones in buffering deleterious mutations. For a representative slice of our work, check out the lab website.

Dr André Brown (GENES AND METABOLISM SECTION)

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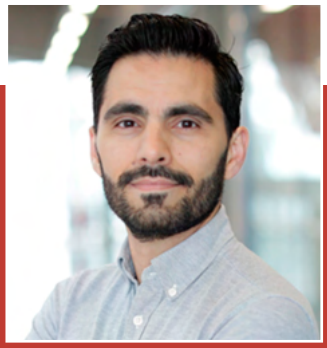
André Brown is a group leader at the MRC London Institute of Medical Sciences and a Senior Lecturer at Imperial College London. His education is in physics (BSc (Hons) Memorial University of Newfoundland; PhD University of Pennsylvania) but he has always been fascinated by biology. He started working on the nematode worm *C. elegans* during a postdoc at the MRC LMB (2009-2013) and continues to work with worms at the LMS.

Research Interests

My research group is interested in how molecular level perturbations such as genetic variation, nutrient intake, and drug treatment affect behaviour, with a particular focus on using whole-animal phenotypic screens to model rare genetic diseases, repurpose drugs, and discover novel neuroactive compounds. We develop technology to increase the throughput and content of phenotypic screens in the nematode worm *C. elegans* and new analysis methods to make sense of the resulting phenomic data sets.

Dr Filipe Cabreiro (GENES AND METABOLISM SECTION)



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Filipe Cabreiro is a biochemist working on the biological mechanisms underlying molecular stress, metabolism and ageing. He held previous roles as a PhD student - Universite Paris Diderot and post doc - University College London (UCL). His independent career started as a Wellcome/Royal Society Sir Henry Dale fellow at UCL. His seminal work led to a paradigm shift in the use of *C. elegans* for studying host-microbe-drug interactions. For his work he has been awarded an EMBO Young Investigator Award.

Research Interests

Our lab has developed experimental pipelines with the potential to unravel drug-diet-microbe-host interactions using the nematode worm *C. elegans*. Our lab combines classical and advanced microbial genetics and high-throughput genomic and chemical strategies, targeted metabolomics and computational approaches to study both host and microbial physiology at scale. Over the years, our lab has identified signalling and biochemical pathways in bacteria regulating drug efficacy and metabolite availability with the capacity to regulate host physiology and ageing. My new research aims to gain insight into the gut microbial action of drugs in higher organisms including mice and to develop strategies to target the microbiota to treat metabolic disease, cancer and ageing in humans.

Professor David Carling (GENES AND METABOLISM SECTION)

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David Carling completed his PhD, which characterised a protein kinase termed AMPK, at Dundee University. David was awarded an MRC Training Fellowship at the MRC Clinical Research Centre to develop molecular biology skills to clone AMPK. In 1992 he moved to the MRC London Institute of Medical Sciences where he has worked ever since. He was made Professor in Biochemistry at Imperial College in 2004. His work continues to focus on AMPK.

Research Interests

My research focuses on investigating the physiological role of AMPK in metabolism. AMPK is the central component of a protein kinase cascade that plays a key role in maintaining energy homeostasis. Dysregulation of energy metabolism occurs in a wide range of human diseases, including obesity and cancer. My group is particularly interested in determining the efficacy of AMPK activation for the treatment of fatty liver disease, obesity and prostate cancer. Recently, we developed a gain-of-function AMPK mouse model that we are using to support our pre-clinical studies. Genetic AMPK activation protects mice against diet-induced obesity. One of the mechanisms for this protection involves the reprogramming of white adipocytes to a skeletal muscle-like cell that has increased thermogenesis mediated by calcium futile cycling. We have also shown that AMPK activation reduces prostate cancer progression in a Pten-deletion mouse model. Our current emphasis is to move our work closer to the clinic.

Dr Helena Cochemé (GENES AND METABOLISM SECTION)

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Helena Cochemé received her PhD in Biochemistry in 2006 from the University of Cambridge, supervised by Professor Mike Murphy at the MRC Mitochondrial Biology Unit. From 2007, she joined the UCL Institute of Healthy Ageing as a PostDoc in the laboratory of Professor Linda Partridge. She established her own group at the MRC London Institute of Medical Sciences (LMS) in 2013, and is also an Honorary Senior Lecturer at Imperial College London.

Research Interests

We leverage *Drosophila* as a powerful *in vivo* model system to gain mechanistic insight into the ageing process.

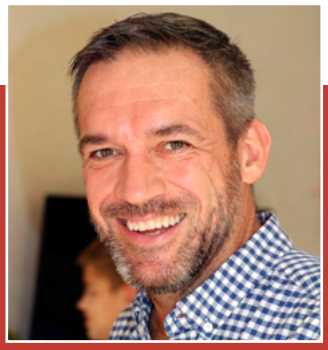
(1) We investigate how redox signalling regulates metabolic homeostasis and longevity, using a combination of redox-specific biochemical, proteomic and genetic approaches (e.g. Cochemé* et al. 2019, bioRxiv 790378).

(2) We study how obesogenic diets impact on metabolic dysfunction and survival. We showed that sugar-induced obesity and insulin resistance can be uncoupled from lifespan in *Drosophila* (van Dam et al. 2020, Cell Metab 31, 710).

(3) We explore evolutionarily conserved pharmacological interventions that extend lifespan (e.g. Pryor et al. 2019, Cell 178, 1299).

Ultimately, we aim to uncover novel strategies and potential therapeutic targets for health and longevity benefits.

Professor Stuart Cook (GENES AND METABOLISM SECTION)



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Stuart Cook grew up in Kenya, went to high school at St Edward's, Oxford and studied medicine at St Bartholomew's Medical School, London. He did a PhD at the National Heart and Lung Institute, UK and a Postdoctoral Fellowship at Harvard. He trained in cardiology and sub-specialized in cardiac MRI. His group discovered a critical role for the IL11 cytokine in fibrosis, inflammation and tissue regeneration. He is a co-founder of Enleofen, a spin-out biotechnology company.

Research Interests

My research focuses on the role of fibroblast-related stromal biology with a specific emphasis on interleukin 11 and its effect on tissue integrity and regeneration. Fibrosis, inflammation and parenchymal dysfunction are key drivers of conditions including cardiovascular disease, obesity, diabetes, NASH and ageing. The ultimate goals of the group are to define new biology, identify new biomarkers and drug targets and to translate scientific tools through academic and commercial channels for patient benefit.

Dr Louise Fets (GENES AND METABOLISM SECTION)

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Louise Fets completed a PhD at the MRC Laboratory of Molecular Biology in Cambridge, with a focus on the signalling pathways that govern gradient sensing in chemotaxis. For her postdoc, she moved to the MRC National Institute for Medical Research (which became part of The Francis Crick Institute) to study cancer metabolism. In spring 2019, she started her lab, working on drug transport and tumour metabolism, at the MRC London Institute of Medical Sciences.

Research Interests

The uptake of nutrients and release of waste products are regulated by transporter proteins that act as molecular gate-keepers to the cell, and in cancer, the expression patterns of these proteins are extremely heterogeneous. It is becoming increasingly clear that transporters are 'hijacked' by many drugs to enable passage across the plasma membrane. This means that heterogeneity in transporter expression may have implications for drug sensitivity. We use large publicly available data sets to predict which transporters are required for the uptake of different cancer drugs, and test these predictions in the lab using cancer cell lines. Long-term, our goal is to identify which transporters are present on an individual patient's tumour and use this, in combination with other molecular data, to predict which drugs will be most effective in that patient.

Dr Susumu Hirabayashi (GENES AND METABOLISM SECTION)

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Susumu Hirabayashi completed his PhD in Medical Biochemistry (Tokyo Medical and Dental University, Tokyo, Japan) in 2004, followed by a three-year appointment as a research staff scientist. In 2007, he joined Ross Cagan's Lab (Mount Sinai School of Medicine, New York, USA) as a postdoctoral fellow, where he studied the link between obesity and cancer, using *Drosophila* as a model system. In 2014, Dr Hirabayashi joined MRC London Institute of Medical Sciences as a Group Head.

Research Interests

Cancer is a systemic disease that associates with a range of host metabolic changes including obesity, diabetes, and cachexia/organ wasting syndrome, each of which alters the host systemic metabolic and nutritional environment. Cancer cells actively acquire nutrients from the extracellular space to support their growth, but how cancer cells sense and respond to changes in systemic nutrient availability remains an under-explored area in cancer biology. We leverage the fruit fly *Drosophila* melanogaster as a model system to explore host-tumour metabolic/nutritional interactions. We also combine insights from our *Drosophila* studies with human cancer database analysis and human cancer cell line work towards the identification and therapeutic exploitation of the nutrient vulnerabilities of cancer.

Professor Irene Miguel-Aliaga (GENES AND METABOLISM SECTION)

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Irene Miguel-Aliaga is Chair of the Genes and Metabolism Section at the MRC LMS and Professor of Genetics and Physiology at Imperial College London. She obtained her DPhil from the University of Oxford, and conducted postdoctoral work at Harvard, Linkoping University and NIMR (now Crick Institute). She was elected to the EMBO YIP programme, EMBO and the Academy of Medical Sciences. She has been awarded an ERC Starting Grant, an ERC Advanced Grant, and a Suffrage Science Women in Science award.

Research Interests

My research group is investigating how and why the gastrointestinal tract communicates with other organs, such as the brain. Our work in flies (and, more recently, mice) has revealed that the gastrointestinal tract of males and females is very different. Sex differences are apparent in diverse cell types, including stem cells, enterocytes and enteric neurons, and these differences impact tumour susceptibility, food intake, and gamete production (Hadjieconomou 2020 Nature, Hudry 2019 Cell, Reiff 2015 eLife). Investigating how the intestine senses and responds to nutrients, my lab also discovered an intestinal zinc sensor that regulates food intake via Tor signalling (Redhai 2020 Nature). If conserved in humans, these findings may have important implications for our ability to reproduce, handle nutrient overload/scarcity, resist certain diseases, and respond to their treatment.

Professor Declan O'Regan (GENES AND METABOLISM SECTION)

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Declan O'Regan is a Consultant Radiologist and Group Head leading the Computational Cardiac Imaging Group at the MRC London Institute of Medical Sciences. After specialist clinical training at Hammersmith Hospital he did a PhD in cardiac MRI at Imperial College London, and undertook post-doctoral research at the Robert Steiner MRI Unit.

Research Interests

My research is focussed on using machine learning to discover mechanisms that underpin common cardiovascular diseases by integrating data from human imaging, genetics and environmental risk factors. My work includes developing algorithms for predicting human survival from cardiac motion and understanding how complex traits influence the risk of heart failure. We also collaborate with industry to accelerate progress in drug discovery using automated genotype-phenotype modelling.

Dr Chris Schiering (GENES AND METABOLISM SECTION)

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Chris Schiering completed his MSci in Immunology at the University of Glasgow in 2008. He then took up a PhD studentship in Fiona Powrie's lab at the University of Oxford. He moved to London in 2013 to conduct his postdoctoral studies in Gitta Stockinger's lab at the Francis Crick Institute. He established his own research group at the MRC London Institute of Medical Sciences in 2019.

Research Interests

Environmental factors are important modulators of physiology. However, little is known about how these signals are integrated at the cellular and molecular level. To shed light on this, we investigate the aryl hydrocarbon receptor (AHR), a ligand-activated transcription factor capable of sensing dietary components and microbial metabolites. Genetic deficiency in AHR is associated with compromised intestinal barrier integrity, altered microbiota composition and dysregulated host responses to pathogens and injury. My group investigates the complex interplay between environment, inflammation and metabolic disease with a particular focus on vascular biology of the gastrointestinal tract. We use a combination of preclinical disease models and integrative omics approaches to better understand how environmental cues, such as diet and microbiota, impact chronic inflammatory diseases.

Dr Santiago Vernia (GENES AND METABOLISM SECTION)

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Santiago Vernia received a BSc in Pharmacy and a PhD in Biochemistry and Immunology from the University of Valencia (2007). In the group of Pascual Sanz, he studied the molecular basis of lafora disease. In 2010 Dr Vernia joined the laboratory of Roger Davis (HHMI/UMASS) to investigate the role of stress pathways in metabolic regulation. He started his group at the London Institute of Medical Sciences in 2016 to investigate the molecular mechanisms underlying metabolic pathologies such as obesity, fatty liver disease and cancer.

Research Interests

Pre-mRNA alternative splicing is a fundamental cellular process that contributes to transcriptional complexity and tissue identity. While up to 95% of multi-exon genes produce several alternative splicing variants (isoforms), there is a very limited understanding of their regulation and functional relevance. The rising prevalence of obesity and its associated comorbidities such as type 2 diabetes, non-alcoholic fatty liver disease or hepatocellular carcinoma constitutes a major health problem. My lab is focused on the characterisation of alternative splicing programmes and downstream isoforms maintaining metabolic homeostasis, or promoting disease. Our goal is to leverage these findings to develop improved diagnostic and RNA-based therapeutic strategies, as a step forward for precision medicine.

Dr James Ware (GENES AND METABOLISM SECTION)

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James Ware is an MRC Investigator at the London Institute of Medical Sciences; Reader in Genomic Medicine at the National Heart and Lung Institute, Imperial College London; and honorary Consultant Cardiologist at Royal Brompton and Harefield Hospitals. He graduated from the University of Cambridge, trained clinically in London and Geneva, and pursued research training at Imperial College London, Harvard Medical School, and the Broad Institute of MIT and Harvard, before starting his research group.

Research Interests

My research aims to understand the impact of genetic variation on the heart and circulation, and to use genome information to improve patient care. Working with collaborators in the UK and internationally, my team are identifying new genes and pathways underlying inherited cardiovascular conditions, developing tools to discriminate between pathogenic and benign genetic variation, and evaluating genetic stratification for precision medicine. Clinical interests include the management of Inherited Cardiac Conditions and the broader application of genetics and genomics to healthcare.

Professor Dominic John Withers (GENES AND METABOLISM SECTION)

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Dominic Withers studied medicine at Oxford and London and continued his clinical training in diabetes and endocrinology at Middlesex and Hammersmith Hospitals. Supported by junior, intermediate and senior MRC clinical fellowships he undertook a PhD at the Royal Postgraduate Medical School and post-doctoral work at Harvard, setting up his own group at Imperial College in 2000. He was appointed to a Chair at University College London in 2004 and moved to MRC London Institute of Medical Sciences in 2009.

Research Interests

My current research primarily focuses on the mechanisms by which the nervous system regulates energy homeostasis with a view to understanding the pathophysiology of obesity and its related disorders such as type 2 diabetes. I also work on the mechanisms of ageing and the causes of age-related disease as these overlap with my work on energy regulation. The work on obesity involves the study of both specific signalling pathways in defined neuronal populations and the identification of new neuronal circuits that are involved in the control of feeding and related behaviours. Using cutting-edge neuroscience approaches, we have recently identified a novel mechanism by which higher brain regions may influence the function of the homeostatic circuits that regulate many aspects of energy homeostasis and give new insights into the top down control of feeding. Ongoing work is aimed at moving these findings toward studies in humans.

Dr Jessica Barrett

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Jessica Barrett studied mathematical physics for a PhD at the University of Durham, and during her postdoctoral career switched subject to biostatistics. She took a position at the MRC Biostatistics Unit in 2007 as a Career Development fellow, and later held a Career Development Award in Biostatistics from the MRC. Jessica then spent 3 years working as a biostatistician at the Cardiovascular Epidemiology Unit, University of Cambridge, before returning to the Biostatistics Unit as an MRC Investigator.

Research Interests

Disease processes are often complex and dynamic, changing in response to time-varying risk factors. One approach to dealing with this complexity is to simultaneously model the disease process and the dynamic risk factors. These multi-outcome models can be used in dynamic risk prediction when we are interested in monitoring over time an individual's risk of an event occurring. My research centres on developing statistical methods for modelling complex multi-outcome data. Current research includes the development of cardiovascular risk prediction tools using data from electronic health records, extending this work to provide recommendations for the frequency of cardiovascular risk assessment, developing statistical methods for modelling within-individual variability in longitudinal outcomes, investigating methods for including information about patterns of observation in risk prediction models, and exploring the association between lung function and survival in cystic fibrosis patients.

Dr Stephen Burgess

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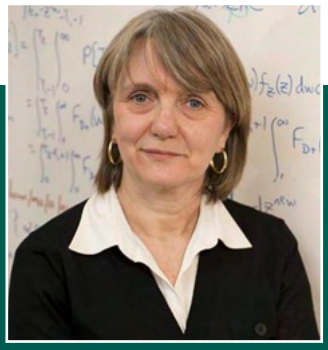
Stephen Burgess completed his BA and MMath in Mathematics at the University of Cambridge. He studied for a PhD in the MRC Biostatistics Unit from 2008-11 working on methods for Mendelian randomization analysis. He joined the Cardiovascular Epidemiology Unit in the University of Cambridge in 2011. In 2017, he returned to the MRC Biostatistics Unit on a Sir Henry Dale Fellowship, and was subsequently appointed to a Programme Leader Track position to establish a research group in the BSU.

Research Interests

My main area of research is causal inference and specifically methods for Mendelian randomization: the use of genetic variants to understand whether putative risk factors are causally related to specific disease outcomes (target validation).

Professor Daniela DeAngelis



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Daniela De Angelis is a Professor of Statistical Science for Health at the University of Cambridge, and Deputy Director and MRC Investigator at the Medical Research Council Biostatistics Unit (MRC-BSU). She has a PhD from Cambridge University and a degree in Statistical Science from the University of Rome 'La Sapienza'. Prior to her appointment as programme leader at MRC-BSU in 2011, she worked as research and teaching assistant at 'La Sapienza' and as statistician at Public Health England.

Research Interests

I have over 25 years of research experience at the interface between statistical/computational methodology and infectious disease epidemiology. I have overall responsibility for the MRC BSU research theme 'Statistical methods Using data Resources to improve Population Health', and lead research on 'Evidence synthesis to inform population health-related decision making'. My work focuses on the development of statistical methods for characterisation of epidemics, spanning: cross-sectional burden estimation; reconstruction/ prediction of disease incidence and transmission; evaluation of interventions, with emphasis on use of multiple data streams. Noteworthy is the development and application of methods to estimate the burden of blood-borne viruses, which are used to produce official UK estimates and underpin HIV prevention policies. Currently, I am leading work on nowcasting and forecasting of the COVID-19 pandemic, which contributes to my involvement with SPI-M, a subgroup of SAGE.

Professor Thomas Jaki

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Thomas Jaki completed his PhD at the University of South Carolina in 2006 and briefly worked at Cleveland State University before joining Lancaster University in 2007 where he was promoted to Professor in 2015. In 2020 he joined the MRC Biostatistics Unit. He has been awarded an NIHR Career Development Fellowship in 2011 and subsequently received an NIHR Senior Research Fellowship in 2015. He has also been leading the EU funded Innovative Training Network IDEAS (www.ideas-itn.eu).

Research Interests

My research is on the interface between statistical innovation and application to health and clinical trials. It is motivated by practical questions for which general solutions are sought and are often in close interaction with clinical experts and the pharmaceutical industry. Mathematically the focus of the research is sequential and adaptive decision making based on accumulating data and the closely related topic of multiple testing. My current research includes five main areas:

(1) Dose-finding trials with multiple objectives

(2) Adaptive designs in small populations

(3) Estimation after adaptive trials

(4) Adaptive trials for infectious diseases

(5) Treatment development in heterogeneous populations.

Dr Paul Kirk

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Paul Kirk completed his PhD in 2010 within the Division of Molecular Biosciences, Imperial College London. He subsequently held post-doctoral positions at the University of Warwick (Systems Biology Centre), Imperial College London (Theoretical Systems Biology), and the University of Oxford (Wellcome Trust Centre for Human Genetics) before moving to Cambridge in 2015.

Research Interests

Having previously made contributions to the field of statistical systems biology, my current research profile is at the intersection of precision medicine and statistical functional genomics. I am currently developing statistical and machine learning methods for the identification of clinically actionable disease subtypes.

Professor Sylvia Richardson (Director)

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Sylvia Richardson has held the Chair of Biostatistics at the University of Cambridge since 2012. Prior to this, Sylvia held the Chair of Biostatistics in the Department of Epidemiology and Biostatistics at Imperial College London from 2000, and was formerly Directeur de Recherches at the French National Institute for Medical Research INSERM, where she held research positions for 20 years. Sylvia was awarded Commander of the Most Excellent Order British Empire (CBE) for her services to medical statistics in the 2019 New Year's Honours List.

Research Interests

I have worked extensively in many areas of biostatistics research for 40 years and made important contributions to the statistical modelling of complex biomedical data, in particular from a Bayesian perspective. My work has contributed to progress in epidemiological understanding, and has covered spatial modelling and disease mapping, measurement error problems, mixture and clustering models, as well as integrative analysis of observational data from different sources.
My recent research has focused on modelling and analysis of large data problems such as those arising in genomics.

Dr Oscar M Rueda

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Oscar Rueda has a PhD in Mathematics (Statistics) from the University of Valladolid, Spain. He has previously conducted research at the Spanish National Cancer Centre (CNIO) as a graduate student working on Bayesian methods for detecting copy number aberrations in DNA and at CRUK as a postdoc, in the Caldas Lab, working on METABRIC and in many other projects analysing breast cancer data from tumours and pre-clinical models.

Research Interests

I am interested in the development of statistical models for the analysis of large genomic and transcriptomic datasets. Specifically, my goal is to integrate large breast cancer datasets in order to identify biomarkers that can be used to stratify patients and to identify potential drug candidates for specific subtypes. The combination of clinical samples and preclinical models can accelerate the clinical implementation of new drugs, however there are multiple statistical challenges that need to be solved in order to bridge the gap between what we observe *in vitro*, in animal models and in the patient. Finally, these biomarkers must also be estimated through a robust and affordable genomic test.

Dr Brian Tom

Brian Tom has lead a programme of research in precision/stratified medicine since 2014. He completed his PhD at the University of Cambridge and then spent four years working in the University's Department of Public Health and Primary Care as both a consulting and a project statistician, before returning to research at the MRC Biostatistics Unit in December 2001. He has been involved in a number of European and MRC-funded stratified medicine consortia.

Research Interests

I have long-standing methodological research interests in the areas of longitudinal and event history modelling. My current interest lies in developing and applying novel methodology to address the statistical challenges arising in stratified medicine, particularly at the analysis stage. These include the longitudinal modelling of biomarker processes, biomarker identification, risk stratification, prediction and validation, joint and integrative modelling of multiple modalities and clinical data types, subgroup identification, optimal treatment regimes and mechanistic understanding/causality. Current disease areas of interest are auto-immune diseases and neurodegeneration/dementia.

Dr Sofia S Villar

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Sofia Villar has a PhD in Business Administration and Quantitative Methods at Universidad Carlos III de Madrid in July 2012, with a focus on Stochastic Dynamic Optimization. In 2013, she joined the MRC Biostatistics Unit (BSU) in Cambridge as part of a project on the design of multi-arm multi-stage clinical trials. In 2014, she was awarded the first ever Biometrika post-doctoral fellowship. She is now leading a team of statisticians at the BSU and at Papworth Hospital trials Unit.

Research Interests

My research aims to improve clinical trial design through the development of innovative methods that lie in the intersection between optimisation, machine learning and statistics. These methods may result in efficiency gains (i.e. smaller or faster trials) but face several practical barriers (e.g. a high computational cost) to be widely adopted. These innovations include patient-centric trials - i.e. those having an explicit goal of assigning more trial participants to superior treatments (e.g. an efficacious vaccine). My work includes four main objectives:

(1) developing computationally feasible innovative trial designs.

(2) improving analysis methods of optimal, patient-centric adaptive trials (estimation and testing).

(3) designing innovative trial designs in response of specific emerging challenges (including using adaptive experiments to enhance and personalise m-health apps).

(4) promoting update and appropriate application of these novel designs in practice.

Dr Chris Wallace

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Chris Wallace trained in mathemetics before studying for a PhD in infectious disease epidemiology at the London School of Hygiene and Tropical Medicine. Chris moved to Cambridge in 2009 to work on human genetics of type 1 diabetes, and joined the MRC BSU as a programme leader in its statistical omics theme in 2016. She is co-funded by the Wellcome Trust and leads a research group focused on understanding causes and identifying treatment targets across a range of immune-mediated diseases.

Research Interests

I am a statistician with interests in the human immune system, and its dysregulation in disease. During the GWAS era, we, and others, identified that many genetic risk factors were shared between immune-mediated diseases. I now follow up this research in three directions:

(1) Jointly analysing multiple immune-mediated diseases/traits to borrow information between them and understand shared and distinct components of risk.

(2) Identifying the cell specific mechanisms through which these variants affect disease risk.

(3) Understanding how the immune system is dysregulated in disease, and how this may be modulated to alter disease outcome.

I am co-funded by the Wellcome Trust as a Director of Research and PI in the Department of Medicine (University of Cambridge) and am a member of the MRC-funded stratified medicine programme CLUSTER, working with partners at GOSH, QMUL, Manchester, and Liverpool on improving treatment for children with arthritis.

Professor Rafal Bogacz

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Rafal Bogacz graduated in computer science at Wroclaw University of Technology in Poland. He then did a PhD in computational neuroscience at the University of Bristol, and next he worked as a postdoctoral researcher at Princeton University, USA, jointly in the Departments of Applied Mathematics and Psychology. In 2004 he returned to Bristol where he worked as a Lecturer and then a Reader. He moved to the MRC Brain Network Dynamics Unit at the University of Oxford in 2013.

Research Interests

My research is in the area of computational neuroscience, which seeks to develop mathematical models describing computations in the brain giving rise to our mental abilities. I am particularly interested in modelling the brain networks involved in action selection and decision making, and understanding how brain dynamics change in Parkinson's disease. Work in my group focuses on three central themes. First, it develops computational models of the neural circuits in basal ganglia that underlie action selection and decision making. Second, it uses computational models to understand the effects of electrical deep-brain stimulation (DBS) on ongoing neural activity. The developed models are used to rapidly test candidate versions of closed-loop DBS *in silico*, and to identify optimal stimulation protocols. Third, it investigates models of information processing in the cerebral cortex, and is particularly interested in the predictive coding framework.

Professor Timothy Denison

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Timothy Denison was a Technical Fellow at Medtronic PLC and Vice President of Research and Core Technology for the Restorative Therapies Group, where he helped oversee the design of next generation neural interface and algorithm technologies for the treatment of chronic neurological disease.

Research Interests

My research focuses on the following areas: Bioelectronic Medicines; Neuroengineering; Chronotherapy; Analog and Mixed-Signal Integrated Circuit Design; Control Systems; Medical Electronics and Systems; Technology Development in Regulated Industries; Functional and Program Management.

Professor David Dupret

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David Dupret completed his Ph.D. in Neuroscience at the Institute Magendie (INSERM, Bordeaux, France) for which he received the French Neuroscience Association's 2007 Ph.D. Prize. He did his postdoc work in the MRC Anatomical Neuropharmacology Unit at the University of Oxford. He is a Programme Leader in the MRC Brain Network Dynamics Unit since 2015, a Scholar of the FENS-Kavli Network of Excellence, the recipient of the Boehringer Ingelheim-FENS 2018 Research Award, and a Professor of Neuroscience.

Research Interests

The central aim of my research is to investigate brain neural dynamics supporting memory-guided behaviour. The idea that groups of neurons transiently coordinate their activity to organise information-representing cell assemblies is central to this investigation. My laboratory uses a transdisciplinary approach that combines multichannel electrophysiological recordings during behaviour with cell-type-selective optogenetic and real-time manipulations of neuronal activity in rodents. The laboratory is known to perform network-level analyses to:

(1) determine how neural representations of the world are computed, consolidated and recalled to support adaptive behaviour;

(2) establish the mnemonic contribution of network oscillations (e.g., theta, gamma, sharp wave/ripples); and

(3) define neuronal motifs and pathways supporting memory. This work is intended to provide principles of interventions aimed at rebalancing network physiopathology of maladaptive memory.

Professor Peter Magill (Interim Director)

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Peter Magill was awarded his D.Phil. in neuroscience by the University of Oxford in 2001. Peter was formerly an MRC-funded postdoctoral scientist (2001-2003), MRC Investigator Scientist (2003-2006), and MRC Programme Leader-Track Scientist (2006-2009) at the MRC ANU in Oxford. He has been an MRC Programme Leader since 2009, and Deputy Director of the MRC Brain Network Dynamics Unit since its creation in 2015. He was awarded the title of Professor of Neurobiology by the University of Oxford in 2014.

Research Interests

Our research aims to deliver mechanistic explanations of brain 'motor circuit' organisation in the context of normal and impaired behaviours. Focusing on the basal ganglia, we harness cutting-edge technologies for monitoring, and manipulating neurons *in vivo* to provide fundamental new insights into the specific cellular substrates of the neuronal network dynamics therein. We place emphasis on defining how the interactions and activities of identified cell types in these brain circuits vary according to the temporal profile of dopamine release and movement. Relatedly, we define how a paucity of dopamine release, as occurs in Parkinson's disease and its animal models, impacts on the neuronal encoding of behaviour in these motor circuits. In taking advantage of the new understanding gained, we use specialised cell types as entry points for novel therapeutic interventions that are designed to correct the brain circuit disorganisation and behavioural difficulties arising in disease.

Dr Andrew Sharott

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Andrew Sharott completed his PhD at University College London in Neurological Studies in 2004. His work focused on the role oscillations in the basal ganglia network in health and disease, using data from movement disorder patients and animal models. He continued this work in post-doctoral positions, firstly at University Medical Centre, Hamburg-Eppendorf as a Marie Curie Experienced Researcher (2005-2009), then as an MRC Investigator Scientist at the MRC Anatomical Neuropharmacology Unit (2009-2015).

Research Interests

The goal of my research is to examine function and dysfunction of cortical-basal ganglia-thalamic circuits. To understand forebrain circuits at the network level, we use high-density multi-electrode arrays that enable many neurons to be recorded from several structures simultaneously *in vivo*. We utilise these techniques to elucidate how the populations generate network activities and examine the effects of perturbing specific circuit components. By performing these experiments in the healthy brain and models of disease, we aim to understand how coordinated network activity underlies the symptoms of disorders such as Parkinson's disease and Obsessive Compulsive Disorder. Where possible, we utilise intraoperative recordings from patients undergoing the implantation of deep brain electrodes to verify and extend observations made in experimental animals. Our ultimate aim is to use the insights from these approaches to develop closed-loop neuromodulation strategies to treat these diseases.

Professor Huiling Tan

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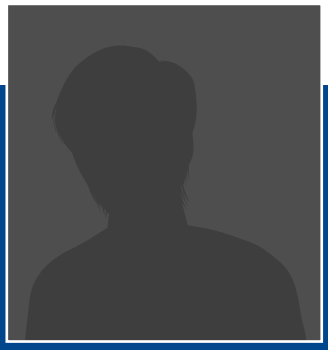
Huiling Tan is an Associate Professor and Programme Leader in the MRC Brain Network Dynamics Unit at the University of Oxford. Before that, Huiling studied Control Engineering at Beijing University of Aeronautics and Astronautics in China, and then obtained a D.Phil. in Engineering Sciences at the University of Oxford in 2006. Huiling studied Psychology as a 2nd degree with The Open University and was awarded B.Sc. in Psychology with Honours (1st class).

Research Interests

My group takes a multidisciplinary approach, combining experimental manipulations in healthy subjects and patients with sophisticated signals analysis and modelling. Our experimental manipulations include non-invasive brain stimulation, and often involve patients who have had deep brain stimulation electrodes implanted as treatment for movement disorders. Over the years we investigated how abnormal interactions between brain cells cause slowness of movement, tremor and stiffness in people with Parkinson's disease. At the same time we have leveraged these insights to pioneer closed-loop approaches to therapeutic brain stimulation. Currently we are refining these closed-loop strategies still further, and extending them to the treatment of gait dysfunction and essential tremor. We are also exploiting local dynamics in basal ganglia nuclei as a basis for Brain-Computer Interfaces that control the environment for paralysed patients.

Professor James Robert Carpenter



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James Carpenter leads the Analysis Programme at the MRC-CTU at UCL, and co-leads the Design Programme. The motivation for his research is finding practical methodological solutions to challenges in Phase III clinical trials and observational research. He works at the MRC CTU at UCL on a 50% secondment from the Department of Medical Statistics at the London School of Hygiene and Tropical Medicine.

Research Interests

My research interests include: Handling missing outcome data in clinical trials and observational research, particularly the method of multiple imputation. Sensitivity analysis – where we explore the robustness of our trial findings to a range of contextually plausible assumptions about the missing outcomes. Choosing appropriate estimands for clinical trials: as clinical trials take a long time to run and are expensive, it is critical to ensure they are carefully designed to address the most relevant questions, not just the questions that are easiest to answer. The relevant question is our 'estimand'. Choosing the estimand involves defining the population, the treatment, the outcome variable, a population summary that describes the treatment's effect on the outcome variable, and how we will handle the 'intercurrent events' (post-randomisation events) that complicate analysis.

Dr Angela Mary Crook

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Angela Crook has worked as a statistician in clinical research for over 25 years in academia, the NHS and industry. She completed a PhD at Imperial College London in 2004, which investigated spatial effects on time to revascularisation.

Research Interests

I am currently the statistical lead for the Respiratory Infections Programme at the MRC Clinical Trials Unit at UCL. This programme includes more than 15 ongoing or planned adult and paediatric clinical trials in tuberculosis (TB), pneumonia, flu and COVID-19. My recent work includes leading the statistical management of the Nix-TB and ZeNix trials. Results from the Nix-TB trial (N Engl J Med. 2020 Mar 5;382(10):893-902. doi: 10.1056/NEJMoa1901814.) led to the FDA approval of pretomanid for treatment of extensively drug resistant TB. This historically hard-to-treat population can now be treated with a 3-drug oral 6-month regimen.

Professor Diana Gibb

Diana Gibb's academic achievements include an MD entitled 'Markers of Renal Complications in Diabetic Children' (Bristol University, 1988), an MSc in Epidemiology (LSHTM 1990) and an honorary doctorate (University of York, 2019). She was appointed Professor of Epidemiology at UCL London in 2001 and Honorary Consultant Paediatrician, Great Ormond Street Hospital NHS Trust, London in 1991. In 2020 she became a Fellow of the Academy of Medical Sciences. She has led a research programme at MRC CTU since 2007.

Research Interests

I am a paediatrician and trialist and have set up and undertaken a wide network of late phase trials and cohorts across Europe, Africa, The Americas and Asia, initially focused on paediatric HIV infection, but expanding to tuberculosis, malaria, hepatitis and bacterial infections. Where possible, trials include both adults and children; they seek to answer multiple questions using innovative designs, and incorporate basic science, pharmacokinetics, health economics and social science. Results have contributed evidence to licensing drugs for children, WHO guidelines and implementation of treatment strategies in low and middle income settings. Capacity development is an important component of my work including initiating and leading Tr@inforPedHIV courses in LMICs, training in clinical trials, PhD supervision and post-doctoral mentorship. I serve on research boards and global guideline committees; I am a founding member of the Paediatric European network for Treatment of AIDS.

Professor Ruth Langley

Ruth Langley qualified in medicine at the University of London in 1985 and completed a PhD on radiation-induced apoptosis at the University of Nottingham 1998. She also completed Specialist Training in medical oncology in 1998. She currently leads a cancer research programme at the MRC Clinical Trials Unit at University College London and is an Honorary Consultant Oncologist at Brighton and Sussex University Hospital.

Research Interests

My research area focuses on the design and management of oncology trials. I work in a number of tumour areas including breast, colorectal, gastro-oesophageal and prostate cancer to implement innovative trial design and speed up the evaluation of new agents and approaches. Specific research interests include the opportunity that repurposing already established medicines as potential anti-cancer therapies brings to improve cancer outcomes, examples of which include the Add-Aspirin trial and the PATCH (prostate adenocarcinoma transcutaneous hormone) programme. I am the clinical chair of the UK Therapeutic Cancer Prevention Network.

Professor Max Parmar (Director)

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Mahesh (Max) Parmar is Director of the MRC Clinical Trials Unit at UCL and also the Institute of Clinical Trials and Methodology at UCL. From 2001-2012 he was an founding Associate Director of the National Cancer Research Network. He joined the MRC Cancer Trials Office in 1987 fresh out of a PhD and has been with the MRC ever since, becoming a Programme Leader in 1996 and then Director of the MRC Clinical Trials Unit in 2010.

Research Interests

The Unit that I direct undertakes clinical trials, meta-analyses and observational studies which have the aim of changing on policy, clinical practice and improving outcomes for patients. We tackle internationally important health questions in infectious diseases and cancer, and more recently in neurodegenerative diseases. Our aim is to deliver swifter and more effective translation of scientific research into health benefits by carrying out innovative and challenging studies underpinned by the development and implementation of methodological advances in the design, conduct and analysis of trials and meta-analyses. Collaboration is particularly important for our work and with many thousands of investigators in more than 60 countries worldwide.

Professor Sarah Pett

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Sarah Pett is a Professor of Infectious Diseases at the Medical Research Council Clinical Trials Unit at UCL, Institute of Clinical Trials and Methodology and Institute for Global Health, UCL. She is a clinical triallist with expertise in large Phase III/IV multicentre, international clinical endpoint trials in HIV for two decades, many have been guideline changing i.e. START, REALITY. She also leads studies and trials in influenza, COVID-19, and HIV treatment optimisation in adolescents in Sub-Saharan Africa.

Research Interests

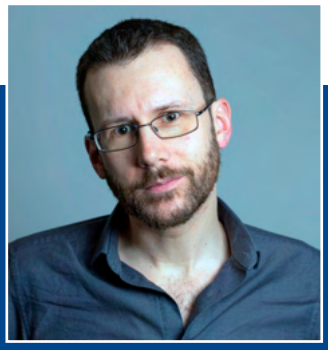
My research has the following streams:

(1) Treatment-optimisation for Blood Borne Viruses: Within this portfolio are a number of RCTs exploring treatment optimisation using weekends-off oral antiretroviral therapy, long-acting injectable antiretroviral therapy in HIV-infected adolescents in Sub-Saharan Africa (BREATHER Plus/LATA), optimisation of DAA treatment for Hepatitis C (VIETNARMS), and treatment of HCV during pregnancy (HCVAVERT).

(2) Treatment of acute respiratory viral infections: my work in this area incudes passive immunotherapy for influenza (FLU-IVIG, published Lancet Resp.Med 2019), and since March 2020, a large portfolio of international, multicentre, COVID-19 trials including ACTT-1 (NEJM, Oct 2020) which led to the fast-track approval of remdesivir, and COVID-19 natural history (ICOS) and its neurological sequelae (CoroNerve).

Other work includes long-term complications of HIV (RHICCA, risk factors for cerebrovascular and cardiovascular disease in Malawi), non-alcoholic fatty liver disease (MAVMET) and pathogenesis of bone disease in HIV (PETRAM).

Professor Matthew Sydes



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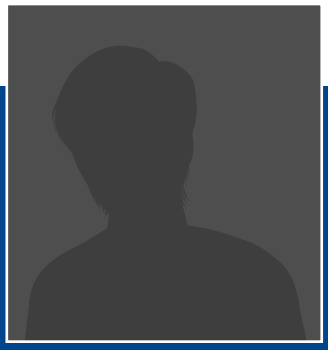
Matthew Sydes started in 1995 as a trial manager before training as a statistician through a part-time Applied Statistics MSc. He has extensive experience running clinical trials and now focuses on methodology research to improve clinical trials. He is on the Executive Committee for MRC-NIHR Trials Methodology Research Partnership. He has sat on ethics committees for Health Research Authority and UCL, and on funding committees for Cancer Research UK, National Institute of Health Research and MRC.

Research Interests

I am interested in improving clinical trial conduct, particularly: use of routinely-collected electronic health records (EHR) to support and run trials; running academic trials with a view to regulatory use and submission; proportionate and efficient trial monitoring; design and implementation of adaptive and efficient designs for late-phase trials; data sharing; communication of findings to various audiences; function of oversight committees.
I currently supervise 5 PhD students in areas of methodological priority. I teach on the UCL Institute of Clinical Trials and Methodology's MSc in Clinical Trials & have served on faculty on clinical trials training courses for international groups.
I previously served as lead statistician on a number of international trials including STAMPEDE, a multi-arm multi-stage platform protocol in prostate cancer, a clinical trial which has delivered practice-changing results three times.

Professor Jayne Tierney



Research Interests

Jayne Tierney has been part of the Unit since it was formed in 1999, and prior to that, in the Cancer Trials Office in Cambridge. Jayne co-leads the Meta-analysis Programme, and for more than 20 years, she has been responsible for designing and conducting systematic reviews and meta-analysis to rigorously re-evaluate the effectiveness of therapies.

Professor Ann Sarah Walker

Sarah Walker (FMedSci, OBE, NIHR Senior Investigator) is Professor of Medical Statistics and Epidemiology at the Medical Research Council Clinical Trials Unit at University College London (MRC CTU at UCL) (40%) and at the Nuffield Department of Medicine at Oxford University (60% FTE). She holds a Masters in Medical Statistics (1994, University of Southampton, UK), a Masters in Bioinformatics (2006, University of Oxford, UK) and a PhD in Medical Statistics (1999, University College London, UK).

Research Interests

At the MRC Clinical Trials Unit, I have responsibility for the statistical design, management and analysis of a portfolio of randomised controlled trials and other interventional and non-interventional studies in infectious diseases. These trials focus particularly on HIV, Hepatitis C, the acutely sick child in Africa and bacterial infections. I have been the Trial Statistician for 15 randomised trials in high-, middle- and low-income countries over the last 10 years. I have a track record in applying efficient but complex and challenging designs, including factorial and multi-arm multi-stage, to address multiple questions within each trial. My studies often include virological, immunological, or pharmacokinetic sub-studies to interrogate mechanisms of action, and observational analyses of trial data to answer critical questions about optimal management of infectious diseases.

Professor Ian White

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Ian White studied mathematics at Cambridge University, and his first career was as a teacher of mathematics in The Gambia, Cambridge and London. He then obtained his MSc in Statistics from UCL, and worked at the Department of Epidemiology and Public Health. He was Senior Lecturer in the Medical Statistics Unit at the London School of Hygiene and Tropical Medicine and for 16 years programme leader at the MRC Biostatistics Unit in Cambridge. In 2017 he moved to the MRC Clinical Trials Unit at UCL.

Research Interests

My research interests are in statistical methods for the design and analysis of clinical trials, observational studies and meta-analyses. I'm particularly interested in developing methods for handling missing data, correcting for departures from randomised treatment, novel trial designs, simulation studies, and network meta-analysis. I run courses on various topics and have written a range of Stata software.

Professor Michael Anderson

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Michael Anderson completed his PhD in Cognitive Neuroscience at UCLA in 1994. He then did a Post-doc in Cognitive Neuroscience at UC Berkeley afterwhich he became Assistant, Associate, and then Full Professor at University of Oregon Psychology. In 2007 he received a Chair in Cognitive Neuroscience University of St. Andrews. Since 2009 he has lead a programme at MRC Cognition and Brain Sciences Unit.

Research Interests

My research areas of interest include: Cognitive and Neural mechanisms of Memory, Cognitive Control and Attention; Brain mechanisms of Active Forgetting; Intrusive memories, thoughts and their control; Forgetting in general.

Dr Duncan Astle

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Duncan Astle is a Programme Leader at the MRC Cognition and Brain Sciences Unit, University of Cambridge, and Fellow of Robinson College. He completed his training at Durham and Nottingham, fellowships at Oxford, Royal Holloway and Cambridge, and has been supported by the Royal Society, British Academy, MRC, ESRC, and James S. McDonnell Foundation. He is Chair of Cambridge NIHR BioResource SAB, Chair of the University's LGBT+ Network, and in 2021 will join the MRC's Neuroscience and Mental Health Board.

Research Interests

Trajectories of cognitive and brain development are established early in life. Across the lifespan, early differences are associated with a host of long-term social, educational, economic and health outcomes. My programme is dedicated to understanding those trajectories, their underpinning neurobiology, and the factors that guide their origins during childhood. Our whole-system methodology detects early vulnerabilities, with precision characterisation in children. The aim is to understand clusters of complex and co-occurring difficulties, and to establish biological, social, and environmental risk factors. More recently, the programme has started using computational modelling to integrate different levels of analysis – including environmental, genetic, neurobiological and behavioural – building a mechanistic framework for understanding child development. Our findings are regularly translated to achieve impact, particularly in the support of children with cognitive difficulties.

Dr Kate Baker

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Kate Baker studied clinical medicine at Oxford and UCL, completing her MBPhD at UCL Institute of Child Health in 2004. She pursued paediatric core training and clinical genetics specialist training, integrating research as an academic clinical fellow and academic clinical lecturer. In 2018, she was appointed to a Programme Leader Track position at MRC CBU and Honorary Consultant in Clinical Genetics at Cambridge University Hospitals.

Research Interests

I work at the intersection between genomics, developmental neuroscience and mental health. I investigate individuals with neurodevelopmental disorders of known genetic origin, characterising their clinical and cognitive phenotypes, and applying neuroimaging methods to uncover neural systems mechanisms. I enjoy interdisciplinary collaboration, bridging the gaps between molecular pathology, cellular physiology and cognitive neuroscience to develop integrated models of symptoms and impairments arising from known rare genomic variants. I focus mainly on disorders of synaptic physiology, especially synaptic vesicle cycling disorders. A further element of my research places genomic disorders in family context, with a particular focus on parental mental health.

Dr Robert Paul Carlyon

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Robet Carlyon completed his PhD at Cambridge University in 1984, followed by a post-doc at the MRC Institute of Hearing Research and a Royal Society University Research Fellowship, held at Sussex University. He is currently a Deputy Director of the MRC Cognition and Brain Sciences Unit at Cambridge University, where he has conducted research since 1994.

Research Interests

I study the basic processes underlying hearing by Cochlear Implant (CI) listeners, identify the reasons for the limitations in CI hearing, and develop methods for improving it. I use a wide range of psychophysical and electrophysiological measures, where possible linking perception to electrophysiology. Another emerging interest concerns the changes in hearing that occur in the months following implantation. Examples of recent projects include:

(i) Linking measures of auditory-nerve and brainstem activity to perceptual measures of loudness, pitch perception and to neural health.

(ii) Measuring changes in temporal pitch perception in the months following implantation.

(iii) Development and test of a novel processing strategy that improves speech perception by CI listeners.

(iv) Evaluation of the pharmaceutical effects of a potassium channel modulator on temporal processing by CI listeners.

(v) Invention of a new method for measuring the sustained neural response to electrical stimulation.

Dr Tim Dalgleish

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Following his undergraduate studies in Experimental Psychology at the University of Oxford, Tim Dalgleish completed a PhD and his clinical psychology training at the Institute of Psychiatry in London. He then moved to his current Unit – the MRC Cognition and Brain Sciences Unit – initially as a post doc but then as a Programme Leader from 2001 working on cognition, emotion and mental health.

Research Interests

I oversee a translational research programme focused on mood and anxiety disorders. My group's work seeks to utilise advances in cognitive theory and fundamental science both to refine existing psychological treatments and to develop novel interventions, with the core aims of increasing clinical efficacy and rates of sustained recovery in these common and debiltating conditions. We take a transdiagnostic approach to understanding these emotional disorders. This is predicated on theory and research indicating that commonalities in aetiology, latent structure, underlying biology, and cognitive-affective processes among mood and anxiety syndromes supersede any differences in surface signs and symptoms between them. Our research model therefore concentrates on understanding core maladaptive psychological and affective processes that cut across established diagnostic divisions and on shaping interventions to modify these processes.

Dr Matthew H Davis

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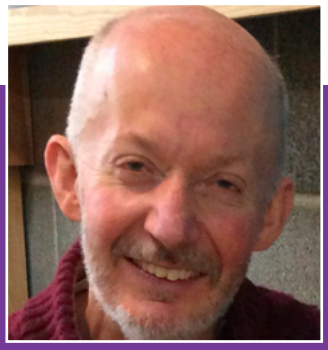
After an undergraduate degree in Psychology at Wadham College, Oxford, Matthew Davis completed a PhD in Psychology at Birkbeck College, London before moving to take up a post-doctoral position at the MRC Cognition and Brain Sciences Unit (CBU) in Cambridge, UK. Since 2005 he has led a programme in the Hearing and Language group at the MRC CBU.

Research Interests

My research explores the cognitive and neural foundations of human speech perception, comprehension and language learning. Brain imaging studies using fMRI and MEG have provided neural markers of speech perception and comprehension for healthy individuals, when speech is degraded or difficult to understand. This work has been applied to investigate residual comprehension abilities and deficits in vegetative patients, during anaesthetic sedation and for individuals with acquired language disorders. Recent work has highlighted neural correlates of effortful listening and perceptual learning relevant for hearing-impaired individuals, and has shown the potential for novel interventions such as electrical brain stimulation to enhance perception and comprehension of speech.

Professor John Duncan



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Educated at the University of Oxford (1970-1976), John Duncan spent two years at the University of Oregon working with Michael Posner before taking up a research position with the Medical Research Council. Currently he is a Programme Leader at the MRC Cognition and Brain Sciences Unit, University of Cambridge, with an adjunct appointment at the University of Oxford. He is a Fellow of the Royal Society and the British Academy, and winner of the 2012 Heineken Prize in Cognitive Science.

Research Interests

My research concerns brain mechanisms of higher cognitive function, including selective attention and human intelligence. The work extends from psychological studies of human behaviour to human and animal brain imaging, effects of selective brain lesions, and single cell electrophysiology. I have proposed that visual selective attention derives from a process of integrated, biased competition across the multiple brain systems responding to visual input. My work links human intelligence to a specific, widely distributed cortical and subcortical network, responsible for integrating the fragments of a cognitive operation into the correct computational structure. The electrophysiological work asks how distributed brain networks encode and communicate information as a cognitive operation is assembled and executed. The work finds application in diverse fields, including cognitive development, cognitive ageing, and assessment and management of brain disease.

Professor Richard Henson

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Richard (Rik) Henson has been an MRC Investigator at the MRC Cognition and Brain Sciences Unit (CBU) since 2004, where he is currently a Deputy Director. After a PhD from Cambridge in 1997, he worked as a BBSRC post-doc and then Wellcome Career Development Fellow at University College London. Since 2018, he has been a Professor of Cognitive Neuroscience at the Department of Psychiatry in the University of Cambridge, and in 2021, he became the President of the British Neuroscience Association.

Research Interests

My research concerns the systems neuroscience of human memory; more specifically how memory changes with age, dementia and brain damage. I am interested in the neural bases of both explicit (conscious) memory and implicit (unconscious) memory, particularly the relationship between recollection, familiarity, and priming, and the relationship between memory and (visual) perception. A deeper knowledge of these different expressions of memory is important for understanding the ubiquitous memory impairments associated with neurological damage, neurodegenerative diseases and normal ageing. I study this topic using behavioural experiments on young, older and amnestic individuals, using neuroimaging techniques such as fMRI and MEG, using computational modelling and using multivariate cognitive, brain, lifestyle and genetic data from large cohorts. I have expertise in neuroimaging and advanced statistical and machine-learning analyses. I am also a strong advocate of open science.

Professor Matthew Lambon-Ralph (Director)

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Matt Lambon Ralph completed his PhD at York. He then worked at the MRC APU/CBU and Bristol as a lecturer. In 2001 he became Professor of Cognitive Neuroscience at University of Manchester and later Associate Vice-President (Research). He became the Director of the MRC Cognition and Brain Sciences Unit in 2018. He is a Fellow of the British Academy, Academy of Medical Sciences, the British Psychology Society and the RCSLT. He also chairs the MRC Non-clinical Training and Career Development Panel.

Research Interests

My research focuses on three main areas:

1. Semantic cognition and its disorders: various interlinked projects explore the nature and neural underpinnings of semantic memory or conceptual knowledge.

2. Aphasia: multiple interlocking projects explore the cognitive and neural mechanisms that underpin acquired language impairments (aphasia). These include investigations of fluent and non-fluent varieties of progressive and non-progressive aphasia.

3. Recovery, rehabilitation and neuroplasticity: As well as concentrating on the nature of chronic and progressive cognitive and language deficits, the third theme is devoted to the study of the neural and cognitive principles that guide recovery and rehabilitation.

Dr Tom Manly

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Tom Manly trained as a clinical psychologist at University College London and then completed a PhD at the University of London before combining his interests in clinical neuropsychology, cognitive rehabilitation for people with acquired brain injury and research at the MRC Cognition and Brain Sciences Unit.

Research Interests

Acquired brain injuries, such as from stroke or traumatic brain injury can have a wide variety of effects. Whilst some people will experience minimal impairment and make a strong recovery, others will go through sometimes devastating alterations in their abilities to undertake everyday tasks. Of particular interest to our group is the way in which the brain organises itself in a goal directed fashion, bringing attention and other capacities to bare on the task at hand and to plan and execute actions in the future. We are interested in how impairments in these basic capacities affect recovery and adaptation to the injury, how they can even affect our awareness of space and mood, how we best assess these abilities clinically, and whether we can develop interventions to help people manage these difficulties. We are also interested in the development of these abilities in childhood and how improved assessment may lead into new interventions to help children who struggle with attention.

Dr Dennis Norris

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Dennis Norris completed his D.Phil in experimental psychology at the University of Sussex in 1980. His thesis investigated the relation between different components of language processing. He stayed at Sussex for two years as a post-doc and then as a lecturer, before spending a brief time at the University of Massachusetts in Amherst. In 1983 he moved to what was then the MRC Applied Psychology Unit in Cambridge, and which later became the Cognition and Brain Sciences Unit. He has remained there ever since.

Research Interests

My research focuses on human short-term memory, reading and speech perception. I do this with behavioural experiments, brain imaging and, most importantly, by building computer models.

Professor James Rowe

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James Rowe is a CBU Programme Leader, Professor of Cognitive Neurology, Director of the Cambridge Centre for Frontotemporal Dementia, and Associate Director of Dementias Platform UK. He supports ~300 families affected by frontotemporal lobar degeneration. His research brings together systems neuroscience, clinical and genetic heterogeneity, brain imaging, and drug treatments. He trained in Experimental Psychology (Cambridge), Clinical Medicine (Oxford), Neurology (London and Copenhagen) and a PhD (UCL).

Research Interests

My research group examines the mechanisms, diagnosis and novel treatments for behavioural disorders arising from dementia and neurodegenerative disease.These include apathy, impulsivity and aphasia. We take a transdiagnostic approach to dementia and parkinsonism, including Frontotemporal dementia; Progressive Supranuclear Palsy; Alzheimer's disease; Corticobasal syndromes and Parkinson's disease. Despite their differences, there is much to be gained from understanding commonalities in the cascade of events from genetic and molecular causes of dementia through to individual expression of phenotypes. The cascade includes neuroinflammation and protein aggregation, the loss of synapses and neurotransmitters, disruption of oscillatory dynamics and cognitive physiology. By mapping this pathway (PET; MRI; MEG; neuropathology, psychopharmacology), we identify *in vivo* targets to prioritise for novel therapeutics, and validate quantitative tools to accelerate experimental medicine and clinical trials, with the goals of precision medicine and prevention.

Dr Alexandra Woolgar

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After a PhD and short postdoc at the University of Cambridge, Alexandra Woolgar moved to Macquarie University, Sydney, Australia, where she led a series of early and mid-career fellowships and programme grants from the Australian Research Council. During 7 years in Sydney she developed a research programme in which she strove to push the boundaries of insight from neuroimaging to study the neural bases for attention and cognitive control. She relocated back to Cambridge to take up an MRC Investigator role in 2018.

Research Interests

My group studies the brain mechanisms for attention and flexible cognition, using multiple neuroimaging modalities (functional magnetic resonance imaging, fMRI, magnetoencephalography, MEG, and electroencephalography, EEG). I have made significant contributions to the development of multivariate analysis of neuroimaging data which allow inference about the task elements 'coded' in different brain regions, and pioneered their application to examine the bases of flexible cognition. I study how information is represented, exchanged, and transformed between brain regions as we make sense of the world around us. Current work focuses on tying neural information coding to behaviour, using both correlational and causal techniques, including the inferentially powerful combination of brain stimulation concurrent with neuroimaging (TMS-fMRI). Key applications include predicting failures of attention from neural signals, and studying hidden cognitive ability in non-speaking children with autism.

Dr Jean Adams

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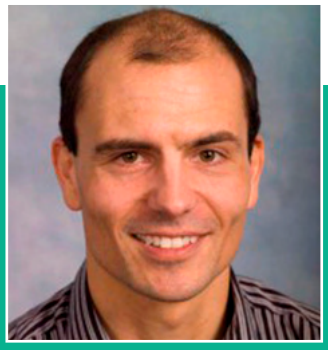
Jean Adams trained in medicine before completing a PhD on socio-economic inequalities in health at Newcastle University. She held an MRC Health of the Population fellowship exploring the role of time perspective in socio-economic inequalities in health behaviours; followed by an NIHR Career Development Fellowship exploring financial incentives for health behaviour change. She moved to Cambridge University in 2014 and became programme leader in the Population Health Interventions programme in 2020.

Research Interests

Healthier diets reduce the risk of many chronic diseases. If we could improve population diet patterns, the health and wellbeing of many people could be improved. However, efforts to achieve this have met with little success to date. One reason may be that the environments we have created for people to live in are not sufficiently supportive. Changing the economic, physical and social factors that influence our behaviour is possible, but more scientific evidence about the effects of doing so is needed to guide policy and practice. The overall goal of our work is to investigate the potential of interventions applied to whole populations to shift population diet patterns (and inequalities in these) by altering fiscal, physical or social environments. Examples of current interventions we are studying include restrictions on food advertising, calorie labelling in chain restaurants, taxes on sugary drinks, and planning restrictions on where new hot food takeaways can open.

Dr Søren Brage



soren.brage@mrc-epid.cam.ac.uk

Søren Brage completed his MSc in Exercise Science and honours degree in health research at the University of Southern Denmark. His MPhil and PhD degrees in Epidemiology were completed at the University of Cambridge. In addition to his position at MRC Epidemiology Unit he also holds an Adjunct Professor title at the University of Southern Denmark and Distinguished Professor title from Yonsei University, South Korea.

Research Interests

My research focuses on: Developing and evaluating assessment methods for physical activity and fitness at population level; the descriptive epidemiology of physical activity and fitness; and characterisation of the relationship between physical activity, fitness, and metabolic disease.

Professor Nita Forouhi

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Nita Forouhi completed her medical training at Newcastle, postgraduate clinical training in Edinburgh and specialised in Public Health in London and Cambridge. She did a PhD in Epidemiology as a Wellcome Fellow at the London School of Hygiene and Tropical Medicine. Since 2005 she worked as clinical investigator scientist at the MRC Epidemiology Unit, where she is now Group Leader. She is member of several committees and Director of Organisational Affairs at the University of Cambridge School of Clinical Medicine.

Research Interests

My research investigates the link between diet, nutrition and the risk of diabetes, obesity, and related disorders in order to inform prevention strategies. My priorities include identifying dietary factors that elevate or mitigate disease risk and mechanistic understanding, development and use of improved dietary assessment methods including discovery approaches with biomarkers, understanding between-population differences and global nutrition and cardiometabolic health. Our research on the link between sugar sweetened beverages and diabetes risk has been translational, being cited in policy evidence nationally and globally, contributing to public health and policy action. It also received the University of Cambridge Impact Award. Our work on blood fatty acids led to a shift in understanding the role of saturated fat that not all saturated fat is alike, and that food sources of saturated fat should be considered, not the nutrient alone, in dietary guidelines.

Professor Simon Griffin

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Simon Griffin qualified from the Royal London Hospital Medical College in 1986. As a Wellcome Training Fellow he undertook doctoral study in Clinical Epidemiology and Public Health at the University of Southampton and London School of Hygiene and Tropical Medicine, before moving to the University of Cambridge in 1998 as a University Lecturer. Since 2005 Simon has led the Prevention Group in the MRC Epidemiology Unit. He was appointed Professor of General Practice in 2013.

Research Interests

My research contributes to efforts aimed at preventing the growing burden of diabetes, obesity and related disorders by translating epidemiological knowledge into preventive action, and evaluating the effectiveness of a range of strategies from behaviour change to screening. Our current focus is on developing and evaluating scalable individual-level interventions, targeting readily identifiable population subgroups, at key points on the type 2 diabetes disease trajectory, which can be delivered in a health care context.

Dr Claudia Langenberg

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Claudia Langenberg is a German-British physician scientist. She completed her medical studies in Germany and trained in epidemiology in the UK and US funded by an MRC fellowship. She completed specialist training in Public Health in 2016 and became Programme Leader at the MRC Epidemiology Unit at the University of Cambridge in 2017. She was appointed Professor of Computational Medicine at the Berlin Institute of Health, Charité – Universitätsmedizin in 2020, in addition to her continued MRC Investigator role.

Research Interests

Common metabolic conditions such as obesity, insulin resistance and type 2 diabetes have both environmental and genetic causes. For example, we now understand that many genetic regions increase the risk of putting on weight or distributing fat unfavourably, in addition to the important roles played by a lack of physical activity and excessive intake of high-calorie foods. Little is known about how identified genes influence disease or which mechanisms are the best targets for intervention. Hundreds and thousands of molecules (such as the human metabolome or proteome) can now be detected and measured on a massive scale in blood and other tissues. Our team integrates genomic and other biological and 'omic' data in large-scale population and clinical studies to characterise the genetic architecture of human metabolism and its influence on health and disease.

Dr David Ogilvie

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David Ogilvie qualified in medicine from Cambridge and subsequently trained in general practice in Suffolk and then in public health medicine in the west of Scotland. He was an MRC doctoral research fellow at the MRC Social and Public Health Sciences Unit in Glasgow before joining the MRC Epidemiology Unit in Cambridge in 2007. He developed and led the Physical Activity and Public Health research programme from 2012 to 2019, and now jointly leads the Population Health Interventions programme.

Research Interests

My interests lie in the design of population-level intervention studies, and in synthesising the complex types of evidence they generate in pursuit of more generalisable causal inference. I specialise in the relationships between transport, the environment, physical activity and health and have led an interdisciplinary group of researchers working in this area, initially on a series of systematic reviews published in the BMJ and then on the design and analysis of natural experimental studies such as the Commuting and Health in Cambridge, iConnect and M74 studies of the health impacts of new transport infrastructure.

Professor Ken Ong

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Ken Ong obtained his PhD following research at the Universities of Oxford and Cambridge, supported by a MRC Clinical Training Fellowship, and then was Clinical Lecturer in the Department of Paediatrics, University of Cambridge. In addition to his research he is a paediatric endocrinologist and clinical lead for childhood obesity at Cambridge University Hospitals NHS Trust, a member of the PHE Scientific Advisory Committee on Nutrition, and chair of its Subgroup on Maternal and Child Nutrition.

Research Interests

My research identified trajectories of rapid infant weight gain, child growth and early puberty timing as determinants of Type 2 diabetes and other obesity-related diseases in adults. John Perry and I co-lead the Early Life Aetiology and Mechanisms programme, which aims to understand the genetic, endocrine and behavioural mechanisms that underlie these links to inform preventive strategies. We work closely with the Unit's other research areas in the aetiology of obesity and Type 2 diabetes, and in the development and testing of interventions to prevent childhood obesity.

Dr John Perry

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John Perry co-leads the Early Life Aetiology programme at the MRC Epidemiology Unit. He is also an associate group leader at the Gurdon Institute and a Fellow and Director of Studies (Medicine) at King's College Cambridge. Prior to this he was a Sir Henry Dale Wellcome fellow, holding positions at the University of Exeter, Wellcome Trust Centre for Human Genetics (University of Oxford), Department of Twin Research (Kings College London) and the Center for Statistical Genetics (University of Michigan).

Research Interests

Epidemiological studies have long linked patterns of early-life growth and reproductive ageing to later life diseases, however the biological mechanisms underpinning these associations remain unclear. For example, what are the pathways that link variation in age of puberty timing to risk of type 2 diabetes and cancer decades later? To explore this, we use large-scale human population studies to identify genetic variants which influence risk of disease or contribute to variation in quantitative traits. These in turn can highlight genes and biological pathways which we aim to further evaluate with experimental collaborators using animal and cellular models. Ultimately we believe elucidating the biological mechanisms linking early life risk factors to later life disease will lead to more effective intervention strategies and therapeutic approaches.

Dr Esther van Sluijs

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Esther Van Sluijs completed her PhD on adult physical activity promotion in Dutch general practice (PACE) at the VU University Medical Centre in Amsterdam (NL) in 2004. She then moved to Cambridge to join the newly established MRC Epidemiology Unit as a Career Development Fellow. In 2012, she was appointed Programme Leader of the newly established 'Behavioural Epidemiology' programme.

Research Interests

The Behavioural Epidemiology and Interventions in Young People programme aims to develop and comprehensively evaluate interventions to promote physical activity and dietary behaviour in young people, and use observational research to further understand where, when and how health promotion interventions in young people may be targeted with a key focus on educational and family settings. Our programme of research applies a wide range of methodological approaches to address these aims, including: evidence synthesis; quantitative observational research; qualitative methods; intervention co-identification and co-development; and mixed-methods intervention evaluation.

Professor Nick Wareham (Director)

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Nick Wareham is the Director of the MRC Epidemiology Unit, Co-Director of the Institute of Metabolic Science, Honorary Consultant at Addenbrooke's Hospital and Professor of Epidemiology at the University of Cambridge, England. He studied Medicine at St Thomas' Hospital Medical School and Epidemiology at the London School of Hygiene and Tropical Medicine and Cambridge University, England. He took up the Directorship of the MRC Epidemiology Unit when it was founded in 2003.

Research Interests

Our programme aims to understand the factors that cause Type 2 Diabetes and the mechanisms by which those factors lead to disease in order to contribute to the development of effective prevention strategies. Type 2 Diabetes originates from a complex interplay between genetics, factors related to growth and development in early life, dietary and physical activity behaviours and obesity, but this interplay is poorly understood. We aim to study this interplay in different epidemiological studies around the world. We aim to identify genetic variants and characterise novel pathways to disease by integrating genetic data with multiple biomarker measurements. A key step is to work out which pathways are directly leading to disease and which are merely associated with it. This distinction is critical to how we can use knowledge of pathways to contribute to the development of new therapies to help prevent and treat diabetes.

Professor Martin White

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Martin White's academic qualifications and posts include: MB ChB (medicine, 1983); MSc Public Health, (1989); MD Public Health (2010); MFPH (1991); FFPH (1997); Lecturer (1990), Senior Lecturer (1992) and Professor of Public Health (2005) at Newcastle; Professor of Population Health Research at Cambridge (2014). He was Director of Fuse, Centre for Translational Research in Public Health (2008-14) and NIHR Public Health Research Programme (2014-2020) and President of SSM (2012-14) and UKSBM (2015-19).

Research Interests

I am an interdisciplinary public health scientist, whose primary current interest is in understanding and transforming food systems for human and planetary health. I have broad experience of social, behavioural, risk and disease epidemiology, and the development, evaluation and translation of public health interventions for population health benefit. I have increasingly specialised in evaluating population-level policy interventions for diet and health, using the methods of natural experimental evaluations. I have a deep interest in advancing theory and methods for population health intervention research and have published extensively in this arena.

Professor Ian Adams

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Ian Adams studied molecular biology and carried out his PhD research on chromosome segregation in yeast under the supervision of Dr John Kilmartin at the MRC Laboratory of Molecular Biology in Cambridge. He then undertook post-doctoral research on mouse germ cell development in Dr Anne McLaren's laboratory at the Gurdon Institute in Cambridge before moving to the MRC Human Genetics Unit in the MRC Institute of Genetics and Molecular Medicine in Edinburgh.

Research Interests

Our research investigates how genetic and chromosomal stability is maintained in mammalian germ cells. Defects in this process are common in humans and result in *de novo* chromosomal aneuploidies being transmitted to ~20% of all conceptions. These inherited aneuploidies are a common cause of human disease including infertility, miscarriage and Down Syndrome. Inherited aneuploidies typically arise during female meiosis and are strongly influenced by maternal age. However some of these errors originate in stages of oogenesis that are not readily accessible in humans. We therefore use mice to study how chromosomes organise, recombine and segregate during meiosis. We have identified pathways that prevent aneuploidies from arising during mouse gametogenesis and are investigating how these pathways influence meiotic chromosomes, how this translates to humans, and whether manipulating these pathways can reduce chromosome ageing and aneuploidy in mammalian oocytes.

Professor Wendy Bickmore (Director)

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Wendy Bickmore is Director of the MRC Human Genetics Unit. She received her BA (Hons) in Biochemistry (University of Oxford) and PhD in molecular biology (University of Edinburgh). Wendy started her independent research group as a fellow of the Lister Institute for Preventive Medicine. Wendy is a Fellow of the Royal Society, the Royal Society of Edinburgh and of the Academy of Medical Sciences and is a member of the European Molecular Biology Organisation. She has been awarded a CBE.

Research Interests

I am fascinated by the three-dimensional organisation of the human genome and how that influences genome function in health and disease. My current research explores how the non-coding genome regulates gene expression, especially how enhancers function to activate genes in time and space.

Professor Javier Caceres

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Javier Caceres studied for a BSc. and a PhD. in Molecular Biology at the University of Buenos Aires, Argentina. He carried out postdoctoral training, first with Jim Dahlberg (University of Wisconsin-Madison), and with Adrian Krainer at Cold Spring Harbor, where he worked on alternative splicing regulation. He established his own lab at the MRC Human Genetics Unit, where he is Head of the Genome Regulation Section. He also holds a Personal Chair in RNA and Gene Expression at the University of Edinburgh.

Research Interests

The major aim of our programme is to study the mechanisms of post-transcriptional regulation of gene expression. Our main focus is on the role of RNA-binding proteins (RNA-BPs) in gene expression and how alterations to RNA processing mechanisms can contribute to human disease. We study different aspects of RNA processing, including alternative splicing regulation (AS), nonsense-mediated decay (NMD) and microRNA (miRNA) biogenesis. We have identified novel players in these pathways and have revealed novel functions for previously identified proteins and novel links between different steps of RNA processing.

Professor Malcolm Dunlop

Research Interests

My research is focused on three main areas:

(1) My primary research focus is on the genetic basis of colorectal cancer in order to shed new light on disease causation and to combat the disease through preventative approaches and early detection.

(2) Cancer chemoprevention is another central theme of the group, focussed primarily on the effect of aspirin and other nonsteroidal anti-inflammatory drugs on NF-kappa-B signalling as a key mechanism of the anti-tumour effect of these agents.

(3) Cancer screening in the general population and also in high risk groups is another focus of research activity.

Professor David FitzPatrick

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David FitzPatrick is an academic paediatric geneticist in MRC Human Genetics Unit at the University of Edinburgh. He is a medical graduate of the University of Edinburgh and trained in paediatrics and clinical genetics in Edinburgh, Bristol and Glasgow. He was a Wellcome Trust Clinical Training Fellow at the University of Glasgow and subsequently a Howard Hughes Clinical Research Training Fellow at Johns Hopkins Hospital in Baltimore. He returned to Edinburgh in 1994 and moved to MRC HGU in 2000.

Research Interests

I have had a long-standing research interest in the genetic causes of developmental disorders. I have a particular interest in the causes of major eye malformations such as anophthalmia (missing eyes), microphthalmia (small eyes) and coloboma (failure of optic fissure closure). My lab identified *de novo* mutations in SOX2 as the commonest cause of bilateral severe eye malformations and several other causative genes (YAP1, SMOC1, MAB21L1, OTX2, FZD5, ITPR1). I also have a major clinical and research interest in a severe multisystem developmental disorder called Cornelia de Lange syndrome which is a disorder of chromatin function. My group identified mutations in BRD4 as a rare cause of CdLS. I am privileged to be involved in the design and management of the large-scale, UK-wide, trio-based exome sequencing project Deciphering Developmental Disorders (DDD) which has transformed diagnostic practice in paediatric genetics.

Professor Nick Gilbert

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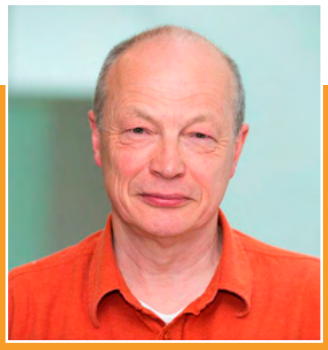
Nick Gilbert trained in classical biophysical techniques during his PhD with Dr Jim Allan, which he applied during his postdoc with Professor Wendy Bickmore to study higher order chromatin structure in human cells. He started his own lab at the Edinburgh Cancer Research Centre with a fellowship from the Wellcome Trust in 2006 which allowed him to develop a collaboration with chemistry where he spends one day per week. He moved to the MRC Human Genetics Unit in 2012 with support from an MRC Senior fellowship.

Research Interests

My lab studies how DNA is folded up with proteins to form chromatin inside mammalian cells. Although we have been studying this for many years it is a big problem, mainly because chromatin is a massive macromolecular complex that makes it very difficult to study. To overcome this we often develop new tools to understand how packaging regulates normal cellular events such as transcription and DNA replication. These often include advanced imaging and molecular biology techniques or close collaborations with chemistry and physics. Chromatin is central to understanding many nuclear processes and recent next generation sequencing projects have identified many mutations in chromatin proteins in cancer. Surprisingly we have found that one of the proteins we work on that regulates chromatin folding is mutated in neurological disorders; we don't yet know the molecular mechanism but this will be an exciting area of research.

Professor Chris Haley



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Chris Haley completed a PhD at the University of Birmingham on the population genetics of fruit flies, followed by a postdoctoral position using twin studies to investigate the genetics of human behaviour before moving to the Animal Breeding Research Organisation (ABRO) in Edinburgh. ABRO subsequently morphed into the Roslin Institute and he is currently a professorial fellow at the MRC Human Genetics Unit and at the Roslin Institute, both within University of Edinburgh.

Research Interests

My research aims to understand the control of complex trait variation in humans and other species. For traits such as height, obesity and depression, variation is controlled by a number of different genes, environmental influences and lifestyle choices as well as interactions between these various factors. Thus there is no simple cause of variation between individuals and such traits are termed complex. Our research uses computational and statistical analysis of data where traits have been measured on large samples of humans or other species and data on genetic, environmental and other potentially causative factors have also been measured. We aim to identify the most important environmental influences and genes with the biggest impact. This information can ultimately be used to build models that can help identify individuals susceptible to disease or contribute to the design of treatments and drugs that treat disease.

Professor Caroline Hayward

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Caroline Hayward's first degree was in Biochemistry from the University of Stirling. After several years of laboratory work she completed her PhD at the University of Edinburgh. This led to post-doctoral positions studying the genetics of Mendelian diseases. Subsequently, she was recruited to the MRC Human Genetics Unit to study the genetics of complex diseases in populations. She now has a Personal Chair in Quantitative Trait Genetics from the University of Edinburgh and continue to work on complex disease genetics.

Research Interests

My core research interest is in the study of the genetics of quantitative traits (QTs) and their relationships to health and disease. I study the genetics of populations from Croatia and Scotland, in which a wide range of data is available from medical examinations, questionnaires and biochemical assays. Plasma, serum and urine have been stored from each cohort participant, allowing additional lab-based measures to be derived and new hypotheses to be tested. Recent advances in Electronic Health Record linkage has increased the availability of clinical measures and enables the longitudinal follow-up of participants and associations with genetic factors. The diversity of phenotypes measured in these cohorts has enabled my research to cover quantitative traits relevant to a very broad spectrum of medically relevant conditions including heart, lung and kidney disease and cognitive traits as well as prevalent and incident disease phenotypes.

Professor Robert Hill

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Robert Hill received his PhD from the Oak Ridge National Laboratories, University of Tennessee in 1981 and started his postdoctoral studies at the Roswell Park Memorial Institute in New York working with Nicolas Hastie. Robert joined the MRC Human Genetics Unit in Edinburgh in 1984. As an MRC principle investigator, he was subsequently awarded a Professorship at the University of Edinburgh. He sat on a number of grant boards during his career including the MRC Nonclinical Training and Career Development Panel.

Research Interests

My area of study is developmental genetics and, throughout my career, I focused on mechanisms responsible for organogenesis with the focus to understand genetic mutations responsible for human congenital abnormalities. Genes that regulate developmental processes are often associated with complex regulatory loci that control gene expression from large genomic distances. Our studies centre on the sonic hedgehog (Shh) locus and we identified a number of genetic mutations that directly disrupt gene regulatory processes to cause a spectrum of defects in limb and craniofacial development. The aims are to investigate long-range gene regulatory mechanisms with focus on processes affected by mutations. These studies focus on the dynamics of enhancer/promoter interactions and the spatiotemporal information encoded in an enhancer. Higher order chromatin organisation underpins the regulatory domain and genetic manipulation is presenting further insights into gene regulatory mechanisms.

Professor Andrew Jackson

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Andrew Jackson is a Programme Leader at the MRC Human Genetics Unit, University of Edinburgh and also practices as a Consultant in Clinical Genetics. He studied medicine at Newcastle University (1993) and completed his PhD at Leeds University (2001), before moving to Edinburgh to start his own group in 2007. Andrew was elected as a Fellow of the Royal Society (2020), the Royal Society of Edinburgh (2014) and the Academy of Medical Sciences (2014), and is a member of EMBO (2013).

Research Interests

My lab identifies genes for Mendelian disorders affecting human brain size and defines the functional role of the encoded proteins using multidisciplinary and multiscale approaches. The ultimate aim is to harness human phenotypes to gain new insights into basic biological processes and extend understanding of disease mechanisms. Working with individuals with microcephalic primordial dwarfism, we identify genes that cause extreme growth failure of the brain and body. We aim to understand how DNA replication and repair, along with epigenetic regulators, establish organ and organism size. We also study Aicardi-Goutières syndrome, a paediatric inflammatory disorder that mimics congenital viral infections, resulting from mutations in genes encoding Ribonuclease H2. This has led to investigation of the cellular and developmental roles of this nuclease and genome-embedded ribonucleotides in genome instability, mutagenesis and inflammation.

Dr Grzegorz Kudla

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Grzegorz Kudla obtained his PhD in 2005 at the International Institute of Molecular and Cell Biology, Polish Academy of Sciences, Warsaw, Poland, supervised by Maciej Zylicz. He was a postdoc with Joshua Plotkin at Harvard University, and with David Tollervey at the University of Edinburgh. Since 2012, he has been leading the RNA Synthetic Biology group at the MRC Human Genetics Unit, University of Edinburgh. He is an EMBO Young Investigator and a Wellcome Senior Research Fellow.

Research Interests

My group studies the relationships between sequence, structure and function in RNA and proteins. Together with the Tollervey and Miska groups, we developed CLASH and COMRADES, two methods that can be used for profiling of microRNA interactions and for determining the structure dynamics of viral genomes in living cells. We also use synthetic biology and deep mutational scanning to understand the effects of mutations in genes. We apply these techniques to a broad range of questions, from the effects of synonymous mutations and codon usage on gene regulation, through the engineering of fluorescent RNA-based sensors, to the prediction of mutational effects in disease genes.

Professor Richard Meehan

Richard Meehan is a Professorial Fellow and investigator at the MRC IGMM, MRC Human Genetics Unit at the University of Edinburgh. He qualified in Genetics at Trinity College Dublin, then completed his PhD in genetics and toxicology (MRC CAPCU and Department of Biochemistry, University Edinburgh). He subsequently discovered the methylated DNA binding protein MECP2 as a postdoc at the IMP Vienna. He has extensive epigenetics expertise in DNA and histone modification analysis in animal and cell models.

Research Interests

My lab focuses on: the relationship between DNA modification patterns and cell identity; identifying genes regulated by DNA methylation 'only'; meta-analysis of *de novo* methylated genes in cancer; and how toxico-epigenetic pathways respond to environmental exposure. My lab showed that CGI genes *de novo* methylated in cancer are primarily marked by PRC1 in embryonic stem cells (ESC). With Wendy Bickmore (MRC HGU) we showed that DNA methylation directed re-distribution of Polycomb activities affects higher-order chromatin structure in mouse ESC. With Sari Pennings (Edinburgh University) we examined the engagement of repressive epigenetic processes in specifying the naïve ground state of mouse ESC. Other collaborations are with Ian Adams (MRC HGU) on the role of DNA methylation in the germline, Mandy Drake (Edinburgh University) on the generational transmission of glucocorticoid-programmed effects and David Hay (Edinburgh University) in analysing metabolic syndromes in hESC models.

Dr Pleasantine Mill

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Pleasantine Mill received her BSc from McGill University and completed her PhD with Professor CC Hui (University of Toronto) dissecting the roles of Gli transcription factors in Hedgehog signalling. Her NSERC Post-doctoral Fellowship funded her work with Professor Ian Jackson (MRC HGU) to identify neural crest genes in a mouse mutagenesis project. As a Caledonian Research Fellow, she focused on several mutant lines affecting cilia. She began on a Programme Leader Track in 2014 and became a Programme Leader in 2018, funded by the MRC and ERC.

Research Interests

My lab aims to understand genetic disease and disease mechanisms arising from dysfunction of mammalian cilia, termed the ciliopathies. While mammalian cilia are ubiquitous and highly conserved structures, the clinical features associated with cilia dysfunction are highly variable in terms of penetrance and severity between tissue types. The cellular and developmental basis to this phenotypic complexity is poorly understood and remains controversial. However, it is quite clear that not all cilia are created equal. In order to better understand the functional and structural diversity of the mammalian cilia repertoire, our strategy has been to engineer genetic tools to allow us to deeply molecularly phenotype cilia with organelle-resolution *in vivo*, using cutting-edge proteomics and advanced imaging. Understanding mammalian cilia diversity is needed to determine disease mechanisms, develop therapeutics and ask fundamental questions about cell biology on an organismal scale.

Professor E Elizabeth Patton

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Liz Patton received a BSc (Honours) degree from King's College at Dalhousie University, and a PhD from the University of Toronto, working with Mike Tyers. Following this, she received a Human Frontier Postdoctoral Fellowship to work with Len Zon at Harvard Medical School, where she developed a zebrafish model for melanoma now used worldwide. Liz is the Editor-in-Chief at Disease Models and Mechanisms (Company of Biologists) and is funded by the MRC, ERC and Melanoma Research Alliance.

Research Interests

Our research is focused on understanding how melanocytes – the pigment cells that become melanoma – develop, divide, migrate and maintain homeostasis within their microenvironment, as well as the genetic and cellular events that cause melanocytes to form moles and their progression to invasive cancer. To do this, we use the zebrafish system, which allows both the visualisation of developing and migrating melanocytes, as well as their aberrant progression to melanoma. The zebrafish is a powerful model system to study developmental biology, chemical biology and disease models. Due to the similar genetic, molecular and cancer pathology between humans and fish, our melanoma progression model can be viewed as an important starting point for identifying novel genes, environmental conditions, and therapeutic compounds that affect melanoma progression.

Professor Chris Ponting

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After training in particle physics and biophysics, Chris Ponting identified many novel protein domains and, with Peer Bork, launched the SMART domain research tool. He co-led the Protein Analysis Section for the human genome project, and led the 2009 mouse genome finishing publication. With Gerton Lunter, his group estimated that 8.2% of the human genome is functional. Funded by Wellcome, his group is investigating lncRNA function. He is also leading a large-scale project on ME/CFS genetics.

Research Interests

My research focuses on the following challenges in various fields:

(1) Genomics: identify DNA variants that predispose individuals to common disease;

(2) Genetics: determine how these changes alter gene expression programmes;

(3) Cell biology: find out how these altered programmes affect development, cells and organs.

Our research uses cutting-edge technologies and analyses to trace the causal links from DNA change to physiological outcome. It is positioned at the intersection between disease genomics, computational biology and experimental determination of molecular mechanism. We use functional genomics approaches at the human population level to infer the causal chain linking DNA sequence variation with altered transcription factor binding, and thereon to changes in disease risk or trait. The group also investigates lncRNA mechanism, deep homology, single cell biology of the thymus and the genetics of ME/CFS.

Professor Colin Semple

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Colin Semple is Head of Bioinformatics at the MRC Human Genetics Unit, where he has led a computational research programme in regulatory and structural genomics since 2001. His group also provides collaborative expertise to experimental research groups within our institute. His postdoctoral work studied the origins and functional impact of genomic variation in yeast, nematode and human populations, while his PhD thesis work examined the maintenance of structural polymorphisms in *Drosophila*.

Research Interests

My group has long standing interests in the roles of selectively neutral processes during the molecular evolution of the mammalian genome, and how they interact with selection. A recurring theme has been the mutational biases associated with different chromatin landscapes, which can cause distinct patterns of sequence variation in regulatory regions. We are currently exploring the evolution of genome variation in isolated human populations and in developmental disorders, to discover the impact on genes and their regulation. We also seek to understand the origins and impact of structural variation in cancer, using tumour sequencing data from consortia studying model systems and patient cohorts. The human genome is now known to be surprisingly labile during evolution and in disease states; our overarching aim is to understand how this abundant variation impacts phenotypes, and how it may be exploited for novel diagnostics or therapies.

Professor Martin Taylor

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Prior to establishing his research group in Edinburgh, Martin Taylor worked at EMBL-EBI investigating the application of evolutionary models to understand genome evolution. Before this he was at the University of Oxford, providing bioinformatics support to multiple research groups and pursuing his own research interests in evolutionary genomics. During his PhD studies in Edinburgh, Martin contributed to the discovery of the DISC1 gene. He obtained a BSc in Genetics from the University of Liverpool.

Research Interests

I am interested in understanding how new DNA sequence changes arise and the consequences of those changes for human health. Many of the insights come from investigating the record of past evolution, using 'the light of evolution' to explore the human genome. My main aims are centred around three interlinked themes: Understanding mutational processes; interpretation of genetic variation; and the evolution of gene regulation. My major findings include the discovery that DNA lesions (damaged bases) segregate unrepaired into daughter cells for multiple generations, thereby generating combinatorial genetic diversity that has profound implications for the evolution and adaptation of cancer genomes. I also showed that the rapid binding of proteins to DNA interferes with replication, making regulatory binding sites hotspots for detrimental mutations. My work speaks to a pressing challenge in human genetics, identifying the small subset of mutations that impact human health.

Dr Veronique Vitart

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Veronique Vitart earned her PhD in 1992 researching tobacco male sterility (Rosine DePaepe lab, Paris). After two postdocs in California, using the emerging plant genetics model system *A. thaliana* in Joanne Chory's and Jeff Harper's labs, she switched to human population genetics after moving to Edinburgh. She has been at the MRC Human Genetics Unit ever since. Here she has completed an MRC special training fellowship (2001) and since 2013 is co-PI of the QTL in Health and Disease research programme.

Research Interests

My overarching research interest is to leverage population genetic findings to understand molecular mechanisms underlying common complex diseases/conditions. Whilst still contributing to or consolidating GWAS studies, for example in retinal detachment - a major risk of vision loss - my group is increasingly focusing on deciphering the physiological roles of established associations. This line of research makes use of the latest developments in statistical genetics, the growing source of GWAS, biological gene-sets and functional annotations, and establishment of cell and animal models. We are currently deploying these approaches to interpret corneal thickness and resistance GWAS results in particular. We are gaining specific insight into growth-factor dependent mechanisms regulating the collagen-rich extra-cellular matrix of the corneal stroma. These insights can inform directly on the aetiology of some corneal pathologies but also of a broader range of, ocular and extra-ocular, conditions.

Professor Jim F Wilson

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After a DPhil in human population genetics at Oxford and a postdoc at University College London, in 2003 Jim Wilson took up a Royal Society University Research Fellowship at the University of Edinburgh, where he has held a personal chair in human genetics since 2016. He is the CI or PI of a number of large research cohort studies including ORCADES, VIKING, NIMS, VIKING II, and Coronagenes. He also leads the ROHgen consortium. His ISI h-index is 93 and he was recently elected Fellow of the Royal Society of Edinburgh.

Research Interests

My research focuses on the genetic architecture of complex traits and the identification of common and rare genetic variants influencing them. I am particularly interested in high kinship isolate populations, which have increased utility for rare variant discovery. We have recruited >8000 subjects from the Northern Isles of Scotland into our richly annotated cohorts, which have been widely used in variant discovery through GWAS and now WES/WGS. A major research interest is in homozygosity and the role of recessive genetic variants in complex traits such as cognition and fertility, via the ROHgen consortium of >200 cohorts. Another key topic is proteomics, glycomics and other omics, as intermediate phenotypes facilitating the application of integrative methods such as Mendelian randomisation. Other research themes include the population genetics of the British Isles; the genetics of lifespan and healthy ageing; the genetics of COVID-19; and the return of actionable genetic findings.

Professor Richard Cornall

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Richard Cornall is the Nuffield Professor of Medicine and Head of the Nuffield Department of Medicine at the University of Oxford. He studied Natural Sciences in Cambridge (MA), and then Clinical Medicine (BM BCh) and Genetics (DPhil) in Oxford. He was a Research Fellow in Immunology at Stanford University, before returning to Oxford and joining the MRC Human Immunology Unit.

Research Interests

My research group is interested in several aspects of inherited and acquired human disease, genetics, the study of biochemical pathways and pathology at the level of single cells, including spatial imaging in renal disease. Our research has covered the development and use of genetic screens and models of immune tolerance; the study of the genetics of type 1 diabetes as a complex trait; investigation into B cell immunity, selection and regulation; the link between the immune system, ageing and cancer susceptibility; and contributions to the discovery of DOCK8 and ZIP7 human immunodeficiency syndromes. With my colleague Professor Simon Davis, I have helped pioneer the use of immuno-modulatory agents based on checkpoint receptor agonism.

Professor Simon Davis

Simon Davis is Professor of Molecular Immunology in the Radcliffe Department of Medicine and MRC Human Immunology Unit, University of Oxford. He completed doctoral training with John F Wheldrake at Flinders University before coming to Oxford to do post-doctoral work with Alan F Williams in 1987. He established his own laboratory in 1995.

Research Interests

My group's focus is on the cell biology of the T-cell surface. We developed general methods for crystalizing glycoproteins and determined the structures of key T-cell surface proteins including: the first adhesion protein CD2 and its ligand CD58; the costimulatory receptor CD28 and its ligand CD80; and the large tyrosine phosphatase CD45. We also worked out how weak, specific recognition is achieved by these types of proteins and obtained the first insights into the likely overall composition of the T-cell surface. Most importantly we proposed, with Anton van der Merwe, one of the most complete and best-supported explanations for leukocyte receptor triggering, called the kinetic-segregation model. Most recently we have been exploiting our understanding of receptor signalling to develop novel treatments for autoimmune conditions, working with Richard Cornall.

Professor Tao Dong

Tao Dong has held the post of Professor of Immunology at Oxford University since 2014. She gained a BSc degree in Physiology from Fudan University, China in 1987, then received a DPhil degree in Immunology from Oxford University in 1998 for work on HIV-specific cytotoxic T cells. During postdoctoral training, where she continued to study immune responses to HIV, she expanded her research to include influenza virus infection and cancer, and started her own independent research group in 2010.

Research Interests

The main objective of my group's research is to focus on antigen specific T cells and studying the factors affecting T cells in controlling virus infection and cancer development. For important human infections, cancer development and the course of disease is influenced mainly by the T cell response - while a robust and appropriate T cell response is beneficial to the host, a weak or inappropriate response can be ineffective or even have a detrimental effect. Numerous factors influence the quality of the T cell response to viral infections, predominant among them being the microenvironment of the infection site, the type of cells infected and the variability of the virus. By understanding the key factors required for efficient viral control by the T cell response in a number of different viral infections and viral associated cancer, we aim to identify targets to augment and control the immune response as a way of improving the outcome of in several important human diseases.

Professor Hal Drakesmith

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Hal Drakesmith is Professor of Iron Biology at the MRC Human Immunology Unit in the MRC Weatherall Institute of Molecular Medicine, University of Oxford. Hal trained at the University of Cambridge, University of Kyoto, and University College London before moving to Oxford. His laboratory works on the interaction of iron homeostasis with immunity, infection, anaemia, and inflammation, with a particular focus on the role of the iron regulatory hormone, hepcidin.

Research Interests

We study how iron and anaemia influence immunity and infectious diseases. Our research develops treatments that control iron physiology to benefit health. Iron is critical for life: too little inhibits DNA synthesis and metabolism; too much generates toxic reactive oxygen species. Furthermore, iron is essential for the growth of pathogens, but also for the immune system that fights infections. During infections, the host sequesters iron to deprive pathogens as part of the innate immune response, while T cells and B cells need iron to clear the infection. Iron levels in the body are controlled by the hormone hepcidin, which acts analogously to how insulin controls glucose. We have advanced understanding of how hepcidin and iron are controlled in health and disease, including anaemia, thalassaemia and viral, bacterial and malaria infections. We utilise experimental models to manipulate hepcidin and understand how iron affects immune responses to infection and vaccination.

Dr Christian Eggeling

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Christian Eggeling did a PhD in Physics at University of Göttingen and became a research scientist at Evotec (2000, Hamburg). In 2003 he joined Professor Stefan Hell's department at the Max-Planck-Institute for Biophysical Chemistry. He has been a PI at the MRC HIU and Scientific Director of the Wolfson Imaging Centre Oxford since 2012. He was appointed Professor of Molecular Immunology (2014) and Professor of Super-Resolution Microscopy/Director of the IAOB (Friedrich-Schiller University) and head of the Dept Biophysical Imaging (Leibniz Institute of Photonic Technologies) (2018).

Research Interests

My group's research is focused on applying and optimising advanced optical microscopy techniques, such as super-resolution STED microscopy, to decipher molecular dynamics in an unprecedented way. In particular, the group studies the biophysics underlying important biological processes, such as viral infection or the organisation of the plasma membrane and changes in cellular structures and molecular organisations following pathogen infections and the immune responses. We believe that capturing the molecular dynamics of such processes is key to understanding them. That is why high temporal and spatial resolution imaging and spectroscopy techniques and analysis tools are developed and applied. Examples include studies on lipid interactions in the immunological synapse or HIV budding sites and the combination of STED microscopy with spectroscopic approaches such as fluorescence-correlation spectroscopy or spectrally-resolved detection.

Professor Lars Fugger

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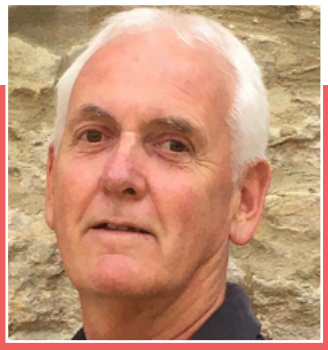
Lars Fugger completed his MD and PhD at the University of Copenhagen and postdoctoral research at Stanford University. He was authorised as a specialist in Immunology in Denmark (2002) and UK (2003). He became an honorary consultant at the Department of Clinical Immunology (2003), Professor of Clinical Immunology (2004) and Professor (Chair) of Neuroimmunology (2007), Nuffield Department of Clinical Neurosciences at the John Radcliffe Hospital, University of Oxford. He was knighted by the Queen of Denmark in 2011. He has been at MRC HIU since 2002.

Research Interests

Neuroinflammatory diseases such as multiple sclerosis are among the most serious health problems facing society today. These conditions pose a staggering personal, societal and economic burden: they affect tens of millions of people worldwide, and by 2050 this figure is expected to triple. Yet, there is no cure for these diseases and current treatments are only partly effective in alleviating symptoms and can be associated with serious side effects. The involvement of inflammation, an otherwise natural and innate response to injury and illness, is of particular interest in these diseases offering a novel avenue of study.

Professor David Jackson



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Having obtained a B.A. (Mod.) and PhD in Natural Sciences (Biochemistry) at Trinity College Dublin, David Jackson moved to Oxford (1987) to work with Professor Sir John Bell, establishing novel methods for expression cloning of leucocyte adhesion receptors. There he was appointed Yamanouchi Fellow in Cell Biology before gaining an MRC Senior Fellowship and joining the MRC Human Immunology Unit (1999) as a PI under Professor Sir Andrew McMichael, to lead a group studying mechanisms of leucocyte trafficking in the lymphatics.

Research Interests

My research interests centre on the structure and function of leucocyte and endothelial adhesion receptors that mediate vascular trafficking in inflammation, infection, immunity and cancer. In particular, my group has focused on the lymphatic endothelial receptor LYVE-1, and how its interactions with hyaluronan in the glycocalyx of immune cells, tumour cells and certain pathogenic bacteria enables them to adhere and enter lymphatic capillaries, and migrate to draining lymph nodes. These studies cover both *in vitro* and *in vivo* analyses and microscopic imaging of key processes such as the trafficking of dermal dendritic cells for T cell immunity, the clearance of monocytes and macrophages following myocardial infarction and lung injury, the lymphatic dissemination of metastatic tumours and the lymphangiogenic response underlying corneal transplant rejection.

Professor Graham Ogg

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Graham Ogg is Deputy Director of the MRC Human Immunology Unit (HIU) at Oxford, having been Interim Director of the HIU and Deputy Director of the MRC Weatherall Institute of Molecular Medicine in 2020. He is NIHR Senior Investigator and Professor of Dermatology. Having trained in Oxford, he was a junior doctor in London, and then completed training through an MRC Clinical Training Fellowship, and Clinician Scientist Fellowship, and progressed to an MRC Senior Clinical Fellowship.

Research Interests

My research investigates the immune response at barrier surfaces, to define disease mechanisms and their translational relevance. My research and clinical work are based on studying disease pathogenesis of the patients I see with inflammatory skin disease. I have a particular focus on the role of CD1a-reactive T cells and innate lymphoid cells. Recent noteworthy findings include the discovery of a pathway in which phospholipases process antigenic lipids that are recognised through CD1a presentation and contribute to disease. The mechanisms highlight a number of therapeutic targets which I am progressing through clinical trials. I collaborate through the NHS, NIHR Oxford Biomedical Research Centre, NIHR Clinical Research Network, and internationally, for example, through leading a Wellcome Trust Collaborative Award. I also work through science capacity building, including supervision of 27 DPhil students, and supporting public engagement.

Professor Jan Rehwinkel

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Between 2003-2007 Jan Rehwinkel completed doctoral Training in post-transcriptional gene regulation with Dr Elisa Izaurralde, European Molecular Biology Laboratory (EMBL), Heidelberg, Germany. He then did postdoctoral research in innate immunology with Dr Caetano Reis e Sousa, Immunobiology Laboratory, Cancer Research UK, London Research Institute, London, UK (2007-2012). He has been a group leader at MRC Human Immunology Unit, University of Oxford, since 2012.

Research Interests

The innate immune response is critical for successful host defence against virus infection. Nucleic acids are often a molecular signature of virus infection and are recognised by innate receptors including toll-like receptors, RIG-I-like receptors and cytosolic DNA sensors. These receptors signal for the induction of innate response genes such as those encoding type I interferons. These in turn induce the expression of many genes involved in anti-viral defence. Our work focuses on cytosolic nucleic acid sensors, in particular RIG-I, MDA5, ADAR1, ZBP1 and cGAS. We are also studying the virus restriction factor SAMHD1. We are using *in vitro* and *in vivo* models of virus infection (including influenza A virus, retroviruses, Varicella-zoster virus, Zika virus and SARS-CoV2) and are interested in Aicardi-Goutières syndrome, a rare genetic disease linked to chronic anti-viral innate immune responses. Furthermore, we study the role of nucleic acid sensors in cancer.

Professor Alison Simmons (Director)

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Alison Simmons is Professor of Gastroenterology, Honorary Consultant Gastroenterologist and Director of the MRC Human Immunology Unit (HIU). She trained as a physician in London, Cambridge, and Oxford, specialising in gastroenterology. She undertook a DPhil and Clinician Scientist award with Professor Sir Andrew McMichael FRS, investigating the mechanisms of HIV pathogenicity. Professor Simmons is an NIHR Senior Investigator, Wellcome Investigator and Fellow of the Academy of Medical Sciences.

Research Interests

My research group studies the immune system within the human gastrointestinal tract and has defined how intestinal immunity underpins health and elucidated pathways driving GI disease.
My work has provided fundamental insight into intestinal immunity and pathogenesis of IBD and has redefined the cellular map of the intestine, discovering unexpected heterogeneity and unknown cell types. My group charted the basis of cellular remodelling that fuels inflammation in colitis, defining populations of disease-associated cells and molecular circuits driving lesional pathology.
I have played a pivotal role in defining the function of the strongest IBD susceptibility genes, describing the basis for their dysregulation in Crohn's. My findings have opened up avenues for the commercial development of novel therapeutic approaches in IBD. I have wide scientific clinical and academic experience in basic molecular and cellular research, experimental medicine studies and early phase trials.

Professor George Davey Smith (Director)

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George Davey Smith FRS is Director of the MRC Integrative Epidemiology Unit and Professor of Clinical Epidemiology at the University of Bristol. After junior medical posts he began his research career in Cardiff in the mid-1980s, including an attachment at the MRC Epidemiology Unit (South Wales). Since then he worked at UCL, the London School of Hygiene and Tropic Medicine and the University of Glasgow (the latter two of which he retains honorary professorships with) before moving to Bristol in 1994.

Research Interests

My research interests have included studying health inequalities, early-life influences on adulthood disease, childhood diarrheal disease and HIV epidemiology and prevention. I have had a particular focus on strengthening causal inference in observational epidemiological data (for example, in 1990 challenging the then taken for granted notion that HDL cholesterol protected against coronary heart disease through the application of sensitivity analysis) and was an early exponent of the use of positive and negative controls and cross-context comparisons in this regard. Over the past 20 years I have pioneered 'Mendelian randomization' approaches exploiting the properties of germline genetic variation in identifying causal influences on health and developmental outcomes. I also have an enthusiastic interest in the history of epidemiology. I have particularly valued the opportunity to mentor and learn from many talented PhD students and early career researchers over the years.

Professor Tom Gaunt

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Tom Gaunt completed a PhD in Human Genetics at University of Southampton in 2002. In 2005 he was awarded a British Heart Foundation Intermediate Fellowship and in 2006 secured a lectureship in bioinformatics and molecular genetics at the University of Bristol. In 2018 he was appointed Professor of Health and Biomedical Informatics. Within the MRC IEU he co-led a data mining and bioinformatics theme (2012-2017), and in 2018 was awarded a programme focused on data mining in population health science.

Research Interests

My research interests lie in the development and application of computational methods in population health sciences. I am interested in understanding the mechanisms of disease, and approach this through the integration of diverse biomedical and epidemiological data and the development of software tools for analysis of these data. One of our key developments is EpiGraphDB (epigraphdb.org), a database that integrates epidemiological and biomedical data to support mechanism discovery and aid causal inference. This builds on previous work to develop the MR-Base platform (mrbase.org) for automated Mendelian randomization and the IEU OpenGWAS database (gwas.mrcieu.ac.uk) of genome-wide association studies. Our application of these tools to drug target prioritization has led to collaborations with several pharmaceutical companies. My other research interests include natural language processing, molecular and genetic epidemiology and development of open source research software.

Professor Deborah Anne Lawlor

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Deborah Anne Lawlor was born in Bradford and studied Medicine at the University of Bristol and then worked in the Bradford Royal Infirmary before working in child and maternal health in Mozambique. On returning to the UK she worked in GP and then public health in Bradford. In 2000 she obtained an MRC fellowship and completed a PhD (Epidemiology; Bristol) and MSc (Medical Statistics; London School of Hygiene and Tropical Medicine) in 2003. She enjoys working in the very multidisciplinary and supportive environment of the MRC IEU.

Research Interests

My research is underpinned by my interest in understanding how social, environmental, clinical and biological risk factors combine to influence reproductive, perinatal and cardiometabolic/ cardiovascular outcomes and the links between these. I have contributed to translational research on the effect of different approaches to IVF on live birth rates and perinatal outcomes and the impact of maternal adiposity (and associated metabolomic change) on pregnancy, perinatal and future maternal and offspring cardiometabolic and cardiovascular outcomes. I have also contributed to the development of methods for improving causal inference in epidemiology, including being at the forefront of developing and using family-based studies for improving causal inference and developing methods for using genetic variants as instrumental variables for making causal inference about modifiable non-genetic risk factors.

Professor Marcus Munafò

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Marcus Munafò completed his PhD at the University of Southampton in 2000, and completed postdoctoral training at the University of Oxford, first in the Department of Public Health and Primary Care and then in the Department of Clinical Pharmacology. He moved to the University of Bristol in 2005, after a short period at the University of Pennsylvania. In 2019 he co-founded the UK Reproducibility Network (www.ukrn.org).

Research Interests

My research focuses on understanding pathways into, and the consequences of, health behaviours and mental health, with a particular focus on nicotine, tobacco and alcohol use. This work includes:

(1) Observational and genetic epidemiology, and the triangulation of evidence from a range of methods that enable stronger causal inference from observational data, such as negative control and Mendelian randomization methods.

(2) The laboratory study of cognitive and neurobiological mechanistic pathways that underpin exposure-outcome relationships.

(3) The development of novel individual- and population-level interventions that target these mechanisms, including choice architecture interventions.

I also have a long-standing interest in the role of incentive structures in science, and the extent to which these shape the robustness and reproducibility of scientific research.

Professor Caroline Relton

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Caroline Relton is a Professor of Epigenetic Epidemiology. She obtained a PhD at Newcastle University in 1999 where she held an academic position for 12 years before moving to the University of Bristol in 2012. She is Director of the Bristol Population Health Science Institute, Programme Lead in the MRC Integrative Epidemiology Unit, Co-PI of the CRUK Integrative Cancer Epidemiology Programme and Director of the Wellcome 4-Year PhD Programme in Molecular, Genetic and Lifecourse Epidemiology.

Research Interests

My research focuses on understanding the role of both genetic and epigenetic variation in development and disease. My group uses population-based approaches to study epigenetic information as a biomarker of exposure and a predictor of disease. I have developed and applied causal analysis methods to understand the role of epigenetic processes as disease mechanisms and have led studies investigating the genetic architecture of DNA methylation variation. My research spans multiple clinical areas from perinatal health to cancer and includes the application of epigenetic biomarkers in disease prevention and prognosis.

Professor Kate Tilling

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Kate Tilling joined St Thomas' Hospital as a Lecturer in Medical Statistics in 1993. She was awarded a PhD in 'Statistical Methods to Study the Incidence and Outcome of Stroke' from King's College London in 1999. Following a postdoc in the Johns Hopkins Bloomberg School of Public Health, Kate joined the department of Social Medicine at Bristol University in 2002. Kate is now a Professor in Medical Statistics in the Department of Population Health Sciences, Bristol Medical School.

Research Interests

My research aim is to develop and apply statistical methods to overcome problems encountered in causal epidemiological research. A key interest is in modelling exposures and outcomes which change over time, and developing methods for analysing such data within a lifecourse setting. Such longitudinal studies typically give rise to missing data, and I have investigated methods for analysing incomplete data using genetic and linked data to explore missingness mechanisms and selection bias. I have continued to develop methods for drawing causal conclusions from observational data, and conducting sensitivity analyses. A current interest is in how collider bias can arise from selection into large studies, or case-only studies, with particular reference to COVID-19 epidemiological research.

Professor Alison Lloyd (Director)

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Alison Lloyd studied Biochemistry (UCL) followed by a PhD in the laboratory of Chris Marshall at the Chester Beatty Laboratories, Institute of Cancer Research in London. This was followed by two postdoctoral fellowships in the laboratories of Bohdan Wasylyk in Strasbourg, France and Hartmut Land at the ICRF laboratories, Lincoln's Inn Fields, London. In 1998, she started her laboratory at the MRC Laboratory for Molecular Cell Biology at UCL. She became Director of MRC LMCB in 2020.

Research Interests

A regenerative tissue must be able to switch between different states; a stable, functional tissue that remains more or less the same for the lifespan of the animal and a repairing tissue that aims to return to the homeostatic state. Peripheral nerve is such a tissue; highly quiescent and architecturally stable during adulthood, it retains remarkable regenerative capabilities. Using a combination of powerful *in vitro* and *in vivo* models, advanced imaging technologies and molecular analyses, our lab explores fundamental questions associated with these changes in cell state to provide insight into pathologies such as cancer, neuropathies and pain. These questions include: How is a stable adult tissue established and maintained? How does a tissue switch to a regenerative state following injury and then return to the homeostatic state? How are regenerative processes such as proliferation, inflammation, cell biogenesis and cell migration co-opted during tumourigenesis?

Dr Christopher Stefan

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Christopher Stefan completed his PhD at Washington University School of Medicine and trained as a postdoctoral fellow at the University of California, San Diego School of Medicine. In 2007, he moved to Cornell University as a Senior Research Investigator where he identified factors that form and function at inter-organelle contacts. In 2013, he became a Group Leader at the MRC LMCB at UCL where his group continues to investigate regulatory mechanisms of membrane lipid and calcium dynamics.

Research Interests

The Stefan lab uses cross-disciplinary approaches to study inter-organelle contacts and their vital roles in membrane lipid and calcium homeostasis. Our studies have focused on contacts between the endoplasmic reticulum and the plasma membrane (ER-PM contacts), providing deeper understanding of phosphoinositide and calcium dynamics during regulated exocytosis and polarised secretion. We are currently studying ER-PM contact architecture and function in hepatocytes. These investigations are suggesting new strategies to control biliary secretion that may prove beneficial in the treatment of liver disease. We are also probing how alterations in inter-organelle contacts and lipid metabolism lead to organelle homeostasis defects. These studies are revealing novel protective pathways that sense and respond to membrane stress and damage. As a result, we expect our findings will be of significance for the treatment of diseases caused by disruptions in membrane lipid and organelle homeostasis.

Dr Mike Bowl

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Mike Bowl is a Principal Research Fellow at the UCL Ear Institute. Mike has a BSc (Hons) Medical Biochemistry and MPhil (Res) Molecular and Cellular Immunology and Oncology from the University of Birmingham, and completed his DPhil studies at the University of Oxford. In 2010, he joined the MGU at the MRC Harwell Institute, initially as a SIS within the Genetics and Pathobiology of Deafness Programme and more recently as the Programme Lead for the Sensorineural Hearing Loss research.

Research Interests

Currently, our limited knowledge of the genetic landscape of deafness is an impediment to: providing a genetic diagnosis to patients; the design of mechanistic studies; and, the development of therapeutic interventions. Indeed, we are still naïve to the complete genetic program that underlies cochlear sensory hair cell identity, function and maintenance. The research aim of my lab is to increase understanding of these genetic programs, with a particular focus on age-related hearing loss (ARHL). Using the mouse as a model, my team and I utilise both forward and reverse genetic approaches to elaborate upon genes that are essential for mammalian hearing. These models allow us to: validate the involvement of genes in ARHL causation; identify critical molecular and cellular processes occurring in the aging mammalian ear; determine the pathobiology associated with disease progression; and, assess for mechanistic links underlying cognitive decline associated with peripheral hearing loss.

Professor Steve Brown (Director)

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Steve Brown undertook research for his PhD at Cambridge University and before he was appointed as Director of the Mammalian Genetics Unit, he was Professor of Genetics at Imperial College, London. He is a Fellow of the Royal Society, a Fellow of the Academy of Medical Sciences, a member of the European Molecular Biology Organisation and in 2009 was the recipient of the Genetics Society Medal.

Research Interests

My research interests cover mouse functional genomics, including the use of large-scale mouse mutagenesis and comparative genomic analysis to study the genetic basis of disease and to develop pre-clinical disease models. A particular focus has been the use of mouse models to study the molecular basis of genetic deafness. Along with Karen Steel, my team discovered myosin VIIA as the gene underlying the shaker1 mutant, one of the first deafness genes to be identified. Subsequently, I developed interests in the protein complexes that are involved with stereocilia elongation in hair cells in the inner ear. In addition, over the last ten years I have led a substantial research effort in the genetics of otitis media or glue ear, a common cause of hearing loss in children, employing mouse models to elaborate the key genetic pathways involved and develop novel therapeutic strategies.

Professor Roger Cox

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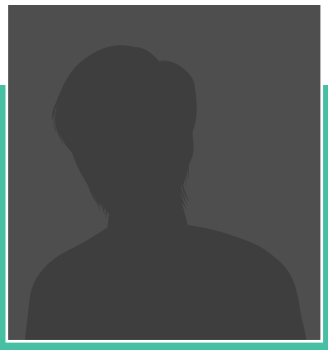
Roger Cox completed his PhD in the Walsh group, Institute of Neurology, University of London (1986). He then joined the Buckingham lab at the Pasteur Institute investigating regulation of skeletal muscle genes and after this worked as a postdoc in the Lehrach group, ICRF, London, studying genome mapping and positional cloning. In 1994 he became Head of the Physical Mapping and Gene ID group at the WTCHG in Oxford. Finally, in 1999 he established the genetics of type 2 diabetes group at the MRC Harwell Institute.

Research Interests

My research interests are in the genetics of type 2 diabetes (T2D) and its physiological risk factors, particularly fat distribution and adiposity. Hundreds of robust well-replicated human genetic loci are associated with fat distribution (waist-hip-ratio), a trait associated with T2D and CVD risk. The alteration of metabolic risk through changes in the size and capacity of particular adipose depots points to important cellular and organismal physiological mechanisms and is the focus of my research.
My group is investigating the TBX15/WARS2 WHRadjBMI associated locus, in which there are four signals. Work is centred on particular SNPs and the function of genes using cellular and *in vivo* mouse models. In a Collaboration with Stanford we are examining the function of another gene associated with type 2 diabetes and ectopic fat deposition. Another focus is development of a 3D adipose organoid spheroid culture system, by incorporating key cell types, to investigate cellular gene function.

Dr Andy Greenfield

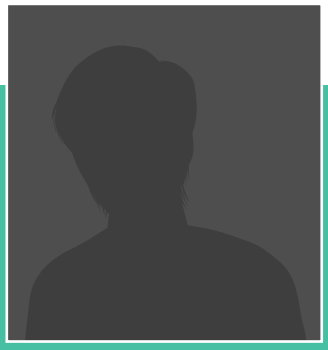


Andy Greenfield is a programme leader at MRC Harwell since 1996. He did his PhD at St. Mary's Hospital Medical School (ICL) and a postdoc at the Institute for Molecular Biosciences, Brisbane, Australia. He has made major contributions to regulation and policy in reproductive medicine, as a member of the HFEA (2009-2018), the Nuffield Council on Bioethics (2014-2020) and the National Academies Commission on Heritable Human Genome Editing (2019-2020). From 2020 he is a member of the Regulatory Horizons Council.

Research Interests

My programme at MRC Harwell investigates gonadal sex determination, broadly with a view to better understanding signals that underlie cell fate commitment in the bipotential fetal gonad and also improving the diagnosis of certain disorders/differences of sex development (DSD) in humans. We collaborate closely with human geneticists and clinician scientists in order to identify novel determinants of testis development. My lab was the first to identify a role for MAPK signalling in mammalian sex determination and, with collaborators, reported that mutations in human MAP3K1 are a frequent cause of 46,XY gonadal dysgenesis (XY female presentation). More recently, we described a role for the WNT signalling antagonist, ZNRF3, in mouse and human sex determination. My lab uses a variety of mouse genetics approaches, alongside genome editing, single-cell transcriptomics and organ culture to investigate molecular and cellular mechanisms of gonad development in the mouse model.

Dr Christopher Holmes



Research Interests

My current research is focussed on applications and statistical methods development in the genomic sciences and genetic epidemiology.

Dr Derek Hood

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Derek Hood obtained a BSc degree from the University of Edinburgh (Microbiology) and a PhD degree from the Department of Biological Sciences at the University of Warwick. Following post-doctoral work at Warwick, he moved to the University of Oxford where he worked with Richard Moxon for 20 years on projects involving bacterial respiratory pathogens. He is currently a Senior Investigator Scientist at the MRC Harwell Institute working on otitis media as part of the Deafness research programme.

Research Interests

I am a microbiologist and since 2013 I have led a research programme that utilises mouse models to study infectious and chronic middle ear disease (otitis media); this is one of the most common infections in children and is a major cause of hearing loss in this age group. Genetically altered mice, which display symptoms of otitis media, allow us to investigate the genetics and pathways associated with the disease. Efficient infection of these mice with human bacterial otopathogens (mainly nontypeable *Haemophilus influenzae*) enable our studies of host-microbial interactions that influence disease and the immunobiology of acute infection. Like human otitis media, not all ears in patients are the same and the quantity and grade of fluid varies significantly in mice. The immunological profile of the fluids influences bacterial infection and changes with progression of the disease. Mouse models also provide a useful means to test novel therapies to improve or prevent otitis media.

Dr Ann-Marie Mallon

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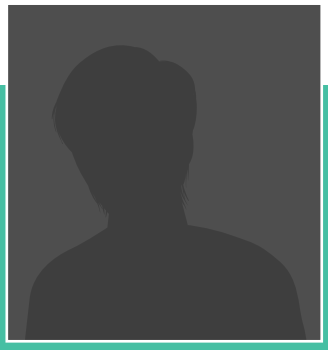
Ann-Marie Mallon first studied biochemistry (University of Manchester, 1995) and then completed a PhD in computational biology. Her early research on mouse genome analysis and development of novel *in-silico* methods for identifying evolutionary conserved regions of the genome contributed to the overall mapping and sequencing of the mouse genome. Her postdoctoral work pioneered development of informatics solutions to support the capture, analysis and dissemination of data from large scale mouse mutagenesis projects.

Research Interests

The group I lead develops computational methods to explore the large volumes of data generated by a number of large scale international and local MRC Harwell projects and disseminates the results to the wider scientific community. In order for our data to be informative, it is essential that it is effectively assessed and managed before being made publicly available. My research focuses on three main areas; the management and analysis of large scale mouse phenotyping data, the analysis of NGS and transcriptomics data and 3D systems imaging. A key remit of my work is to ensure that all data made available is of high quality and presented in a form that can be used by Harwell research programmes and specifically external groups for further research.

Dr Patrick Martin Nolan



Research Interests

Our research group at Harwell routinely use approaches focused on generating and characterising mouse models with behavioural deficits.

Dr Dominic Norris

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Dominic Norris is a geneticist and cell and developmental biologist using cell and mouse models to understand cilia function in development and disease. His PhD (MRC-LMS) examined CpG-island methylation in X-inactivation and genomic imprinting. As a Post-doc (Harvard) he defined, then deleted enhancers *in vivo* that control Nodal. At MRC Harwell (CDA, SNCF, then Programme Leader) he conducted genetic screens to identify novel mutants in Left-Right patterning genes, many of which affected cilia function.

Research Interests

Cilia are widely required for both embryonic development and adult physiology. Defects in cilia function are pleiotropic, influencing many phenotypes and cell types. We study the function of cilia in tracheal clearance, polycystic kidney disease, and left-right (L-R) patterning (which can result in congenital heart disease). We are interested in how cilia allow the detection of fluid flow; how the product of the Polycystic Kidney Disease 1-like-1 (Pkd1l1) gene, and its partner Pkd2 interact. Our genetic analysis defined a multi-repression-based mechanism controlling the establishment of L-R pattern. We have further established that the PKD2 protein must localise to cilia to prevent kidney cyst formation, and we continue to analyse both PKD1L1 and PKD2 protein function at the cellular level. This work has also allowed us to model the human diseases Primary Ciliary Dyskinesia and Polycystic Kidney Disease in mice.

Dr Peter L Oliver

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After a Biochemistry degree (Bath) and a PhD in genetics (NIMR, London), Peter Oliver worked with Kay Davies at the MRC FGU in Oxford studying novel gene function using the mouse. In 2013, he was awarded an ERC Consolidator award to focus on the function of the TLDc family of proteins in the nervous system. In 2018, he moved his group with an MRC Programme Grant to create the new Molecular Neurobiology Group at MRC Harwell to continue these studies using mouse models of neurodevelopmental disease and epilepsy.

Research Interests

My research programme is focused on a family of proteins that we have shown to be important for controlling the stress response in neuronal cells. We have demonstrated that deletion of the protein oxidation resistance 1 (Oxr1) causes neurodegeneration in mice, yet conversely, over-expression of Oxr1 is protective in cellular and mouse models of ALS. Oxr1 contains the TLDc domain, a motif present in a family of proteins including TBC1 domain family member 24 (TBC1D24), a protein mutated in a range of disorders characterised by seizures, hearing loss, and neurodegeneration. The TLDc domain is highly conserved across species, although the structure-function relationship is unknown. To understand the role of this domain in the stress response and disease, we are carrying out systematic functional analysis of TLDc domain-containing proteins as well as investigating their neuroprotective properties in mouse models of neurodegeneration.

Dr Clemence Blouet

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Clemence Blouet received a PhD in Nutrition Physiology from the AgroParisTech and trained in neuroendocrinology with Professor Gary Schwartz at the Albert Einstein College of Medicine, funded by the American Heart Association and a K99/R00 award from NIDDK. In 2013, she was appointed Assistant Professor at Einstein and moved to the Institute of Metabolic Science in Cambridge as a new blood fellow shortly after. In 2018, she joined the MRC Metabolic Disease Unit as Programme leader Track.

Research Interests

My research focuses on brain nutrient sensing and its role in the maintenance of energy balance. I use a multi-disciplinary approach to characterise nutrient-sensing cells, perform discrete molecular manipulations of these cells and downstream neurocircuits, and use cutting-edge molecular genetics and refined functional assessments in behaving rodents to characterise how nutrients are detected by the brain to maintain energy homeostasis in health and disease. One current focus of the lab is to characterise the central representation of protein availability, identify molecular signatures of protein-sensing cells and map the neural circuits involved in the behavioural and metabolic responses to protein excess or deficit. In addition we now study the role of hypothalamic oligodendrocytes in nutrient sensing and the regulation of hypothalamic functions.

Dr Anthony Coll

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Tony Coll is a University Lecturer in Metabolic Medicine (Clinical Biochemistry, University of Cambridge). He qualified in Medicine at King's College Hospital, London and undertook postgraduate training in London and Cambridge. He is a Principal Investigator at the University of Cambridge Metabolic Research Laboratories. He is also an Honorary Consultant Physician (Addenbrooke's Hospital, CUHFT) and continues to be involved in clinical care.

Research Interests

With Stephen O'Rahilly and Giles Yeo, I lead a research programme that aims to understand the biological processes controlling what we eat and how we store and use energy. These pathways are disturbed in obesity and related metabolic conditions such as Type 2 diabetes, and this knowledge will ultimately lead to development of new treatments for these disorders. I have a particular expertise in using murine models to address these issues, in particular how signals from peripheral organs are integrated within the brain to change appetitive behaviour.

Dr Miguel Constancia

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Miguel Constancia did a PhD in Developmental Epigenetics (2000) at University of Cambridge (UCam). Between 2000-2007 at the Babraham Institute, Cambridge, he did postdoctoral work on Genomic Imprinting, then became a Career Progression Fellow and finally a Group Leader and BBSRC David Phillips Fellow in Epigenetics. He was appointed Lecturer (2007) and then Senior Lecturer (2012-present) in Reproductive Biology at UCam. He has been a PI at Metabolic Research Laboratories and Centre for Trophoblast Research since 2007.

Research Interests

My research interests are focused on epigenetic mechanisms of gene regulation and functional significance for development and disease.
We aim to:

(1) Understand the epigenetic mechanisms underlying the programming of metabolic health and disease following exposure to a sub-optimal early environment. The specific questions we are addressing are: How does early nutrition impact on epigenetic mechanisms? How do nutritionally induced epigenetic changes modulate metabolic function? How is epigenetic information integrated during programming of metabolic health and disease across generations?

(2) Investigate the role of epigenetics in processes related to growth and metabolism, at cellular level and whole-body physiology, i.e: How do imprinted genes regulate fetal demand and placental supply of maternal nutrients? How do imprinted genes modulate maternal-fetal communications? How does early life epigenetic programming affect developmental growth and metabolism?

Professor Fiona Gribble

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Fiona Gribble is Professor of Endocrine Physiology at the University of Cambridge, Director of Graduate Education at the School of Clinical Medicine, and Honorary Consultant in Diabetes at Addenbrooke's Hospital. She trained as a physician at the Universities of Cambridge and Oxford, and in 1997 gained a PhD in pancreatic b-cell physiology in Oxford as an MRC CRTF. Her research group in Cambridge has been funded by a series of Wellcome Intermediate/Senior/Investigator and MRC programme grants.

Research Interests

I run a joint research group with Frank Reimann, focusing on identifying signalling pathways in the gut-brain-pancreatic axis that could be exploited to develop new drugs that modulate the gut hormone axis for the treatment of diabetes and obesity. The exemplar gut hormone, Glucagon-like peptide-1 (GLP-1), has been extensively exploited therapeutically for the treatment of type 2 diabetes and obesity through the development of GLP-1 receptor agonists and DPP4 inhibitors. The Gribble and Reimann labs use a variety of techniques to interrogate chemosensory mechanisms in enteroendocrine cells and gut-brain signalling, including *in vitro* techniques such as live cell imaging, electrophysiology and transcriptomics using genetically modified human and mouse organoids, murine metabolic phenotyping *in vivo*, and human physiological studies. Recent innovations include development of mass spectrometry based peptidomics for identifying and quantifying endocrine and other bioactive peptides.

Professor Steve O'Rahilly (Director)

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Stephen O'Rahilly studied Medicine in Dublin and undertook post-graduate clinical and academic training in London, Oxford & Boston, then in 1991 moved to Cambridge and in 2000 was appointed to Chair of Clinical Biochemistry and Medicine. Since 2013 he has been Director of the MRC MDU and co-Director of the Wellcome-MRC Institute of Metabolic Science. He is a Fellow of the Royal Society, an international member of the USA National Academy of Sciences and has won numerous awards for his research.

Research Interests

The MRC Unit programme that I co-lead with Tony Coll and Giles Yeo is interested in the control of energy balance and how this goes wrong in human disorders including obesity and cachexia. We take a multidisciplinary approach including human genetics and murine models. Recent highlights include our work on the hormone GDF15, which is a key mediator of cachexia and responsible for the weight loss-inducing effects of metformin, and the extension of our long-standing body of work on the leptin-melanocortin system to identify elements of this pathway critically involved in the control of nutrient partitioning, linear growth and the timing of sexual maturation. My work on the control of human metabolism and its disorders has been supported by Wellcome for over 30 years. The work has led to the identification of many novel genetic diseases impairing insulin action and to the development of a nationally commissioned NHS service for the management of this family of disorders.

Professor Susan Ozanne

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Susan Ozanne is Professor of Developmental Endocrinology and MRC Investigator at the University of Cambridge. She obtained a first-class honours degree in Biochemistry from Edinburgh University in 1990 and a PhD from Cambridge University in 1994. Prior to her current post, she held fellowships from the British Heart Foundation (Senior Fellow), Diabetes UK (RD Lawrence) and the Wellcome Trust (Career Development). She is an elected member of council of the Society for the Developmental Origins of Health and Disease.

Research Interests

Our research aim is to understand the mechanisms by which *in utero* exposures, such as suboptimal nutrition, influence risk of type 2 diabetes, cardiovascular disease, obesity and premature death. To achieve this, we take an integrative approach using rodent models and human biopsy material (including adipose tissue, muscle, liver and placenta). The inclusion of studies in humans and animal models enables us to define the molecular processes that underpin the concept that has been termed developmental programming and maximises translational potential. We study changes in the transcriptome, proteome and epigenome (including non-coding RNAs and higher order chromatin structure). Our long-term goal is to use this mechanistic insight to design rational intervention strategies to improve the health of women and their children. An important aspect of our current work thus explores the short and long-term impact on mother and baby of different interventions during obese and/or diabetic pregnancy.

Professor Frank Reimann

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Frank Reimann studied Biochemistry in Hannover and received a PhD for work with voltage and ligand gated potassium channels at the Center of Molecular Biology Hamburg (ZMNH) in 1998. He completed a first PostDoc in Oxford focused on K(ATP)-channel structure function. Since 2000, he is working at the Department of Clinical Biochemistry (diverse PostDoc and Fellowship Funding), and has held the position of Professor of Endocrine Signalling since 2018.

Research Interests

The main focus of my lab is on enteroendocrine hormones, for example glucagon-like peptide-1 (GLP-1). How is secretion of these hormones from rare enteroendocrine cells (<1% of the gut epithelium) controlled and how can it be manipulated for the treatment of diabetes and obesity? How do these gut derived hormones, which are also expressed as neuromodulators in the central nervous system control appetite? To answer these questions we have made bespoke mouse and *in vitro* models of human origin allowing identification and manipulation of rare cells types expressing either specific hormones or their receptors. In collaboration, we characterise ion channels underlying nociceptive channelopathies.

Professor Antonio Vidal-Puig

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Antonio Vidal-Puig obtained his MD degree from Valencia Medical School, PhD at Granada Medical School and completed post-doctoral training at Harvard University funded by a Paul Dudley White Fellowship. He is: Professor of Molecular Nutrition and Metabolism at Cambridge; MRC Investigator and Associate Director MRC MDU; Associate Faculty Wellcome Trust Sanger Institute; Associate Research Scientist at Cambridge University Nanjing Centre of Technology and Innovation; and HonProf University of Nanjing.

Research Interests

My lab's (TVPLab) research focuses on the molecular mechanisms linking obesity with insulin resistance, diabetes and cardiometabolic complications. My research strategies include a combination of hypothesis driven and non-biased systems approaches that make extensive use of animal models, stem cell biology, human biological samples (including induced pluripotent stem cells), omics technologies and bioinformatics. Our lab's creativity is reflected in the 'adipose tissue expandability hypothesis' and the concept of 'lipotoxicity'. My scientific contributions to three lines of research are:

(1) Defining the adipose tissue expandability and lipotoxicity hypothesis.

(2) Proposing the use of energy dissipating strategies to reverse lipotoxicity by promoting brown fat differentiation and activation.

(3) The pioneering use of systems biology and stem cell approaches to elucidate the role of specific lipids and networks in the development the cardiometabolic metabolic syndrome.

Dr Giles Yeo

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Giles Yeo completed his PhD at Cambridge in 1998, after which he joined the lab of Stephen O'Rahilly to work on the genetics of severe human obesity. He is now a programme leader at the MRC Metabolic Diseases Unit in Cambridge, focusing on the influence of genes on feeding behaviour and body-weight. He is Honorary President of the British Dietetic Association, a broadcaster and author. He was appointed an MBE for services to 'Research and Communication and Engagement' in the Queen's 2020 birthday honours.

Research Interests

We aim to identify new molecules and pathways that play a role in the brain control of energy homeostasis. We focus on

(a) Understanding the physiological role of known genetic modifiers influencing food intake and body-weight. This is work is funded by the MRC MDU, in a programme I co-lead with O'Rahilly and Coll;

(b) Mapping the human hypothalamic functional architecture underlying appetitive control using both single nucleus RNA sequencing (NucSeq) and single molecule fluorescent in situ hybridization (smFISH). Funded by BBSRC, we are profiling >500,000 human hypothalamic cells, as well as mapping the feeding circuitry onto human hypothalamic sections;

(c) Molecularly characterising, in human neurons, genes associated with severe obesity identified from consanguineous pedigrees.

In an MRC project grant with Froguel (Imperial), we are molecularly characterising emerging candidate genes that emerge from the screen in human neurons and mapping their expression in the human hypothalamus.

Professor Judy Hirst (Director)

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Judy Hirst is Director of the MRC Mitochondrial Biology Unit and Professor of Biological Chemistry at the University of Cambridge. Following an MA and DPhil in chemistry at Oxford, she held a Wellcome Trust International Fellowship at The Scripps Research Institute in La Jolla, then joined the MBU to establish her own research group in 1999. She was elected Fellow of the Royal Society in 2018, Fellow of the Academy of Medical Sciences in 2019, and appointed MBU Director in December 2020.

Research Interests

Dysfunctions of respiratory complex I, the first of four huge energy-converting complexes that supply the cell with ATP by oxidative phosphorylation, cause many mitochondrial diseases — but there are major gaps in our understanding of them. Following the 'resolution revolution' in cryo-electron microscopy the structure of mammalian complex I has been solved, but how it works remains unknown. It is further unclear how it is regulated, repaired or replaced; how its structure, function or assembly are affected by clinically-identified mutations; or how reactive oxygen species, drugs or toxins affect it. My research aims are to define and understand the molecular structure, function and dysfunction of complex I, and to exploit this basic knowledge to understand complex I in the cell, elucidate disease mechanisms, support clinical diagnoses, and contribute to development of therapeutic strategies against both primary diseases and complex multifactorial disorders that involve complex I.

Professor Edmund Kunji

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Edmund Kunji obtained a Master's degree in Biology (1990) and in Chemistry (1991), and a PhD in Mathematics and Natural Sciences (Cum Laude, 1997) at the University of Groningen. From 1996 – 2000 he was an EMBO Postdoctoral Fellow in the group of Richard Henderson at the MRC Laboratory of Molecular Biology. In 2000, he was appointed Group Leader at the MRC Mitochondrial Biology Unit, and in 2005 Fellow of Trinity Hall. In 2019, he became Professor of Biophysics at the University of Cambridge.

Research Interests

Research activities of my lab focus on the transport proteins of the mitochondrion, in particular mitochondrial carriers, which form the largest transporter family in humans (SLC25). They transport nucleotides, amino acids, inorganic ions, keto acids and vitamins across the mitochondrial inner membrane. These transport steps provide metabolites for cellular and mitochondrial pathways and molecules for synthesis and maintenance processes. One of them is the mitochondrial ADP/ATP carrier, which transports ADP in and ATP out of mitochondria to fuel the cell. Using a combination of computational, structural and biophysical approaches we discovered a unique transport mechanism which involves the coordinated movement of six structural elements around a central substrate translocation pathway. The mechanism has provided a molecular explanation for many of the severe metabolic, developmental and neuromuscular disorders that are associated with the dysfunction of mitochondrial carriers.

Dr Michal Minczuk

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Michal Minczuk leads the Mitochondrial Genetics programme at the MRC MBU. He holds a PhD from the University of Warsaw, where he studied mitochondrial RNA metabolism. He did his post-doctoral training at the MRC Laboratory of Molecular Biology in Cambridge, working with Aaron Klug on engineered DNA-binding proteins. He joined the MRC MBU in 2007, initially as an Investigator Scientist with Ian Holt, became a Programme Leader Track in 2009 and a tenured Programme Leader in 2015.

Research Interests

My current work is focused on discovering the genetic links between mitochondrial dysfunction and human disease. My group develops methods for editing of the mammalian mitochondrial genome (mtDNA) using programmable enzymes. These methods are being used to model mtDNA-associated diseases and to correct pathogenic mtDNA variants in gene therapy approaches. We are also interested in investigating how mitochondrial gene expression is regulated, with the main focus on epitranscriptomics, mitoribosome biogenesis and RNA polyadenylation. In addition, my laboratory has been making important contributions to establishing genetic basis and molecular mechanisms of mitochondrial disorders resulting from defects of mitochondrial gene expression. The long-term aim of these efforts is to contribute to understanding of the involvement of mitochondria in human health and disease and to develop mechanism-based therapies of mitochondrial diseases.

Professor Mike Murphy

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After undergraduate studies in Chemistry at Trinity College, Dublin, Mike Murphy completed a PhD with Martin Brand in Biochemistry at Cambridge. After various positions in the US, Zimbabwe and Ireland, he moved to the University of Otago in New Zealand. Nine happy years later, he returned to Cambridge to the MRC Unit that became the Mitochondrial Biology Unit. He is still there and is now Professor of Mitochondrial Redox Biology at the University of Cambridge.

Research Interests

I work on all aspects of mitochondrial redox metabolism, including oxidative stress, free radical production and the development of mitochondria-targeted drugs and probes. My research focuses on the roles of reactive oxygen species in mitochondrial function and pathology. In particular, I have developed the targeting of bioactive and probe molecules to mitochondria *in vivo*. This general methodology is now widely used. Prominent mitochondria-targeted compounds are antioxidants, such as MitoQ, which protects against oxidative damage in ischaemia-reperfusion injury. This work has established mitochondria as a relevant drug target and opened up the field of mitochondrial pharmacology. Recently my work has extended to determining the mechanism by which mitochondria produce free radicals during ischaemia-reperfusion injury in heart attack and stroke.

Dr Julien Prudent

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Julien Prudent obtained his PhD in 2011 at Claude Bernard University Lyon I (France) in Pr. Germain Gillet's lab where he was investigating the roles of Bcl-2 proteins in calcium signalling during zebrafish embryonic development. Dr Prudent moved to postdoc in Pr. Heidi McBride's lab at McGill University (Canada) in 2013 to study the interplay between mitochondrial dynamics, membrane contact sites and cellular homeostasis. He started his independent group at the MRC Mitochondrial Biology Unit in Cambridge (UK) in 2016.

Research Interests

Mitochondria form a dynamic and connected network that undergoes cycles of fission and fusion. These dynamic transitions are not only required to ensure mitochondrial functions but also to respond to cellular needs by adapting their morphology to the metabolic state of the cell. Mitochondria also form an elaborate network of organelle interactions by forming membrane contact sites (MCS) with almost all the organelles. However, while these MCS are hotspots for metabolite flux, the interplay linking mitochondrial dynamics, membrane contact sites, and cellular functions are not fully understood. Our research programme focuses on the understanding of how mitochondrial membrane dynamics and remodelling converge to cellular functions and govern cell fate decisions. To address these questions, we use state-of-the-art microscopy combined with proteomic and biochemical analysis and investigate their relevance to the cell death/survival and inflammation pathways as well as cellular metabolism.

Dr Alexander Whitworth

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After a PhD at the University of Cambridge, Alexander Whitworth did his post-doctoral research at the University of Washington, developing several new *Drosophila* models of Parkinson's disease. In 2005 he started his own research group at the University of Sheffield, progressing from Lecturer to Senior Lecturer and Reader. In 2015 he joined the Mitochondrial Biology Unit where his group focuses on understanding the role of mitochondrial dysfunction in various neurodegenerative diseases.

Research Interests

Mitochondria are critical to the function of active tissues such as the brain, and have long been implicated in the pathogenesis of numerous neurodegenerative diseases. Functional studies in genetic models of Parkinson's disease (PD) established that PINK1 and parkin regulate mitochondrial homeostasis. Numerous studies have implicated the PINK1/parkin pathway in many steps of mitochondrial quality control including fission/fusion dynamics and intracellular trafficking for autophagic degradation (mitophagy). The inability to properly regulate mitophagy impacts on the long-term maintenance of the mitochondrial network and ultimately on neuronal survival, however, the understanding of this mechanism *in vivo* is limited. The work in our lab aims to reveal the cellular mechanisms underlying neurodegenerative diseases, and to identify potential therapeutic intervention points, primarily using *Drosophila* as a model system.

Associate Professor Dr Ross Chapman

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Ross Chapman received his PhD from Steve Jackson's lab (2010, Cambridge) working on the DNA damage response. As a Sir Henry Wellcome Fellow, Ross next worked with Simon Boulton at CRUK (London), researching DNA double-strand break repair mechanisms. Establishing his group in 2013 (Wellcome Centre for Human Genetics), he was elected to Associate Professor in 2017. In 2020 he moved to the MRC Molecular Haematology Unit (Oxford) where he holds CRUK and Lister Fellowships and is a EMBO Young Investigator.

Research Interests

The accurate repair of DNA breaks is vital for protecting our genomes against cancer-causing mutations, however, the B and T lymphocytes of our immune systems deliberately induce and repair DNA breaks in a mutagenic fashion in order to adapt and diversify antigen receptor molecules. My group is interested in how cells and different tissues strike an appropriate equilibrium between accurate and mutagenic DNA repair mechanisms, so that we can understand why faults in this regulation lead to cancer and immunodeficiency, and devise innovative strategies to exploit these faults in cancer therapies. Recent research:

(1) Non-homologous end joining (NHEJ) in cancer, lymphocyte development and diversification; Ghezraoui et al. Nature 2018; Becker et al. Nat. Comms 2018.

(2) The interplay of homologous recombination (HR) and NHEJ pathways; Saredi et al. Nat. Cell Biol.2019; Becker et al. 2021, BioRxiv.

(3) Synthetic lethality in cancer treatment; Xu, Chapman et al. Nature 2015; Yeow et al. Nature 2020.

Professor Marella de Bruijn

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Marella de Bruijn obtained her BSc in Biomedical Sciences from Leiden University and her PhD from Erasmus University, Rotterdam, the Netherlands, where she trained in Immunology. She was a Post-Doctoral Fellow at the Department of Cell Biology and Genetics at Erasmus University, and a Fellow of the Dutch Cancer Society at Dartmouth Medical School, Hanover, NH. In 2003 she moved to Oxford to join the faculty of the MRC Molecular Haematology Unit at the MRC Weatherall Institute of Molecular Medicine.

Research Interests

My research group's main interest is the birth of blood stem and progenitor cells during mammalian embryonic development. Our work focuses on the cellular lineages and gene interaction networks that underlie the *de novo* generation of blood stem and progenitor cells, and on establishing the contribution of these cells to the developing hematopoietic and immune system. This knowledge will facilitate the development of novel and improved cell therapies for blood and immune cell-related disorders and regenerative medicine.

Professor Richard Gibbons

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Richard Gibbons trained in Medicine at Oxford qualifying in 1986. He completed his DPhil project between 1980-84 at the Dunn School of Pathology in Oxford and then a Postdoc with Doug Higgs in the MRC Molecular Haematology Unit, Weatherall Institute of Molecular Medicine from 1990-1997. He has been a PI and Honorary Consultant in Clinical Genetics since 1997.

Research Interests

I run a research group in the MRC Molecular Haematology Unit in the Weatherall Institute of Molecular Medicine, Oxford. My major research interest is in the role of a chromatin remodeling factor, ATRX. Mutations in the ATRX gene are associated with ATR-X syndrome, a rare inherited condition associated with severe intellectual disability. ATR-X syndrome represents one of the best studied examples of a newly recognised class of human disease, a disease of chromatin. Acquired mutations are a feature of tumours that maintain their telomeres via the telomerase-independent, alternative lengthening of telomere pathway and this has indicated that ATRX acts as a tumour suppressor.

Professor Jim Hughes

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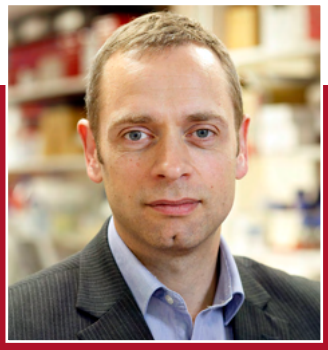
Originally a biochemist, Jim Hughes became fascinated by genetics and molecular biology during a PhD at Oxford identifying and cloning disease genes. His interests shifted from genes to gene regulation, which underlie a very large proportion of human disease predisposition. During the course of his career in genomics, he realised that computational skills would become essential and he retrained as a bioinformatician. His group in Oxford reflects this by integrating both bench and computational approaches.

Research Interests

The Hughes group is interested in how mammalian genes are regulated and how their deregulation is linked with human disease. The ~22 thousand genes in the genome are turned off and on or precisely modulated in different cell types to maintaining the complex biological system of a multicellular organisms. We integrate both bench and computational approaches to understand how genomic regulatory switches or enhancer elements work and how variations in their activity in our genomes leads to increased risk of developing common diseases. The group has a track history in the development of novel genomics technologies as well as computational approaches, with a molecular biology arm that is expert in next-generation sequencing based genomics and genome engineering with a purely computational arm expert in bioinformatics and machine learning approaches. The group is highly multi-disciplinary and is always keen to incorporate different fields to help answer its central questions.

Professor Adam Mead



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Adam Mead is a professor of haematology at the Weatherall Institute of Molecular Medicine at the University of Oxford. Professor Mead's research is focused on understanding how the normal haematopoietic stem/progenitor hierarchy is disrupted during the development of myeloid malignancies. Professor Mead is Clinical Lead for Myeloid Disorders at Oxford University Hospitals NHS Trust and he leads the UK NIHR Myeloproliferative Neoplasms Clinical Studies Subgroup.

Research Interests

The overarching aim of my research group is to improve the management of patients with myeloproliferative neoplasms (MPN), chronic myeloid leukaemia (CML), and related conditions through better characterisation and therapeutic targeting of malignant stem and progenitor cell populations. My laboratory has a particular interest in the development and application of single cell genomics techniques to analyse malignant stem cell populations. My group has used this approach to analyse leukaemia stem/progenitor cells in patients with CML, MPN, juvenile myelomonocytic leukaemia and related conditions. We are also applying this approach to analyse patients with chronic myeloid neoplasms who transform to acute leukaemia and those receiving novel targeted therapies in order to better understand mechanisms of resistance to molecularly targeted therapy in stem cell populations and pathways of transformation to more aggressive forms of disease.

Associate Professor Thomas Milne

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Tom Milne received a PhD in 2005 co-supervised by Dr Hugh Brock (University of British Columbia, Vancouver, Canada) and Dr Jay Hess (University of Pennsylvania, Philadelphia, USA). Tom then did his postdoctoral studies at The Rockefeller University (NY, USA) in the lab of Dr C. David Allis. He became a Group Leader in 2010 at the MRC Molecular Haematology Unit in the MRC Weatherall Institute of Molecular Medicine at the University of Oxford and then became an Associate Professor of Haematology in 2014.

Research Interests

Chromatin proteins have become key therapeutic targets in cancer treatment but it is still not fully understood how these proteins function. My lab aims to better understand how chromatin proteins contribute to gene regulation in normal haematopoietic cells and in disease, and in particular how chromatin proteins influence gene expression through differential enhancer activity. We have a specific focus on high risk paediatric leukaemias, particularly those caused by rearrangements of the Mixed Lineage Leukaemia (MLL) gene. The overall goal is to use key mechanistic insights from our work to design effective combination therapies using pre-clinical models of disease.

Professor Claus Nerlov

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Claus Nerlov received a Ph.D. in Molecular Biology in 1995 from Copenhagen University. After postdoctoral studies with Thomas Graf at EMBL he became Head of the Laboratory of Gene Therapy Research at the Copenhagen University Hospital. He rejoined EMBL as a Group Leader in 2001. In 2009 he was appointed Head of the Institute for Stem Cell Research at the University of Edinburgh. In 2012 he joined the MRC Molecular Hematology Unit at the University of Oxford as Professor of Stem Cell Biology.

Research Interests

My key scientific interests are the cellular organisation of the hematopoietic system, and the transcriptional and signalling mechanisms that control normal and perturbed hematopoiesis.
A particular focus has been the use of single cell biology to identify functional heterogeneity within hematopoietic stem and progenitor cell populations, leading to the identification of fate-restricted hematopoietic stem cell subtypes and of two distinct cellular pathways of myeloid cell differentiation. This improved cellular framework is used to better understand how oncogenic mutations affect hematopoiesis and how hematological malignancies arise. Other areas of interest include ageing, and how this contributes to age-related anaemia, immune decline and the development of hematological malignancies. Finally, having identified bi-directional signalling by the c-Kit-mKitL complex as important to thymic development, the importance of this signalling complex in cancer is being investigated.

Professor KJ Patel (Director)

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KJ Patel trained as a gastroenterologist and then completed a PhD with Michael Neuberger FRS at the MRC Laboratory of Molecular Biology. KJ continued his research there and was later appointed Tenure Track Group Leader and Tenured Principal Investigator (2007). In 2020 KJ was appointed Director of the MRC Weatherall Institute of Molecular Medicine & MRC Molecular Haematology Unit at the University of Oxford. KJ is a Fellow of the Royal Society, Academy of Medical Sciences, and a member of EMBO.

Research Interests

We study endogenous DNA damage and its impact on the function of vertebrate stem cells and the ageing process. Our recent work has shown that metabolism releases reactive aldehydes that are a potent source of such endogenous DNA damage. Mammals are protected against these genotoxic metabolites by first eliminating them through oxidising enzymes, and secondly by repairing the DNA damage they cause. Our current research aims to define the origins and identity of genotoxic metabolites, how cells remove them, the nature of the DNA damage they cause and how this damage is repaired. We also want to understand how certain stem cells and organ systems are damaged by these sources of endogenous DNA damage, and the consequences of this to an organism.

Associate Professor Catherine Porcher

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Catherine Porcher received her PhD from University of Paris VII. She joined Professor Stuart Orkin's group at Harvard University (Boston, USA) for her post-doctoral studies, where she developed an interest in the transcriptional control of haematopoiesis. She was then appointed as a Group Leader in the MRC Molecular Haematology Unit, MRC Weatherall of Institute of Molecular Medicine, University of Oxford and, in 2014, became Associate Professor of Developmental and Stem Cell biology.

Research Interests

Blood cell fate determination initiates long before emergence of the first blood cells during embryonic development, suggesting progressive realisation of a blood cell identity. My group studies the transcriptional and epigenetic mechanisms imparting blood cell fate to mesodermal progenitors, their initial differentiation along the haemato-endothelial trajectory, and the developmental relationships between haematopoietic cells and distinct endothelia/blood vessels to reconstruct lineage hierarchies. This work will help model blood stem cell development *in vitro* for basic research and regenerative medicine purposes.

Professor Irene Roberts

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Irene Roberts qualified in medicine at Glasgow University. After clinical training in paediatrics and haematology and doctoral training in Garret FitzGerald's lab, Vanderbilt University, Nashville, she joined Lucio Luzzatto's lab at Imperial College London where she established her own group in 1990. She moved to Oxford in 2013 where she is Professor of Paediatric Haematology and Group Leader in Paediatrics and the MRC Molecular Haematology Unit, MRC Weatherall Institute of Molecular Medicine.

Research Interests

Our group aims to identify developmentally-regulated, molecular and biological properties of fetal haematopoietic stem and progenitor cells (HSPC) that provide the permissive cellular context for leukaemia in early childhood and to investigate the mechanisms which drive these changes. We study 3 tractable models of early childhood leukaemia where evidence supports leukaemia initiation before birth: Down Syndrome (DS)-leukaemias, infant acute lymphoblastic leukaemia (ALL) and Juvenile Myelomonocytic Leukaemia (JMML).
We were the first to show that trisomy 21 causes global disruption to fetal HSPC development. In collaborative projects we recently characterised leukaemic stem cells in JMML and developed novel human ALL models allowing cell context-specific mechanistic studies. A major aim of our current work is to identify specific mechanisms by which trisomy 21 perturbs the functional, transcriptomic and epigenetic landscape of human fetal HSPC and how this initiates leukaemia in DS.

Professor Paresh Vyas

Research Interests

Our aim is to characterise the heterogeneous populations of leukaemia propagating cells in adult and childhood Acute Myeloid Leukaemia (AML) at functional, genetic, epigenetic and molecular levels, eventually at a single cell level, to improve our basic understanding of leukaemia initiation and propagation. The ultimate aim is to translate this knowledge to improve survival rates in patients.

Associate Professor Vincenzo D'Angiolella

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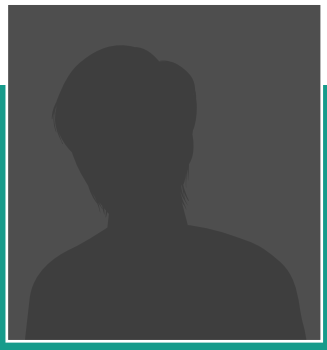
Vincenzo D'Angiolella is an Associate Professor at the Oxford Institute for Radiation Oncology. He has a Medical Degree (MD) from the University of Naples 'Federico II', where he completed his DPhil in the field of Molecular Pathology. After his medical studies, he worked as a postdoctoral fellow at the New York University School of Medicine in the USA in the laboratory of Professor Michele Pagano. His studies have focused on the role of ubiquitin system in cell cycle control and cancer.

Research Interests

The Ubiquitin Proteasome System (UPS) is a crucial regulator of cell survival in normal conditions and after DNA damage. The function of UPS is dysregulated in cancer, providing a repertoire of targets to exploit for cancer treatment. While there are more than 1000 genes composing the UPS, the function and mechanisms of action of the majority of them are unknown. The mission of my laboratory is to decipher the role of the E3 ubiquitin ligases, components of the UPS, in cancer pathogenesis and response to treatment with Ionising Radiation. My laboratory has defined roles for UPS in cell cycle control (cyclin F) and medulloblastoma pathogenesis(Fbxl17). The laboratory completed UPS focused CRISPR screens to investigate UPS in the pathogenesis of medulloblastoma and glioblastoma. Investigation of E3s will provide insights in the pathogenetic mechanisms of cancers and pose the basis for drug development through PROteolysis TArgeting Chimeras (PROTACs) and molecular glues.

Professor Amato Giaccia (Director)



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Amato Giaccia was awarded his PhD in Pathology by the University of Pennsylvania. Until January 2019, he was Professor of Radiation Oncology and Director of the Division of Radiation & Cancer Biology at Stanford University. Amato was the recipient of the 2013 ASTRO Gold Medal and in 2015 was inducted into the National Academy of Medicine. He is currently Professor of Radiation Oncology and Director of the MRC Oxford Institute for Radiation Oncology in Oxford University.

Research Interests

My research programme is focused on translating basic science findings on the role of hypoxia in tumour progression and resistance to therapy from pre-clinical models of cancer into the clinic. The overarching hypothesis is that hypoxia not only makes tumour cells resistant to radiotherapy, chemotherapy and targeted therapies, but also increases their metastatic potential by inducing a select group of genes that regulate tissue remodelling, EMT and immune evasion. My group is developing new targeted therapies to eliminate hypoxic cells or inhibit hypoxic genes that drive malignant progression. We have advanced understanding of gene regulation under hypoxic conditions, identified novel targets for hypoxia directed therapies, and are developing new diagnostics for hypoxia. Our current goals are to define the molecular mechanisms induced by hypoxia that impact targeted therapies such as DNA damage response inhibitors and immune response modulators to enhance their efficacy.

Dr Timothy Humphrey

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Tim Humphrey is Deputy Director at the Oxford Institute for Radiation Oncology (OIRO). He performed his doctoral studies with Nick Proudfoot at the University of Oxford and was an EMBO and HFSP post-doctoral research fellow at Harvard Medical School before returning to the UK to become a group leader at the MRC Genome Stability Unit, Oxfordshire. He was awarded tenure in 2003, and in 2008 he moved to Oxford where he heads the Chromosome Integrity Group within OIRO.

Research Interests

The aim of our research is to understand how genome stability is maintained in response to DNA double-strand breaks, and to exploit our findings to target cancer. Exposure to ionizing radiation (IR) can cause chromosome breaks, in which both DNA strands are broken. In addition to causing cell death (the desired outcome during radiation therapy), such lesions can also cause chromosomal rearrangements and genome instability, a hallmark of cancer cells. We are focusing on the early events and chromatin modifications in DNA double-strand break (DSB) repair and misrepair. Further, we are exploiting our findings to develop novel targeted cancer therapies in the clinic.

Dr Eui Jung Moon

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Eui Jung Moon is a Group Leader at MRC Oxford Institute for Radiation Oncology. She received her PhD from Duke University, USA with Dr Mark W. Dewhirst while focusing on the effect of hypoxia-inducible factor (HIF) on tumour reoxygenation after mild hyperthermia (2004-2010). Then she joined Dr. Amato Giaccia's lab at Stanford University, USA, to study hypoxia regulation of MAFF protein and its role in tumour cell invasion and metastasis as a postdoctoral fellow and a research scientist (2010-2021).

Research Interests

Our lab focuses on determining how hypoxia promotes tumour progression such as invasion, metastasis, and metabolism. Based on screening data, we identified key pathways involving MAFF protein. The regulation of MAFF protein, a bZIP transcription factor, has been implicated in the transactivation of antioxidant response genes. Our work demonstrated that the level of small MAFF protein expression is critical to the regulation of gene induction or repression, indicating that stresses like hypoxia act like a rheostat regarding the formation of MAFF homodimer and heterodimer formation, leading to transactivation or gene repression. Biologically, we found that the MAFF protein is a major regulator of tumour cell invasion and metastasis under hypoxia and impact the radiation response of cells though controlling antioxidant gene transcription. The Moon lab is currently working on how MAFF plays a role to alter tumour metabolism and radiation responses under hypoxic conditions.

Dr Monica Olcina

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Monica Olcina was awarded an MSc and D.Phil in Radiation Biology by the University of Oxford. During this time, she was an MRC-funded student. In 2014 she joined Stanford University where she worked as a Cancer Research Institute Irvington Postdoctoral Fellow. In 2019 she moved to the University of Zurich to continue her postdoctoral studies. At the end of 2020 she established her group at the MRC Oxford Institute for Radiation Oncology, at the University of Oxford.

Research Interests

Our lab studies the mechanistic details of how tumours exploit innate immunity pathways to their advantage by using a combination of cancer patient data, *in vitro* experiments and *in vivo* models. We are particularly interested in how we can use these mechanistic insights to improve radiotherapy. Our most recent work has focused on the complement system, a central innate immunity pathway which we have found is frequently dysregulated in human cancers with poor prognoses. As we learn more about the complement system it is becoming increasingly clear that components of the tumour microenvironment, including the low oxygen (hypoxic) conditions found in tumours, are key contributors to its dysregulation in cancer. Importantly, targeting dysregulated complement proteins may improve radiation responses through non-canonical functions of these proteins, and we are actively investigating the mechanisms underlying these novel roles.

Dr Kristoffer Petersson

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Kristoffer Petersson is a Researcher and Medical Physicist from Helsingborg, Sweden. He completed his MSc (2009) and PhD (2014) in Medical Radiation Physics, Lund University, Sweden. He has held positions as a Post-doc researching FLASH Radiation (Lausanne, Switzerland, 2014-2017) and a Clinical Medical Physicist, Group leader on FLASH Radiotherapy, Skåne University Hospital, Sweden (2017-2019). Since October 2019 he has led a programme on Biology and Physics of FLASH Radiation at Oxford Institute for Radiation Oncology.

Research Interests

My research ambitions are to further improve the knowledge in the field of Medical Radiation Physics and Radiobiology. My goal is to improve on current clinical practice in radiotherapy, to achieve a more efficient patient treatment and with less adverse effects. With that goal in mind, over the last seven years I have focused my research on FLASH radiation, i.e. radiation delivered at ultra-high dose rates. Currently, I am heading one of the most prominent teams in the world in this field of radiation research, at the University of Oxford. FLASH radiation is a novel radiotherapy technique that shows great potential in improving cancer treatment. However, very little is known about the biological mechanisms behind the highly beneficial FLASH effect. My research team aims to identify these mechanisms, explain the effect, and to find the optimal way of implementing the technique in clinical practice.

Professor Kristijan Ramadan

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Kristijan Ramadan holds degrees in Veterinary Medicine (1997), Pathology (2000) and Doctorate of Philosophy (2004) in Biochemistry and Molecular Biology from the University of Zürich under supervision of U. Hübscher. He did post-doctoral training at the ETH-Zürich in the group of H. Meyer. He was Junior Group Leader (2009-2013) at the University of Zürich. He became MRC Senior Group Leader (2013), Associate Professor (2014) and Full Professor of Molecular Medicine (2019) at the University of Oxford.

Research Interests

My work has been addressing some of the fundamental biological questions that are relevant for genome stability, oncology, radiation biology and cancer therapy. The overarching goal of my laboratory is to understand two basic biological processes: chromatin-associated protein degradation (CHROMAD) and DNA-protein crosslink (DPC) proteolysis in DNA repair and response to radio- and chemo-therapy. Our specific scientific question is to elucidate the role of ubiquitin-chaperon p97/VCP - the central molecule in the ubiquitin system - in genome stability and cancer. p97/VCP sits at the cross-roads of CHROMAD and DPC proteolysis. My work and research group are recognised for co-discovery of (i) CHROMAD (Ramadan et al. Nature 2007), (ii) a human syndrome associated with premature ageing and hepatocellular carcinoma now known as Ruijs-Aalfs Syndrome (Lessel et al. Nature Genetics 2014) and (iii) the SPRTN protease, the essential human enzyme for DPC repair (Vaz et al. Molecular Cell, 2016).

Professor Colin Baigent (Director)

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Colin Baigent is Director of the MRC Population Health Research Unit and Deputy Director of the Clinical Trial Service Unit and Epidemiological Studies Unit (CTSU) at the University of Oxford, where he is Professor of Epidemiology and Honorary Consultant in Cardiovascular Epidemiology. Professor Baigent is a Fellow of the Royal College of Physicians, the Faculty of Public Health, and the European Society of Cardiology. He was elected a Fellow of the Academy of Medical Sciences in 2019.

Research Interests

My main scientific interests are the design and conduct of large-scale streamlined randomised trials and the use of meta-analyses of individual patient data from randomised trials. I lead the Vascular Meta-analysis programme in PHRU, which includes some of the world's largest meta-analyses of individual patient data. These have resulted in numerous landmark papers, including those that have defined the effects of statin therapy (the Cholesterol Treatment Trialists' [CTT] Collaboration). I led the Study of Heart and Renal Protection (SHARP) in which 9438 patients with chronic kidney disease were recruited in 390 hospitals in 18 countries, and which showed that cholesterol-lowering by statins reduced the risk of atherosclerotic events in this population. I am now co-chair of the ongoing EMPA-KIDNEY trial comparing empagliflozin versus placebo in 6600 patients with chronic kidney disease, which is part of PHRU's trials programme.

Professor Louise Bowman

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Louise Bowman is Professor of Medicine and Clinical Trials at the University of Oxford. She did her medical training at St Catharine's College, University of Cambridge, and St Bartholomew's Hospital, University of London. Her specialist clinical background is in Diabetes and Endocrinology. She has particular research interests in cardiovascular disease in diabetes, and maintains her clinical practice with regular specialist lipid clinics.

Research Interests

I am Chief Investigator for the ORION-4 trial, assessing the effects of Inclisiran on clinical outcomes among 15,000 people with cardiovascular disease, and for the AMALFI trial, evaluating screening for undiagnosed atrial fibrillation in high-risk individuals. I am also Co-principal Investigator for the landmark ASCEND trial, which studied the effects of aspirin and of omega-3 fatty acid supplementation for the primary prevention of cardiovascular disease in 15,000 people with diabetes, and for REVEAL, an international clinical trial that assessed the efficacy and safety of the CETP-inhibitor, anacetrapib, in 30,000 high-risk individuals. Through my work on major trials in cardiovascular disease, I have developed a specialist interest in Clinical Trials Methodology. My focus is on the development, application and widespread promotion of methods to enhance the design and conduct of trials to ensure high quality outputs and reliable results at low cost.

Professor Zhengming Chen

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Zhengming Chen qualified in medicine at the Shanghai Medical University in 1983. Before coming to the UK in 1987 he worked as a research assistant and also undertook postgraduate training in public health. He gained a DPhil in Epidemiology at the University of Oxford in 1992. Currently he holds positions as Professor of Epidemiology at Oxford University's Nuffield Department of Population Health, and also honorary professorships of several universities (eg, Peking Union Medical College, Fudan University).

Research Interests

My main research interests involve determinants of common chronic disease (e.g. stroke, IHD, diabetes), development of evidence-based medicine, and efficient strategies for chronic disease control in low- and middle-income countries. Over the last 25 years, I have led large placebo-controlled trials involving in total 60,000 heart attack and 20,000 stroke patients, leading to major changes of international guidelines. I initiated and have led since its inception in 2003 the China Kadoorie Biobank of >512,000 adults recruited from 10 areas in China, with extensive data collection by questionnaire and physical measurements, and with long-term storages of biological samples and follow-up for fatal and non-fatal health outcomes. I currently lead a team of >50 staff in Oxford, with research activities covering observation and genetic epidemiology, novel biomarker discovery, chronic infection and inflammation, and application of big data in development of precision medicine and health.

Professor Jonathan Emberson

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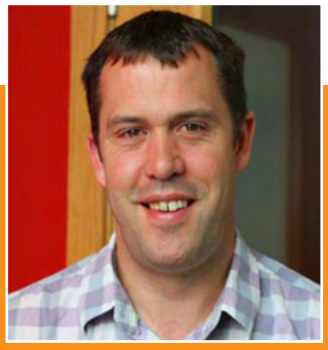
Jonathan Emberson is Professor of Medical Statistics and Epidemiology within the Nuffield Department of Population Health, University of Oxford. After studying Mathematics at Oxford as an undergraduate, he did his MSc in Applied Statistics before completing his PhD in Epidemiology at University College London. He returned to Oxford in 2004 when he joined the Clinical Trial Service Unit and Epidemiological Studies Unit, the unit in which the MRC Population Health Research Unit is now housed.

Research Interests

My main research interest is studying the causes and prevention of cardiovascular diseases, through the design and analysis of large-scale observational and randomised studies, and individual-patient-data meta-analyses of such studies. I am the UK principal investigator of the Mexico City Prospective Study, a blood-based cohort study of 150,000 middle-aged Mexican adults with over 15 years of mortality follow-up. My research in Mexico aims to establish the main genetic and non-genetic causes of premature morbidity and mortality and the pathways through which those causes are mediated. In particular, my group previously showed that diabetes accounts for at least one third of all Mexican deaths between ages 35 and 74 years (twice that previously thought based on extrapolations from high-income populations). More recently, I have been responsible for statistical analyses of the RECOVERY trial, the world's largest trial of treatments for patients hospitalised with COVID-19.

Professor Richard Haynes



Richard Haynes did pre-clinical medical studies in Cambridge and clinical studies in Oxford qualifying in 2000. He came to CTSU for a period of 'out of programme' research in 2006 to work on the HPS2-THRIVE trial with Professor Jane Armitage. He completed his training in renal medicine in 2011 and was appointed as an honorary consultant at the Oxford Kidney Unit. Soon after, he was appointed to the MRC Programme Leader track and he is now Programme Leader in the MRC Population Health Research Unit.

Research Interests

My main interest is in large clinical trials and developing practical methods to streamline them and integrate them into routine clinical care. My primary interests are in kidney and cardiovascular disease, although I have spent much of 2020 coordinating the RECOVERY trial. I am also interested in the ways that clinical trials and the data they generate can explore earlier hypotheses and generate ideas for future trials.

Professor Martin Landray

Martin Landray trained in medicine at University of Birmingham before specialising in General Internal Medicine and Clinical Pharmacology and Therapeutics. He is Professor of Medicine and Epidemiology at the Nuffield Department of Population Health, University of Oxford, UK, where he is Deputy Director of the Big Data Institute. He leads the clinical trials programme for Health Data Research UK and NHS DigiTrials. He is an Honorary Consultant at Oxford University Hospitals NHS Foundation Trust and was elected to the Academy of Medical Sciences in 2021.

Research Interests

My research focuses on the use of digital technology and quality-by-design principles for large randomised trials. I have led a series of major clinical trials assessing treatments for cardiovascular and kidney disease. These have enrolled over 80,000 individuals, producing results that have changed regulatory drug approvals, influenced clinical guidelines and changed prescribing practice. Since March 2020, I have been co-chief investigator of the RECOVERY trial, a very large platform trial of potential treatments for patients hospitalised with COVID-19 in the UK. The trial has enrolled over 36,000 patients and produced six practice-changing results, including the discovery that dexamethasone and tocilizumab reduce mortality, shorten hospital stay, and reduce the need for mechanical ventilation in the sickest patients (see www.recoverytrial.net for details).

Dr Alan Young

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Originally a mathematician, Alan Young did his PhD and initial research in computational environmental modelling, moved on to genetics, then clinical trials, and is currently working in large-scale epidemiology. He is Director of Information Science for NDPH (Oxford University) and Systems Architect for UK Biobank. In both roles he designs, develops and deploys infrastructure and systems to acquire, handle and distribute large scale data at lowest cost and highest quality.

Research Interests

The focus of my work is on developing tools and technologies for gathering, cataloguing and disseminating clinical data at large-scales in cost-effective and secure fashions. A primary illustration of this is the UK Biobank with which I have been involved from project inception, leading the team that developed the clinical systems, data archives and Showcase modules which underpin its functioning. I have also been involved with over 30 clinical trials, including the HPS and Search studies which pioneered electronic data entry at source. Currently I am developing generic systems to enable multiple projects to take advantage of the custom technologies previously implemented.

Dr Emmanuel Amankwah Asante

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Emmanuel Amankwah Asante obtained a BSc (Hons) from the University of Ghana and a PhD from the University of Edinburgh. He then took up molecular genetics and transgenesis for his postdoctoral work at the Roslin Institute, Edinburgh. Since joining the MRC in October 2002, he has successfully applied his expertise in transgenic animal modelling to prion diseases within the MRC Prion Unit at UCL which is directed by Professor John Collinge. He is also a UCL Senior Lecturer, and Adjunct Professor at the University of Ghana.

Research Interests

My research is centred on using humanised transgenic models that faithfully recapitulate the key features of human prion diseases to model aspects of prion biology. These include the species barrier, prion strain variation, inherited prion diseases, the protein only hypothesis, and evaluating candidate small molecule therapeutic drugs and antibodies against human prion disease. Several seminal papers have been published, including challenging the relevance of modelling human prion disease-associated mutations on rodent prion protein as a surrogate for direct modelling on the human prion protein, a 2015 Nature paper on a single amino acid variant 127GV that conferred absolute protection against kuru infection in Fore-speaking people of Papua New Guinea, and most recently demonstration of the first transgenic model expressing only mutant human PrP to show spontaneous generation of transmissible PrP assemblies that directly mirror those generated in an inherited prion disease in humans.

Dr Jan Bieschke

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Jan Bieschke did his PhD in 2000 with Manfred Eigen at the Max Planck Institute for Biophysical Chemistry. Following studies with Hans Kretzschmar (LMU Munich) and Jeffery Kelly (Scripps Research Institute, La Jolla), he became Delbrück fellow at the Max-Delbrück-Center for Molecular Medicine and Assistant Professor at Washington University in St Louis. In 2018, he was appointed Programme Lead for Structural Biology at the MRC Prion Unit and Associate Professor at UCL.

Research Interests

Prions, the infectious agent in diseases such as Creutzfeldt-Jakob and mad cow disease, are self-replicating assemblies of the prion protein PrP. The Bieschke group aims to understand the central problem in the prion mechanism; what is the change in shape that distinguishes natively folded prion protein, PrP^{C}, from its rogue form, PrP^{Sc}, and how does it come about? Specifically, we are asking what the structural causes are for becoming a prion, what the common drivers are for their replication, and whether the same principles underlie other diseases, both inside the central nervous system and in the rest of the body. We try to understand how this mutation changes the structure of the natively folded PrPC using NMR spectroscopy. We study the self-assembly process of PrP and other proteins that may replicate following prion-like mechanisms on the molecular level, using a combination of classic biophysical techniques and amyloid-specific nanoscopic imaging techniques.

Professor John Collinge (Director)

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John Collinge is Professor of Neurology and Director of the MRC Prion Unit and Institute of Prion Diseases at UCL. He also directs the NHS National Prion Clinic at the National Hospital for Neurology and Neurosurgery. Professor Collinge trained in medicine at the University of Bristol and in neurology at St Mary's Hospital and the National Hospital for Neurology and Neurosurgery in London.

Research Interests

Prions, unlike other infectious agents or germs, appear to lack their own genes and consist of aggregated misshapen forms of one of the body's own proteins, the prion protein or PrP. Despite lacking genes, prions can exist as distinct strains with quite different properties. These unique features have wide implications in biology and evolution, and prions and prion diseases are of intense international research interest. My laboratory demonstrated in 1996 that the new human prion disease, variant CJD, was caused by the same prion strain as that causing BSE in cattle and has been responsible for key advances in the field. Our research programmes have developed to focus both on areas of public health concern and a long-term approach to the understanding of prion biology and the wider relevance of prion-like mechanisms (seeded protein polymerisation) in Alzheimer's and other neurodegenerative diseases. The Unit's work is highly multidisciplinary spanning molecular structure, genetics, biochemistry, immunology, cell and animal models, and clinical research - including treatment trials.

Professor Parmjit Singh Jat

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Parmit Singh Jat received an undergraduate degree in Biochemistry at the University of Bath (1974-78), followed by PhD at the ICRF in London, with Robert Kamen (1978-82) and postdoctoral research at the MIT Centre for Cancer Research (USA) with Philip Sharp (1983-1987). He was Head of Transformation Studies at the UCL Branch of the Ludwig Institute for Cancer Research (1987-2003) and joined the UCL Institute of Neurology in 2003 to work with the MRC Prion Unit. He has been leading the Cell Biology Programme since 2013.

Research Interests

Cell culture systems to study prion biology are limited to a few cell lines susceptible to either mouse-adapted or sheep prion strains, with none yet described able to stably propagate human prions. We are undertaking development of cells that can propagate human variant and sporadic Creutzfeldt-Jakob disease prions by using a 'silencing-reconstitution strategy'. This will enable us to develop a robust highly sensitive, automated cell culture assay for human prion infectivity. Prions are infectious agents which cause rapidly lethal neurodegenerative diseases. It has been assumed that they are directly toxic to cells, but recent studies have suggested that prion infectivity and neurotoxicity can be uncoupled. We have developed a multiparametric high content imaging assay of neurotoxic phenotypes and demonstrated that prions themselves are not directly toxic, but lead to the production of a toxic species. Work in the Unit is now aimed at isolating the toxic species and investigating the mechanism of action.

Dr Peter Kloehn

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Peter Kloehn obtained an MRes in Biochemistry in 1992 at the University Freiburg, FRG and undertook his PhD in cancer research at the Julius-Maximilians University Wurzburg. Following postdoctoral research positions at the Karlsruhe Institute of Technology (KIT) and at the University of Medical Research in Padova, Italy, he joined the MRC Prion Unit, headed by Professor John Collinge, in 2001. Since 2014 he is leading his own research as MRC Investigator at the UCL Institute of Prion Diseases.

Research Interests

My research group seeks to better understand the cellular basis of prion replication and its wider implication on prion pathogenesis. Our multi-faceted approach includes:

(i) The identification of gene signatures associated with prion replication in neuronal cells.

(ii) The generation of monoclonal antibodies to characterise the cellular trafficking of disease-associated PrP using conventional and subdiffraction microscopy.

(iii) Imaging the spread of prions in whole mouse brains.

We continue to advance the development of cell-based bioassays of prion 'strains', which are of wide importance to prion research and other neurodegenerative diseases. We seek to apply our established expertise to develop analogous tools to assay 'prion-like' mechanisms in Alzheimer's disease as part of wider developments within the Unit to explore the importance and pathogenetic relevance of these mechanisms in other neurodegenerative diseases.

Professor Simon Mead

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After medical training at Cambridge and Oxford Universities and a PhD in the genetics of prion diseases at Imperial College London, Simon Mead is a consultant neurologist and Clinical Lead of the UK National Prion Clinic based at UCLH. At the UK MRC Prion Unit he is Deputy Director. He was made a Professor at UCL in 2014, NIHR Senior Investigator in 2018.

Research Interests

Molecular genetics remains fundamental to understanding the aetiology of human prion disease. Human genetics has established the central importance of prion protein gene mutations and polymorphisms in human disease susceptibility, phenotypic modification and recent human evolution. We lead a global collaboration of DNA sample collection in prion disease and genome wide association studies. We recently proposed variants in STX6 and GAL3ST1 are new genetic risk factors (Lancet Neurology 2020). We also work on the prion disease kuru, transmitted by cannibalism. We have described one of only a handful of examples of human evolutionary selection acting at a specific gene variant G127V in PRNP (NEJM 2009). We work on diagnosis and prediction in inherited prion disease, to support families and preventive medicine eg. NEJM 2013. Following the recruitment of Dr Emmanuelle Vire, we work on epigenetics, single cell omics and DNA methylation.

Dr Jonathan Wadsworth

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Jonathan Wadsworth studied Biochemistry at Imperial College London and was awarded a PhD in 1990 for work on botulinum neurotoxins. His early post-doctoral research at Hammersmith Hospital London focused on the pharmacology of potassium channel neurotoxins. In 1997 he joined Professor John Collinge at Imperial College School of Medicine to work on prion diseases and moved with Professor Collinge to UCL in 2001. He is currently a Programme Leader within the MRC Prion Unit at UCL and Reader in Prion Diseases.

Research Interests

Mammalian prions are lethal pathogens and are composed of infectious polymeric assemblies of misfolded host-encoded cellular prion protein which propagate by means of seeded protein polymerization. Different prion strains can propagate in the same host to produce different disease phenotypes and appear to be encoded by distinct pathogenic prion protein conformations and assembly states. Our research aims to define the fundamental biology of what makes prion strains different from one another and why some are able to cross from animals to humans to cause disease.

Professor Dario Alessi (Director)

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Dario Alessi obtained a BSc (1988) and PhD (1991) from the University of Birmingham and carried out postdoctoral research at the University of Dundee from (1991 to 1996). In 1997 he became a Programme leader in the MRC Protein Phosphorylation Unit, and was appointed as its Director in 2012. His publications have accumulated over 83,000 citations (h-index 139) and his work has been recognised through several awards including the Francis Crick Medal and Lecture (2006) and election to the UK Royal Society (2008).

Research Interests

My research focuses on unravelling the roles of poorly characterised components which regulate protein phosphorylation or ubiquitylation pathways linked to disease. My work has contributed to the understanding of several disease-relevant signal transduction pathways including PDK1 (diabetes and cancer), LKB1 (cancer), and WNKs (blood pressure). Much of my current work is focused on understanding LRRK2 and how mutations in this enzyme cause Parkinson's disease. I am passionate about open science sharing ideas, reagents and technology very early to accelerate worldwide progress. I work to promote collaborations between industry, clinicians and basic researchers to better understand human disease resulting from disruption of signalling networks. I also collaborate with companies, to stimulate the development of specific inhibitors and chemical probes for the treatment of disease, as well as for the study of cell signalling.

Dr Ian Ganley

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Ian Ganley obtained his Biochemistry degree from the University of Oxford and PhD from The University of Cambridge with Dr Nick Ktistakis. In 2002 Ian moved to Stanford to carry out postdoctoral research with Professor Suzanne Pfeffer, working on Rab proteins and intracellular transport. During this time Ian became interested in autophagy and in 2007 joined the lab of Dr Xuejun Jiang at Memorial Sloan-Kettering Cancer Center. Ian set up his own lab in 2010 to further study mechanisms of autophagy.

Research Interests

My lab are trying to understand the molecular regulation of autophagy, an intracellular 'self-eating' pathway. Autophagy prevents the accumulation of damaged and toxic cellular components, which if left to persist, can lead to disease. The goal of our research is to find novel ways to regulate autophagy so that it can be used as a therapeutic tool. To do this, we need to identify physiological autophagy-inducing signalling pathways and determine how they trigger autophagosome formation. Towards this endeavour we have developed mito-QC, a powerful tool to monitor the autophagy of mitochondria *in vivo*, disruption of which is implicated in Parkinson's disease. We have uncovered multiple instances of mitophagy in clinically relevant cells and tissues, for example in dopaminergic neurons that degenerate in Parkinson's, and our objectives are to resolve these mechanisms, delineate the relevant signalling pathways and determine how they relate to development and disease.

Dr Yogesh Kulathu

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Yogesh Kulathu studied Chemical Engineering at the Birla Institute of Technology and Science (BITS), Pilani, India. He did his PhD at the Max Planck Institute of Immunobiology, Germany (2008) working on B cell signalling. To learn to apply structural biology to study cell signalling he did his postdoc at the MRC LMB, Cambridge (2009-12) funded by Marie Curie and EMBO fellowships. He set up his lab at the MRC PPU in 2013 and is a recipient of ERC Starting and Consolidator Grants, EMBO Young Investigator and Lister Prize.

Research Interests

The research goals of my lab are to understand the fundamental principles of how posttranslational modification (PTM) of proteins with ubiquitin and ubiquitin-like modifiers (UBL) alter protein function and signal transduction to maintain cellular homeostasis. We study how different ubiquitin signals are formed and decoded in cells with an emphasis on branched heterotypic ubiquitin, a complex and information rich modification. We investigate how deubiquitinases (DUBs) regulate ubiquitin signalling and our discovery of two new families of DUBs expands our understanding of regulatory mechanisms. We also study how UFM1, a poorly characterised but essential PTM, functions as a cellular signal to maintain ER homeostasis. In our research we use a multidisciplinary approach with techniques ranging from biochemistry, structural biology and proteomics to studies in model organisms to gain mechanistic and functional insights into ubiquitin signalling mechanisms in health and disease.

Dr Karim Labib

Research Interests

All cells must duplicate their chromosomes before cell division, so that the two daughter cells each receive a complete copy of the genetic blueprint, which is contained within the chromosomes in DNA. Mistakes in this process can be lethal, or else can make cells proliferate out of control and produce a tumour. Our lab studies a large molecular 'machine' known as the replisome, which is the central player in the process of chromosome duplication. The assembly and disassembly of the replisome is very tightly controlled, to ensure that cells make just one copy of each chromosome before cell division.

Professor John Rouse

After graduating with a B.A.(Mod.) Hons. (Biochemistry) from Trinity College Dublin, John Rouse carried out a PhD with Professor Sir Philip Cohen at the MRC Protein Phosphorylation Unit, University of Dundee. John Rouse carried out postdoctoral research at the Gurdon/CRUK Institute at University of Cambridge working with Professor Steve Jackson. At the end of 2002, John set up his own lab at MRC Protein Phosphorylation Unit.

Research Interests

My research focuses on the molecular mechanisms underlying the signalling and repair of DNA damage, especially DNA lesions that perturb DNA replication. My work places strong emphasis on how DNA repair mechanisms are controlled by protein phosphorylation and ubiquitylation. A major aim of my lab's work is to understand how derailment of DNA repair can cause disease, and to understand how pathogenic mutations affect DNA repair. Over the years my laboratory has discovered a host of factors vital for DNA repair. These include the SLX4 regulator of DNA repair nucleases, the FAN1 DNA repair nuclease and the DVC1/SPRTN protease, all of which play critical roles in preventing genome instability and disease.

Dr Adrien Rousseau

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Adrien Rousseau did a PhD in the lab of Dr Marie-Christine Rio and Dr Catherine Tomasetto at the IGBMC (France) where he worked on the role of TRAF4 in breast cancer. In 2013 he moved to Dr Anne Bertolotti's lab at the MRC LMB, where he was awarded an EMBO long-term and advance fellowship to work on proteasome homeostasis. In November 2017, he relocated to Dundee to establish his own lab at the MRC PPU to work on signalling pathways controlling protein homeostasis.

Research Interests

Increasing evidence reveals that alterations and mutations in components of the Ubiquitin-Proteasome system (UPS) are an underlying cause of various age-related diseases, most prominently cancers and neurodegenerative disorders. Thus, understanding how cells adapt protein degradation to the cell requirements may help to identify new strategies to rescue proteostasis defects in diseases. We have recently identified that proteasome assembly is increased under different stress conditions in order to maintain an adequate level of protein degradation in cells. The goal of our lab is to unravel how post-translational modifications such as phosphorylation regulate protein homeostasis so that accumulation of unfolded, misfolded and damaged proteins can be cleared before they are deleterious. We are also aiming at developing new tools to decipher how the proteasome is regulated in cells as well as to identify new drugs and regulators modulating its function.

Professor Gopal Sapkota

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Gopal Sapkota obtained a Masters in Biochemistry degree from Bath University in 1999 and was awarded his PhD degree by University of Dundee in 2003. He undertook his postdoctoral research at Memorial Sloan-Kettering Cancer Center in New York. In 2008, Gopal started his research group at the MRC Protein Phosphorylation and Ubiquitylation Unit at University of Dundee's School of Life Sciences (SLS). He was awarded tenure in 2014 and promoted to Chair in Disease Signalling in 2020.

Research Interests

My research group studies the reversible phosphorylation and ubiquitylation of proteins, which underpin the regulation of many cell signalling processes. Faulty signalling cascades account for many human diseases, including skin and bone disorders, cancer and neurodegenerative diseases. My group has undertaken ground-breaking work in deciphering the mechanisms by which the FAM83 class of scaffold proteins regulates the pleiotropic CK1 family of protein kinases. My lab is testing the hypothesis that the FAM83 proteins direct specific CK1 isoforms to distinct subcellular compartments and substrates. My group has also developed a new technology termed Affinity-directed PROtein Missile (AdPROM) system that is leading to new ways of targeting specific protein fates, including targeted degradation. This technology is allowing us to test new approaches to potentially targeting the so called undruggable targets.

Professor Satpal Virdee

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Satpal Virdee obtained his undergraduate degree in computational chemistry in 2004. His doctoral studies were in the area of chemical and structural biology at Birkbeck, University of London. Next, he carried out postdoctoral research at the MRC Laboratory of Molecular Biology, Cambridge. In 2011 Satpal established his own lab at the MRC Protein Phosphorylation and Ubiquitylation Unit at the University of Dundee where he holds a Personal Chair in Chemical Biology.

Research Interests

My lab carries out research at the chemistry and biology interface, developing novel research technologies and reagents that are used to obtain a deeper molecular understanding of the ubiquitin system. We have pioneered the development and application of chemical probes for profiling the activity of ubiquitin ligase enzymes. These probes have the potential to assess predisposition to disease and have also been used to discover entirely novel classes of ubiquitin ligase with striking mechanisms of action. We have also recently synthesised reagents that enabled the discovery of a class of deubiquitinating enzyme that remove ubiquitin from non-canonical amino acids. In summary, my research has revealed that ubiquitin ligases have an unappreciated mechanistic diversity whose modulation has the potential to halt pathology such as neurodegeneration. My research has also underscored the significance of non-lysine ubiquitination, which adds a new dimension to the ubiquitin system.

Professor Michael Chapman

Mike Chapman trained in Medicine at St. Bartholomew's and The Royal London Hospitals Medical Schools. He undertook a PhD with Bertie Göttgens and Tony Green in Cambridge and was a Post-Doc with Todd Golub at the Broad Institute in Cambridge, Massachusetts. He has run an independent research group since 2013. This was initially in the Department of Haematology at the University of Cambridge but is now based in the MRC Toxicology Unit. He is also an honorary Consultant Haematologist.

Research Interests

Adaptive cellular therapies, such as CAR-T cells, have proven revolutionary in the treatment of haematological cancers. However, their use is associated with significant and life-threatening toxicity, including cytokine release syndrome, immune effector cell-associated neurotoxicity syndrome, and cytopenias. The mechanisms underlying these toxicities are poorly understood. My lab is focused on studying the cellular and molecular basis of adoptive cellular therapy toxicity *in vitro*, using cellular models, and *ex vivo*, using samples from patients undergoing CAR-T cell therapy. We are employing several approaches, including proteomics, genomics, and cellular and molecular biology to study this toxicity. Our goal is to be able to predict patients at risk of toxicity as well as to modify the CAR-T manufacturing process to make treatment safer.

Professor Marion MacFarlane

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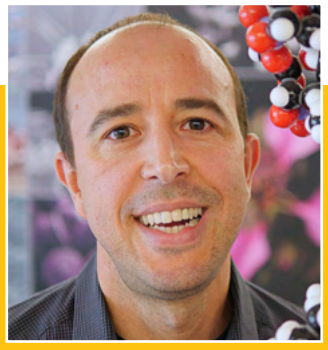
Marion MacFarlane graduated in Pharmacology (Hons) from the University of Glasgow and obtained a PhD in Biochemistry at the University of Surrey (BBSRC I-CASE Award with AstraZeneca). She secured a Wellcome Trust Advanced Training Fellowship in Toxicology and in 1992 joined the MRC Toxicology Unit. Following a Fellowship in Philadelphia, USA, she was appointed Programme Leader-Track (1998) then Programme Leader (2004) and Deputy Director (2012); Marion also holds an Honorary Chair at the University of Leicester.

Research Interests

My research is aimed at understanding the fundamental mechanisms of cell death that regulate life/death decisions. By understanding the underlying molecular and cell biology of these processes, we aim to deliver field-changing mechanistic insights into toxicology and disease. My lab was the first to reconstitute the CD95/TRAIL-R DISC (Hughes et al 2009, Mol Cell), providing new mechanistic understanding of Caspase-8 activation. Moreover, we discovered that within the DISC multiple Caspase-8 molecules are required to combine in a helical 'tDED filament' to trigger cell death (Dickens et al 2012, Mol Cell) and showed this event is tightly regulated by key modulators of cell death such as c-FLIP (Hughes et al 2016, Mol Cell; Fox et al 2021, Nat Commun). In parallel, I co-lead a cross-Unit research Programme aimed at understanding the processes of disease development associated with pathogenic fibre-induced toxicity, to inform the future 'safe by design' of new classes of nanomaterials.

Dr L Miguel Martins



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Between 1994-1998, Miguel Martins completed his PhD on apoptosis supervised by Professor William Earnshaw (Johns Hopkins School of Medicine). Between 1998-2003 he did post-doctoral work with Dr Julian Downward on signal transduction mechanisms (Cancer Research UK, London Research Institute). He has been a group leader with the MRC Toxicology Unit since 2003.

Research Interests

Our goal is to understand the cellular and molecular mechanisms that mitochondria use, as signalling hubs, for coping with toxic insults. We aim to manipulate these mechanisms to protect tissues such as the intestine, liver and brain from toxicity following exposure to chemicals and in disease conditions. We are a cell biology-based programme that aims to provide detailed, applicable, mechanistic toxicology, to identify the molecular initiating events and downstream toxicity pathways, associated with mitochondrial damage, that are disease relevant. To achieve our goals, we combine a series of approaches, including data analysis using computational tools, cultured cells and *Drosophila* as an *in vivo* model system.

Dr Kiran Raosaheb Patil

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Kiran Patil studied Chemical Engineering at the Indian Institute of Technology (Mumbai, India) and thereafter obtained his PhD in Systems Biology at the Technical University of Denmark (DTU). Kiran was then appointed as Assistant Professor at DTU where he worked on transcriptional regulation and metabolic engineering. In 2010, Kiran joined the Structural and Computational Biology Unit at the European Molecular Biology Laboratory (EMBL-Heidelberg, Germany). He joined the MRC Toxicology Unit in 2019.

Research Interests

An adult individual harbours hundreds of grams of microbes in their digestive tract. This gut microbiota is fundamental to our development and health, and its dysfunction contributes to various diseases such as diabetes, cancer and Parkinson's. We have previously shown that one in four non-antibiotic drugs negatively affect commensal gut bacteria. The microbiota also actively contributes to drug metabolism forming a complex web of drug-bacteria interactions that can lead to adverse effects. Our current research focuses on disentangling this complex web by bringing together various experimental and computational approaches. We aim at identifying molecular mechanisms underlying microbiome-xenobiotic (not only drugs but also food-borne pollutants) interactions to aid us in mitigating the adverse effects through personalised approach to drug selection and dosage.

Dr Ritwick Sawarkar

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Ritwick Sawarkar studied Microbiology and Biochemistry in Mumbai and obtained his PhD in 2010 from Indian Institute of Science. He then moved to ETH-Zürich as a postdoctoral fellow in the lab of Renato Paro. In 2014, Ritwick started his own independent group at the Max Planck Institute of Immunobiology and Epigenetics in Freiburg (Germany), before moving to the MRC Toxicology Unit in 2019. Ritwick received the ERC Consolidator Grant in 2018 and Alfred Tissières Young Investigator Award in 2019.

Research Interests

Transcriptional control is a major regulatory layer that determines the strength, the duration and persistence of cellular response to environmental stress and toxins. The molecular mechanisms underlying transcriptional response to stress is the main focus of our research programme. We aim to address the following questions:

(i) Which cellular pathways sense stress/toxins?

(ii) How does chromatin interpret stress signalling to control transcriptional response to stress?

(iii) How does the transcriptional response adapt cellular phenotypes to survive the stress?

We study these three questions in the context of cellular exposure to environmental stress as well as small-molecule therapeutics in collaboration with pharmaceutical companies. Discovery-driven global approaches in mammalian cells are further validated by *in vitro* reconstitution experiments and mouse genetic models. We aim to gain novel insights and mechanistic understanding of transcriptional response to stress and toxins.

Dr James Thaventhiran

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James Thaventhiran is an academic clinical immunologist trained in both translational and fundamental immunology. Prof Anthony Pinching and Dr David Webster supervised his clinical training at St. Bartholomew's and the Royal Free Hospitals. He is now an accredited clinical specialist in primary and acquired immunodeficiency. Prof Doug Fearon supervised his PhD, which studied clonal differentiation of CD8+ T cells. Further scientific training supported by an MRC Clinician Scientist Fellowship explored the immunogenetics of inborn errors of immunity.

Research Interests

Despite the exciting successes of immunotherapy treatment in cancer and autoimmune disease, this treatment response is not universal. A significant barrier is the inconsistent efficacy and unpredictable toxicity seen in patients. We have a novel approach to improve this. We study rare patients with genetic disruption of pathways targetted by immunotherapy to define the spectrum of phenotypes caused by immune pathway loss. In animal models, we assess environmental exposures for their ability to exacerbate and improve this. With this combination of preclinical and clinical work, we hope to be able to maximise the benefit and minimise the risk of harm from immunotherapy.

Dr Mathew Van de Pette

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Mathew Van de Pette did his PhD entitled 'Effects of altered Cdkn1c dosage in mice' between 2008-2012 at Cardiff University. His postdoctoral work was carried out at MRC London Institute of Medical Sciences (supervisor Professor Amanda Fisher) between 2012-2017. He was a Faculty Fellow at Imperial College, London between 2017-2019.

Research Interests

I am interested in human-relevant subtoxic exposures to the mammalian pregnancy, and how these may influence the developing epigenome of the offspring. We use sensitive luciferase-based reporter lines to track disturbed epigenetic marks in animals, through life-course and into subsequent generations. We combine this approach with an array of genomics and standard molecular biology assays to gain insight in the mechanisms by which these changes comes about.

Professor Anne Elizabeth Willis (Director)

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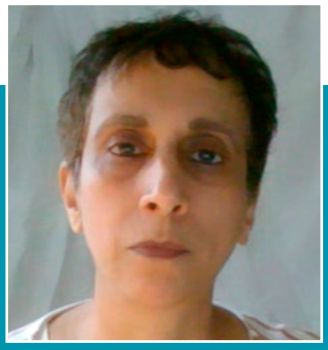
Anne E. Willis completed her degree in Biochemistry (University of Kent) and PhD in Biochemistry (University of London) with Dr Tomas Lindahl; Cambridge University with Professor Richard Perham, and Junior Research Fellowship at Churchill College Cambridge; Lectureship-Professor, University of Leicester from 1992-2004; Director of Cancer Research Nottingham and Chair of Cancer Cell Biology from 2004-2010; 2010 Director of the MRC Toxicology Unit. EMBO member 2015, OBE in 2015, Fellow British Toxicology Society 2018.

Research Interests

My laboratory identifies how specific RNA motifs and their cognate binding proteins post-transcriptionally control adverse outcome pathways that are triggered in response to drugs, biologics or environmental exposures. We have shown how such systems can become dysregulated following toxic injury e.g. after exposure to UV light and the widely-used platinum-based cancer chemotherapeutics (Sommers et al 2015 Genes Dev) and how cytoplasmic RNA-damage results in cell cycle arrest (Stoneley et al 2021). We have also devised new techniques (Queiroz et al Nature Biotech 2019) to explore the toxicities of novel RNA-based therapeutics. We have provided new insights which illustrate how the protein synthesis machinery can be modulated to reverse progression in exposure-associated disease (Bastide et al 2017 Current Biology) and have identified the toxicity pathway that leads to nano-fibre/asbestos-induced mesothelioma (Chernova et al 2017 Current Biology; Grosso et al 2021).

Professor Nishi Chaturvedi (Director)



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After studying medicine at the University of London (1985), Nishi Chaturvedi specialised in public health and epidemiology at University College London. Nishi was appointed Chair of Clinical Epidemiology in the National Heart and Lung Institute, Imperial College London, (2000) and then moved to a Chair in Clinical Epidemiology in the Institute of Cardiovascular Sciences at UCL (2014). She has directed the MRC Unit for Lifelong Health and Ageing since 2017.

Research Interests

Our research aims to improve population health by understanding risk factors and mechanisms of the chronic diseases of ageing. To achieve this we apply detailed phenotypic investigation to capture early signs of disease in population cohorts over the whole of life. Our Unit curates the National Survey for Health and Development (NSHD), a birth cohort established in 1948 and one of the oldest national birth cohorts in continuous follow up. Repeat measures of brain and cardiometabolic health using imaging, dynamic testing and serological investigation provides insights into risk factor trajectories and disease pathways, as well as determinants of resilience and maintenance of function. Our team is multidisciplinary, including clinicians, epidemiologists, data scientists, social scientists, imagers, physiologists and biomedical engineers.

Dr Daniel Davis

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Daniel Davis is a geriatrician and epidemiologist, funded as a Wellcome Trust Intermediate Clinical Fellow. He joined UCL in 2014 after his PhD at the Cambridge Institute of Public Health. He leads the Delirium and Population Health Informatics Cohort and is a senior scientist on the MRC National Survey for Health and Development. He is a member of the World Health Organization's Clinical Consortium on Healthy Ageing. His clinical work is as an honorary consultant at University College and St Pancras Hospitals.

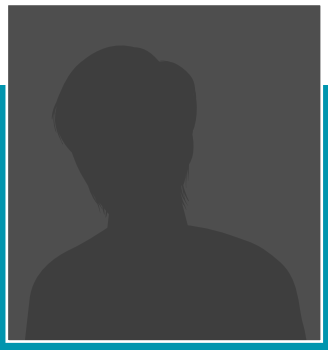
Research Interests

My current programmes concentrate on two complementary themes:

(1) The relationship between delirium and long-term cognitive impairment to investigate the impact of delirium on trajectories of cognitive decline. Biological, clinical and epidemiological studies have shown that episodes of delirium greatly increase the subsequent risk of dementia. By describing different rates of disease progression around acute illness, I am exploring the possibility of delirium interventions as a strategy for the secondary prevention of dementia.

(2) Physiological resilience in ageing: causes and consequences. With my co-lead, Nish Chaturvedi, I am using physiological responses to everyday dynamic stressors, such as mobility, cognitive tasks, and orthostatic challenge, to quantify age-related impairment in resilience across multiple systems. These measures are complemented by community-based data collection using wearable devices to enable the digital phenotyping of daily function.

Professor Marcus Richards



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Marcus Richards is a Professor of Psychology in Epidemiology at University College London. He read Experimental Psychology at Oxford University and obtained a PhD at London University in the physiology of human learning. He has held appointments at Columbia University in New York and King's College London to conduct research into neurodegenerative diseases of ageing and was one of the first recipients of an Alzheimer's Society Research Fellowship.

Research Interests

My research is focused on: life course epidemiology; mental ageing; cognitive function; mental health; population health; birth cohorts.

Professor Jonathan Mark Schott

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Jonathan Schott trained in medicine (MBBS) and physiology (BSc) and completed medical (MRCP) and neurology training in London. He did an MD investigating MRI in Alzheimer's at UCL (2004) returning as Senior Lecturer and Hon Consultant Neurologist (2009). He was promoted Reader (2014) and Professor in 2017 and was elected FRCP (2013), Fellow of the European Academy of Neurology (2019), and Senior Fellowship, Higher Education Academy (2017). He was appointed Chief Medical Officer for Alzheimer's Research UK (2019).

Research Interests

I lead a number of clinical research projects in the dementias, with particular interests in atypical and young onset dementia, and how clinical assessment, epidemiology, imaging and fluid biomarkers, and genetics can be combined to identify individuals at risk of cognitive decline. I co-lead the mental ageing programme of the MRC Unit for Lifelong Health and Ageing, and lead Insight 46 a neuroscience study of the MRC National Survey of Health and Development British 1946 Birth Cohort. I have grant income >£20M with >£10M as PI, edited the Oxford Textbook of Cognitive Neurology and Dementia, and have published over 280 papers on dementia/ ageing. Research highlights include: demonstrating that midlife vascular risk influences late life brain health; using imaging and fluid biomarkers to define individuals at risk of dementia and screen for preclinical Alzheimer trials; and studies investigating posterior cortical atrophy – the visual variant of Alzheimer's disease.

Professor Umberto d'Alessandro (Director)

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Between 1982 and 1989, Umberto D'Alessandro worked as a clinician in Benin and Kenya. In 1990, he joined the MRC Unit The Gambia (MRCG) where he worked for his PhD that was completed in 1996 (London University). He joined the Institute of Tropical Medicine, Belgium, in 1996 where he was head of the Malaria Unit between 1999 and 2010. In 2011, he joined the MRCG as Leader of Disease Control & Elimination Theme and since January 2014 he has been the Unit Director.

Research Interests

My research interests are focused on malaria, from the biology of the parasite and its vector, to treatments and preventive interventions. This includes also drug and insecticide resistance. My current research programme in The Gambia is built around questions related to malaria elimination/ eradication. During my research career I have carried out several large field-based epidemiological projects, including large clinical trials.

Professor Alfred Amambua-Ngwa

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Alfred Amambua-Ngwa completed his PhD in Biochemistry and Molecular Parasitology in 2004 at the University of Buea (Cameroon). He joined MRC Unit The Gambia at LSHTM in 2006 as a Postdoctoral researcher and was then appointed Manager of MRCG Molecular Diagnostics Labs in 2010, prior to the successful award of an MRC Career Development Fellow in 2013 to 2018.

Research Interests

Earlier in my career, I studied *Plasmodium falciparum* invasion pathways and genetic diversity. I used deep sequencing data on Gambian *P. falciparum* isolates to investigate signatures of balancing selection, with the aim of identifying new gene targets for functional and immunological investigations. As a Career Development fellow at MRC Unit The Gambia at LSHTM, I investigated malaria population genomics with a particular interest in determining genome-wide signatures of selection for markers of drug resistance in *P. falciparum*. I lead several projects, including the Pan-African Malaria Genomic Epidemiology Network, an H3Africa consortium for malaria genetic epidemiology, and an EDCTP Senior Fellowship-Plus. I am a member of the Pathogen Diversity Network Africa (PDNA), African Association for Research and Control of Antimicrobial Resistance (AAAMR) and two African Academy of Science researcher training programmes (AAS-DELTAS).

Professor Martin Antonio

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Martin Antonio obtained his PhD from Queen Mary and Westfield College, University of London in 1997. He is a Fellow of the African Academy of Sciences, and Royal College of Pathologists (UK) by published works. Additionally, he is Honorary Fellow of the Royal College of Physicians (London, UK) and Honorary Professor at Warwick Medical School, University of Warwick, UK. He was previously an Honorary Professor at LSHTM until MRC Unit The Gambia was transferred to LSHTM in Feb 2018.

Research Interests

My research is focused on the leverage of innovative molecular technologies for diagnosis of tropical diseases (mainly tuberculosis, meningitis, pneumonia, diarrhoeal diseases), investigation of meningitis outbreaks and transmission, antimicrobial resistance and clinical trials. I lead a number of large-scale international research projects, including serving as the WHO Reference Laboratory for Invasive Pneumococcal Disease (IPD) and establishing large IPD surveillance platforms across twelve countries in West and Central Africa for measuring pneumococcal conjugate vaccine impact. Furthermore, my research applies molecular tools to understand the impact of air pollution on the nasopharyngeal microbiome and epidemic meningitis in Africa.

Professor Beate Kampmann

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Beate Kampmann originally trained as a Paediatric Infectious Diseases clinician in Germany, France, UK and the USA. During her PhD at Imperial College she investigated the immunology of childhood tuberculosis and developed a novel reporter gene assay to study host-pathogen interactions. She conducted postdoctoral research at Case Western University in the USA and the University of Cape Town, South Africa and subsequently held an NIHR Senior Research Fellowship and an MRC programme grant.

Research Interests

I hold a Chair in Paediatric Infection and Immunity at The London School of Hygiene and Tropical Medicine, London, UK where I also direct the Vaccine Centre. I am the Scientific Director for vaccine research at the MRC Unit, The Gambia and lead a comprehensive Vaccinology and tuberculosis research programme in sub-saharan Africa. I have over 15 years of practical and research experience in childhood infection and immunity. I conduct laboratory-based and programmatic research in vaccines in both resource-poor and -rich settings. I have a special interest in the use of vaccines in pregnancy and lead the international IMPRINT vaccine network. I incorporate systems vaccinology approaches into trials and observational cohort studies to gain new insights into the ontogeny of the immune system in the context of vaccination and infection and investigate novel diagnostics for childhood TB to improve its diagnosis and management.

Associate Professor Kris Murray

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Kris Murray trained in ecology, completing his PhD on wildlife disease at the University of Queensland. Following a postdoc at James Cook University, he worked for an NGO in New York on emerging infectious disease ecology, before joining The Grantham Institute and the MRC Centre for Global Infectious Disease Analysis at Imperial College London, where he established the Ecological Health Lab. Most recently, he moved to the MRC Unit, The Gambia, where he is leading a new research programme in Planetary Health.

Research Interests

I am Associate Professor of Environmental Change and Health at the MRC Unit The Gambia at LSHTM and Senior Lecturer in Ecological Health in the MRC Centre for Global Infectious Disease Analysis in the School of Public Health, Imperial College London. My background is in ecology, and I work on projects at the human-animal-environment nexus, particularly on the role of global environmental change in shaping impacts on biodiversity and health, often through the lens of infectious diseases. I moved to The Gambia last year to establish a research program in Planetary Health. My current projects include work on the eco-epidemiology of snakebite, climate change impacts on vector-borne and zoonotic diseases, the multidimensional influence of land-use change on human health, agriculture and infectious diseases links, and the health co-benefits of climate change mitigation.

Professor Andrew Prentice

Andrew Prentice is head of the Nutrition Theme at MRC Unit The Gambia @ LSHTM. Initially trained in biochemistry, he completed his PhD on riboflavin deficiency at Darwin College, Cambridge. Following his post-doc in rural Gambia he returned to Cambridge to lead the MRC Energy Metabolism & Obesity Group at Addenbrooke's Hospital. Born and bred in Uganda, his passion for Africa led him to found the MRC International Nutrition Group at LSHTM, and a subsequent return to the MRCG Keneba fieldstation in rural Gambia.

Research Interests

Due to a complex interplay between diet, infections and inflammation, nutritional interventions in low-income settings frequently yield disappointing results. Progress is further limited by inter-generational constraints caused by deficiencies in prior generations. Our group conducts basic research aimed at better understanding these interactions to guide the development of better public health interventions. For example, by studying the actions of hepcidin – the master regulator of iron metabolism – we have discovered that respiratory infections are an important driver of iron deficiency and anemia. We are especially excited by our recent epigenetic discoveries showing that a mother's (and probably father's) nutritional status when they conceive a baby affects the fetal methylome with likely life-long influences on important health outcomes including cancers, obesity, thyroid function and viral immunity. Reaching a better understanding of exactly how these changes occur, and which nutrients are driving them, may inform new interventions to benefit families throughout the world.

Professor Anna Roca

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Anna Roca did her BSc in Chemistry at the University of Barcelona (1988-1996), followed by a PhD (1999-2002) at the same University on Molecular Epidemiology of the Respiratory Syncytial Virus in Mozambique. After finishing her PhD, she studied a MSc on Epidemiology at the LSHTM (2002-2003). Her post-doctoral positions includes 2 years at CISM in Mozambique, followed by 4 years as Assistant Research Professor at CRESIB (Barcelona). In 2009, she moved to the MRC Unit in The Gambia.

Research Interests

I am a Professor of Epidemiology with experience in Southern and Western Africa. I have served in several international pneumonia experts groups; including WHO, BMGF. My work includes studies on the transmission dynamics of bacterial infections and how these dynamics are modified by public health interventions. My recent research portfolio has mainly focused on the impact of using oral azithromycin on bacterial transmission, severe infection (i.e. sepsis and meningitis) and mortality. My work extends into the effect of these interventions on establishing antibiotic resistance in the community. I am actively engaged in COVID-19 research leading a treatment trial in West Africa and an evaluation of the impact of the pandemic in mortality in The Gambia. My current role at the MRCG Unit is Deputy Theme Leader of the Disease Control and Elimination theme, which has more than 250 employees. I am a member of the Unit Leadership and as such part participate in strategic decisions.

Professor David Bhella

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David Bhella undertook his PhD with Professor Helen Saibil FRS, at Birkbeck college, London. Upon completing his doctoral training in 1998, he moved to the MRC Virology Unit in Glasgow to establish a structural biology programme by CryoEM. He attained Programme Leader status in 2011 and was promoted to chair of structural virology in 2019. He recently founded the Scottish Centre for Macromolecular Imaging; a national facility for structural biology research by Cryo-EM.

Research Interests

Research in my laboratory focuses on the structural biology of viruses and virus-host interactions, using cryogenic electron microscopy (cryo-EM) and electron tomography (cryo-ET). We are interested in RNA synthesis, genome encapsidation/trafficking and virion morphogenesis of influenza A virus and respiratory syncytial virus; employing cryo-ET and soft X-ray cryotomography to visualise viral replication compartments and virion budding. We also use helical and single-particle methods to determine high-resolution structures of nucleocapsids and RNA-dependent RNA polymerases. Using icosahedral and asymmetric single particle methods, we study tegument attachment and genome packaging/release in herpes simplex virus along with virus attachment and entry in caliciviruses. We are also developing high-throughput methods to study the structures of viral glycoproteins, to investigate the antigenic properties of influenza virus haemagglutinin and to develop entry inhibitors for SARS-CoV2.

Dr Chris Boutell

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Chris Boutell received his PhD from the University of Glasgow (2000). As a post-doctoral scientist (MRC Virology Unit, 2000-2010), he helped to define the biochemical properties of the viral ubiquitin ligase ICP0, a key antagonist of cellular intrinsic and innate immune defences to HSV-1 infection. Since 2010, his group (MRC-University of Glasgow CVR) has investigated the role of ubiquitin and ubiquitin-like pathways in the regulation of cellular immune defences to DNA and RNA virus infection.

Research Interests

My group studies the role of ubiquitin and ubiquitin-related pathways in the regulation of intrinsic and innate immune defences to viral infection. Our group aims to define biochemical events that influence the outcome of infection in response to a range of clinically important pathogens, including HSV-1, HCMV, IAV, and SARS-CoV2. Our goal is to uncover unique viral-host interactions that will facilitate the development of novel antiviral approaches for targeted therapeutic intervention. Current projects include defining the biochemical specificity of ubiquitin ligases during viral infection, defining the role of host SUMOylation in the regulation of cellular immune defences to infection, and the development of next generation 3D cell culture models to accelerate drug discovery and the identification of novel antiviral therapeutics.

Professor Alain Kohl

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Alain Kohl did his Diplom Biology at WWU Münster, doctoral studies in Microbiology at University Paris 7-Denis Diderot/Institut Pasteur, Paris. His fellowships include a Wellcome Trust Research Career Development Fellowship at the University of Edinburgh (2006) and Career Track Fellow at the Roslin Institute. In 2011 he joined MRC-University of Glasgow Centre for Virus Research as a Programme Leader and since 2017 has been Professor of Arbovirology.

Research Interests

My group's research focuses on arboviruses, and more specifically on virus replication and interaction with host responses. On the vector side, we try to understand how these responses modulate the relationship between the arthropod vector and virus, specifically with regards to RNA interference pathways and virus detection in infected cells. We also have projects on the genetic modification of mosquitoes. With regards to vertebrate cells, we also study innate immune responses and virus-cell interactions. Alphaviruses of the Togaviridae family, viruses of the Flaviviridae familiy and viruses of the Bunyavirales order are the most relevant to current work.

Professor John McLauchlan

john.mclauchlan@glasgow.ac.uk

John McLauchlan completed his PhD at Glasgow University (1986) in Virology. His thesis title was 'Herpes Simplex Virus Ribonuclease Reductase DNA and Requirements for mRNA 3' End Formation Current Position'. He is Professor of Viral Hepatitis; Group Leader in the Viral Hepatitis Programme and Associate Director of the MRC-University of Glasgow Centre for Virus Research.

Research Interests

My group investigates:

(1) How do viruses such as HCV and DENV evolve? The scope of our interest spans populations to individuals to single cells.

(2) How does this evolution impact drug response and disease? We identify and investigate the emergence or natural occurrence of drug-resistant variants in HCV-infected individuals that also helps to guide retreatment strategies.

(3) What is the host response to infection? We focus on the role of specific components in regulating the virus life cycle and response, and the impact of viral infection in the heterogeneous microenvironment.

Professor Massimo Palmarini (Director)

Massimo Palmarini qualified in Veterinary Medicine (Italy) and then trained as a virologist and obtained a PhD (University of Edinburgh). He did post-doctoral research (University of California Irvine) before becoming Assistant Professor at University of Georgia. He later received a Chair in Molecular Pathogenesis at University of Glasgow and acted as Head of the Division of Veterinary Pathological Sciences and Associate Dean for Research. He has been the Director of Centre for Virus Research since August 2010.

Research Interests

Our laboratory studies the biology and pathogenesis of livestock diseases induced by emerging arboviruses such as Bluetongue virus (BTV) and Schmallenberg virus (SBV). Approximately 30 percent of all infectious diseases that emerged between 1990 and 2000 were caused by arthropod-borne viruses (arbovirus). This is probably the result of a combination of factors including a dramatic increase in travelling and commercial exchanges, climate and ecological changes and increased livestock production. In addition, changes in trading and commercial policies have created optimal conditions for the movement of infected vertebrate hosts and invertebrate vectors over wide geographical areas.

Professor Arvind Patel

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Arvind Patel obtained a PhD in Microbiology from the University of Wales, and then worked as a post-doctoral fellow at Trinity College, Dublin. In 1987, Arvind moved to the then MRC Virology Unit in Glasgow where he worked on different viruses. He has been a Programme Leader at the MRC Virology Unit (now the CVR) since 1996 leading a research group focused on hepatitis C virus and other flaviviruses. More recently, his group have initiated studies on SARS-CoV-2.

Research Interests

My group's work has been at the forefront of national/international research on identifying/dissecting hepatitis C virus (HCV) neutralising antibody epitopes at the structure and function levels. The information gained has aided our efforts to design and develop epitope-focused vaccines against HCV. More recently, we have extended our research interests into studying other viruses such as Zika virus, yellow fever virus, and louping ill virus primarily with a view to addressing unmet needs of vaccine and anti-viral developments. Indeed, we have recently developed a unique VLP-based Zika virus vaccine that is undergoing pre-clinical evaluation. More recently, we have initiated studies on a range of coronaviruses, including SARS-CoV-2, including generation of reagent toolkit and performing antiviral screens.

Professor David L Robertson

David Robertson completed postgraduate study at University of Nottingham and Trinity College Dublin (1992-1996). He then held research positions at the University of Alabama at Birmingham, USA (Research Associate, 1999-1997); CNRS, France (ANRS Research Fellow, 1997-1999) and University of Oxford (Wellcome Trust Research Fellow, 1999-2002). He was a Principal Investigator between 2012-2017 at the University of Manchester and since then has been Head of CVR Bioinformatics and Principal Investigator, University of Glasgow.

Research Interests

I am interested in computational and data-driven approaches applied to the study of viruses and their host interactions. I have over 25 years of experience studying molecular evolution and have made contributions to understanding the importance of viral diversity and recombination (eg: the first reporting of widespread recombination in HIV-1 and explanations for the non-random distribution of breakpoints). I have studied viral evolution in longitudinal studies in the context of drug resistance, worked on the naming and significance of clusters of viruses and characterisation of novel variants related to animal reservoirs. I use networks as a model of virus-host molecular interactions. My current research focuses on virus-host molecular interactions using bioinformatics and machine learning approaches. Since early 2020 I have been working on the origins of the COVID-19 pandemic and the subsequent evolution of SARS-CoV-2 in the human population.

Professor Peter Craig

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After completing a PhD at the University of Bristol, Peter Craig worked for 25 years as a research manager in central government, first in Whitehall and then in the Scottish Government. From 2006-11 he combined this role with managing the MRC's Population Health Sciences Research Network. Since 2014 he has worked in the Social and Public Health Sciences Unit, co-leading the Unit's 'Informing Healthy Public Policy' and 'Inequalities and Health' research programmes.

Research Interests

My research is focused on the evaluation of the impact on population health and health inequalities of public policies and other complex interventions. I have a particular interest in natural experimental methods and in the health impacts of changes in the social security system and other social and economic (i.e. non-health sector) policies.

Professor Alastair Leyland

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Professor of Population Health Statistics at the University of Glasgow. Alistair Leyland is the Associate Director of the MRC/CSO Social and Public Health Sciences Unit, where he co-leads the Inequalities in Health programme, and Director of the NIHR Global Health Research Group on Social Policy and Health Inequalities. He is an advisor to the Research Pillar of the European Public Health Association and Chair of the Section Council. He has been an editor of the European Journal of Public Health since 2009.

Research Interests

I have worked with linked administrative data from several countries for over 30 years with a focus on their use to assess inequalities in health. I have developed and applied multilevel modelling in the health sciences, having written two books on the subject. My programme considers the measurement of health inequalities, improves our understanding of the causal relationships underlying inequalities, investigates what works to reduce health inequalities, and assesses inequalities in the workplace. I make use of natural experiments to evaluate the impacts of policy on health and health inequalities. I am the Director of a NIHR funded Global Health Research Group, working with colleagues in Brazil to evaluate the impact on health of various welfare programmes.

Professor Petra Meier

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Petra Meier joined the MRC/CSO Social and Public Health Sciences Unit (SPHSU) at the University of Glasgow in July 2020, after working in ScHARR at the University of Sheffield for many years. She is a Fellow of the Academy of Social Science (FAcSS), serves on the NIHR Public Health Research Funding Board and Public Health England's Alcohol Advisory Board. She is President-Elect of the Kettil Bruun Society for Social and Epidemiological Alcohol Research and a Senior Editor for the journal Addiction.

Research Interests

I lead SPHSU's new programme 'Systems Science Research in Public Health' and am Director of the UKPRP-funded SIPHER Consortium, a hub for Systems Science in Public Health and Economic Research (2019-2024). Together with colleagues, I seek to develop a new methods framework for public health systems approaches which blends qualitative research, data science, (health) economics, epidemiology and macro- and micro-level systems modelling approaches to tackle complex health and wellbeing challenges. My current work focuses on health and wellbeing inequalities and on providing evidence to support policy partners' Wellbeing In All Policies efforts, especially around inclusive, sustainable economies. A second strand of research interest is the effectiveness and cost-effectiveness of alcohol policies and change and stability in drinking cultures. I enjoy interdisciplinary research and close collaboration with policy and practice partners at local, regional and national governments.

Professor Kirstin Mitchell

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Kirstin Mitchell began by studying humans (BSc in Human Sciences; Oxford 1993) then humans and health (MSc in Health Promotion; LSHTM 1998) and finally, sexual health (PhD; LSHTM; 2008). Early career research posts included LSHTM and MRC/UVRI Research Unit in Uganda. She lived and worked in Uganda, Rwanda and Ethiopia for 13 years, for HIV/AIDS charities and as a Lecturer at LSHTM. She joined MRC/CSO Social and Public Health Sciences Unit in 2015.

Research Interests

I lead the 'Relationships and Health programme' which seeks to understand mechanisms linking social relationships and health and use this understanding to develop and evaluate relationship-focused solutions. The programme tackles key public health challenges (primarily mental health, sexual health, and healthy ageing) by understanding social relationships as inter-dependent elements in a connected social system. My own research focuses on intimate relationships. It seeks to understand how people achieve sexual health and well-being. I use this evidence to design, test and evaluate public health interventions. I also seek to conceptualise, measure and promote sexual function and wellbeing for Public Health, via my role as co-investigator on the British National Survey of Sexual Attitudes and Lifestyles. I am an inter-disciplinary researcher and instinctive 'systems thinker', committed to co-producing knowledge and solutions with research users and beneficiaries.

Professor Rich Mitchell

After a degree and PhD in geography at the University of Southampton, Rich Mitchell moved to London for post-doc work and training in public health and epidemiology. Following a series of jobs, he joined the University of Glasgow in 2007, eventually leading the Public Health group. In 2010, with colleagues in Edinburgh, Rich co-founded the Centre for Research on Environment, Society and Health (CRESH). In 2017 he joined the Social and Public Health Sciences Unit to lead the Places and Health programme.

Research Interests

In my early career I focused on monitoring and exploring social and geographical differences in health. Over time however, I became more interested in how health can be protected than in what damages it, and in how social and geographical gaps in health could be addressed. I subsequently developed an extensive programme of research on the benefits of urban green spaces for health and am author and co-author of multiple key studies in this field. I continue to develop research on how change in the state, management and/or use of natural and other neighbourhood environments can positively affect population health, and in the methodologies required to know about, measure and evaluate such change including simulation studies.

Professor Laurence Moore (Director)

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Laurence Moore completed his PhD in Geography (Bristol, 1988) and MSc in Medical Statistics (LSHTM, 2000). He worked as a Senior Research Statistician and Head of Evaluation at Health Promotion Wales (1990-95), a research Fellow (University of Bristol Department of Social Medicine 1995-99) and Senior Research Fellow (2000-13). He was appointed Professor in 2003 (Cardiff School of Social Sciences). Achievements: NIHR Career Scientist Award (2002); Fellow, Faculty of Public Health (2006); Fellow, Academy of Social Sciences (2016).

Research Interests

I am the Director of the MRC/CSO Social and Public Health Sciences Unit in the University of Glasgow, as well as the co-lead of the Complexity in Health Programme within the Unit. Prior to taking up that post in 2013, I was Professor of Public Health Improvement at Cardiff University and founding Director of DECIPHer, a UKCRC Public Health Research Centre of Excellence. I am also a social scientist and statistician with a track record in the development and evaluation of interventions to improve public health. Working in multidisciplinary teams and in collaboration with policy makers, practitioners and the public, I have completed mixed methods evaluations of diverse interventions and programmes, which have then had a direct impact on policy and practice. I am particularly interested in research methods, notably trials of complex interventions; complexity informed programme evaluation; social network and agent based simulation.

Professor Sharon Anne Simpson

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Sharon Simpson completed a PhD in medical problem solving at the University of Aberdeen (1994). She is currently Professor of Behavioural Sciences and Health at the Social and Public Health Sciences Unit, University of Glasgow. Previously she was a Senior Research Fellow, University of Glasgow (2014-2016), Deputy Director of DECIPHer at Cardiff (2012-2014) and Senior Research Fellow/Associate Director, South East Wales Trials unit Cardiff University (2003-2014) researching obesity, physical activity, diet and complex interventions.

Research Interests

I co-lead the Complexity in Health Programme which aims to lead application and dissemination of novel methods to identify the most effective means to improve population health and to reduce inequalities. The work of the programme includes workstreams focused on developing and evaluating complex interventions, methods development and translation and modelling complex systems. My main research interests lie in two domains;

(1) Lifestyle behaviours (smoking, diet, physical activity, obesity).

(2) Mental health of young people and older adults.

I have a particular interest in social networks and mobile health technologies. I have methodological expertise in randomised controlled trials and in the development and evaluation of complex interventions, as well as mixed methods approaches and process evaluation.

Professor Alison Elliott

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Alison Elliott is theme leader for Vaccines and Immunity at the Uganda Research Unit, and directs the Makerere University/UVRI Centre of Excellence for Infection and Immunity Research and Training. She became interested in research in Africa as an undergraduate, with an elective in The Gambia. After medical training she undertook studies on TB and HIV in Zambia, then infectious diseases and immunology training in Colorado. Since 1997 she has been working in Uganda.

Research Interests

My current interests focus on population differences in immunological profile; how this is related to the effects of chronic, immunomodulating infections (such as helminth infections and malaria); and how this impacts upon immune responses to vaccines, susceptibility to infectious disease, and non-communicable disease risk, such as allergic disease and metabolic disease risk factors. I am also working to contribute to research capacity building in Africa.

Professor Matthew Cotten

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Matthew Cotten completed his Ph.D in Biochemistry at the University of Iowa in 1986 and moved to do postdoctoral research in Vienna working on viral entry mechanisms. Since then, he has worked as a virologist in academic, clinical and industrial laboratories in the United States, Europe and Africa.

Research Interests

My research has focused on describing virus-host interactions and the patterns of virus transmission, especially for viruses of clinical relevance. I have led independent research groups and have teaching experience at both undergraduate and postgraduate levels. I have wet-lab experience in growing and manipulating viruses. I have established high-throughput viral next generating sequencing (NGS) methods with a special focus on large sample clinical studies. I have Python coding skills, and I am familiar with the bioinformatics tools for analysing and extracting useful information from viral NGS data. I have a strong interest in supporting and training collaborators throughout the world.

Professor Pontiano Kaleebu (Director)

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Pontiano Kaleebu has been the Director of the Uganda Virus Research Institute (UVRI) since 2016 and Director of MRC/UVRI and LSHTM Uganda Research Unit since 2010. He completed medical training at Makerere University, Kampala in 1987 and a PhD from the University of London in 1995. He is a professor of immunovirology at the London School of Hygiene and Tropical Medicine; a Fellow of Royal College of Physicians (Edinburgh), Fellow of Imperial College London, Faculty of Medicine and a Fellow of the Academy of Medical Sciences.

Research Interests

My main research interests include viral vaccine research especially understanding protective immune responses, vaccine design and trials, virus diversity and HIV resistance to antiretroviral drugs. My team has used phylogenetics and phylogeography to study HIV transmission networks and hot spots. More recently I have been involved in vaccine design using the messenger RNA platform and looking for novel viral vectors. Working with other partner, I am involved in virus discovery and emergency response. I am leading on SARS-CoV-2 national diagnostic reference activities and studies aimed at COVID-19 immune profiling. I have published studies on human genomics and non-communicable diseases.I am involved in epidemiological studies including those aimed at understanding HIV risk factors, and studies of the long term consequences of ART which have identified the fishing communities as major key populations. I also participate in other HIV prevention studies and trials.

Professor Eugene Kinyanda

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Eugene Kinyanda holds an MBChB, Masters of Medicine (Psychiatry) and a PhD (Suicidology). He served as a consultant psychiatrist at Butabika National Psychiatric Referral Hospital (up to 2006). Currently, Eugene is head of the Mental Health Section at the MRC Unit in Uganda and he also holds the position of Professor of Mental Health at the LSHTM. Recently Eugene was the recipient of the MRC/DfID African Leadership Award (2014-2016) and Senior Wellcome Trust Senior Research Fellowship (2017-2022).

Research Interests

Over the last 13 years at the MRC/UVRI and LSHTM Uganda Research Unit, my research has focused on the psychiatric complications of HIV/AIDS among adults, children and adolescents and the elderly, looking specifically at the epidemiology of psychiatric disorders (PD) in HIV/AIDS and its impact on clinical, behavioural and social outcomes. We have explored the biological correlates of PD by conducting studies into the genetics and immunological risk factors of major depressive disorder and suicidality. We have also undertaken studies into the risk of contracting HIV among war-affected populations and more recently among people living with severe mental illness. Through the Wellcome Trust Fellowship that I received, I am developing and evaluating a model for the integration of depression management into adult HIV care in Uganda. Other research interests include the epidemiology of PD and suicidality in both war-affected and non-war-affected communities in Africa.

Professor Kirsty Le Doare

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Kirsty Le Doare is the chief investigator for the SGUL@MUJHU maternal vaccines and seroepidemiology studies in Uganda, co-chair of the DNDi MNCH COVID19 research coalition and WHO scientific advisor for maternal vaccination. My group's interest is in understanding why some babies get very ill and die from infections in the first months of life and how we can harness protection transferred from a mother to her baby via the placenta and in breastmilk.

Research Interests

I am a Professor of Vaccinology and Immunology and chief investigator for Maternal vaccines and seroepidemiology studies in Uganda. I have developed a comprehensive maternal vaccination platform to test current and future vaccines including those for pandemic control. My groups in Uganda and the UK use a variety of approaches to study bacteria and viruses that cause neonatal and young infant disease, ranging from clinical studies, whole genome sequencing, to complex immunology. We want to understand how mothers' blood and breastmilk can protect babies from deadly diseases.

Professor Robert Newton

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Robert Newton's training includes: MBBS (London, 1991) and D.Phil (The Epidemiology of HIV-associated Cancers; Green College, Oxford, 1998; Supervisor: Dame Valerie Beral FRS). Between 1992-2005, he worked at the Cancer Epidemiology Unit in Oxford. In 2005, he moved to the University of York and in 2012, he was seconded to the MRC/UVRI Research Unit in Uganda. He is a Professor of Clinical Epidemiology with an interest in infectious causes of cancer.

Research Interests

I am interested in the role of infectious agents and immune suppression in the aetiology of cancer and have particular experience of the conduct of epidemiological research in sub-Saharan Africa.

Professor Moffat Nyirenda

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Moffat Nyirenda is an Endocrinologist and Professor of Medicine at London School of Hygiene and Tropical Medicine, and leads NCD research at MRC/UVRI and LSHTM Uganda Research Unit. He obtained medical training from Malawi College of Medicine and University College London, PhD from University of Edinburgh, and was subsequently supported by an MRC Clinician Scientist Fellowship. He was Associate Director of Malawi-Liverpool-Wellcome Programme, and Director of Malawi Epidemiology and Intervention Research Unit.

Research Interests

I lead the Non-Communicable Disease (NCD) Research Theme at the MRC/UVRI and LSHTM Research Unit Uganda. My research interests lie in understanding how and why NCDs in Africa manifest differently (eg in relatively young and lean individuals) from how they present in high-income countries. My studies include:

(i) Detailed clinical and laboratory studies to understand the 'African diabetes phenotype' to inform appropriate prevention, diagnosis and management.

(ii) Investigating the association between early environmental insults and the risk of obesity, diabetes and hypertension in adulthood.

(iii) Using cross-cutting approaches to examine the interactions between chronic infectious diseases and NCDs.

(iv) Contributing to genomics studies of NCDs in sub-Saharan Africa.

Professor Janet Seeley

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Janet Seeley is a social anthropologist, with a PhD in that subject from University of Cambridge (1985). She has led a programme at the MRC/UVRI and LSHTM Uganda Research Unit since 2008 and also in 1989-1993, when the Unit was set up. She is also faculty lead for social science and research ethics at Africa Health Research Institute, KwaZulu-Natal, South Africa. She is actively engaged in research on the social aspects of health, particularly HIV, since 1987, working in sub-Saharan Africa and Asia.

Research Interests

Over the last 40 years, I have undertaken periods of research in Kenya, Uganda, Zambia, South Africa, India, Nepal, Bangladesh, Pakistan, and Papua New Guinea on the social aspects of health, and the context of people's lives and livelihoods that influence health and health-related behaviours. I am interested in gender analysis, poverty analysis and the need to understand diversity and difference.