

Babraham Institute Enterprise



Commercialising the Science of the Babraham Institute



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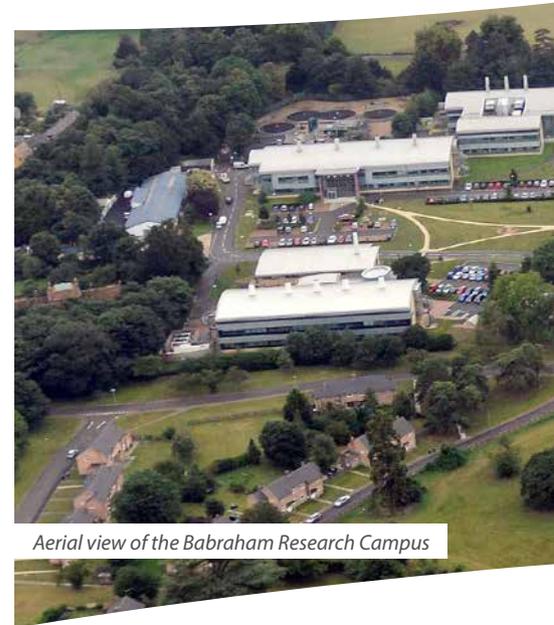
Introduction

The Babraham Institute undertakes innovative, life sciences research to understand the biological processes underpinning lifelong health and wellbeing.

Our research focuses on signal transduction and genome regulation (particularly the interplay between the two), how they regulate important physiological adaptations to maintain health and how, over lifetime, their failure or abnormality may contribute to ageing and age-related pathological conditions.

Our work is recognised as world-leading and is supported by strategic funding from the Biotechnology and Biological Sciences Research Council (BBSRC) which funds our four Institute Strategic Programmes (ISPs):

- Epigenetics
- Lymphocyte Signalling and Development
- Nuclear Dynamics
- Signalling



Aerial view of the Babraham Research Campus

Our Knowledge Exchange & Commercialisation Programme seeks to maximise the impact of our research through collaboration and interactions with key stakeholders. As well as their basic biological research, many of our scientists are involved in translational research such as identifying new disease drivers, validating new drug targets or developing new methods and reagents. Much of the funding for this translational research comes from the MRC, Wellcome Trust, charities and industry.



Babraham Institute Enterprise

Babraham Institute Enterprise Limited (BIE) is the wholly-owned trading arm of the Babraham Institute. BIE supports the delivery of the commercialisation of the Babraham Institute's science. As part of this role, it manages, develops and commercialises the Babraham Institute's intellectual property portfolio. This generally involves out-licensing to existing organisations, but intellectual property may also be spun-out of the Institute to create new ventures, such as Crescendo Biologics Ltd.

BIE also facilitates collaborations between the Institute and industry, and arranges access to the Institute's expertise and scientific facilities and services. The Institute is co-located on the Babraham Research Campus with over 50 biomedical companies, and benefits from a number of on-site collaborations.



Epigenetics

Developmental decisions in all organisms are accompanied by epigenetic modifications of DNA or chromatin, and by genome regulation through non-coding RNAs and higher order chromatin structures.

The Babraham Institute's Epigenetics Programme seeks to understand how epigenetic changes regulate genome function, especially during development and in response to external signals. The programme is amongst the world's ten leading epigenetic research centres (www.sciencewatch.com)

Sequencing technologies for epigenetics – oxBS-Seq

Collaboration between Wolf Reik and The University of Cambridge led to the development of oxBS-Seq, the first method for quantitative mapping of 5-hmC in genomic DNA at single-nucleotide resolution. Cambridge Epigenetix Ltd, a spin-out from the University set up to commercialise this technology, is based on the Babraham Research Campus and has a number of links with the Institute.

Group Leaders

Wolf Reik FRS, Programme Head, studies epigenetic reprogramming in mammalian development, pluripotency, transgenerational inheritance and especially epigenetic dynamics in germ cells.

Olivia Casanueva studies the causes of inter-individual variability in longevity pathways in *C. elegans* and the role of chaperones in ageing.

Myriam Hemberger studies the genetic and epigenetic control of early cell lineage decisions that dictate stem cell potency and underlie the formation of a functional placenta.

Jon Houseley studies RNA mediated changes to the genome and epigenome, focused on how cells respond to their environment by changing gene expression, epigenetic marks and copy number.

Gavin Kelsey studies the establishment of epigenetic marks on the genome, with a focus on imprinted genes and the role of environmental factors in programming epigenetic marks.

Llewelyn Roderick uses physiological systems to understand how the epigenome is influenced by ageing and the underlying role of signalling pathways in this interaction.

Peter Rugg-Gunn studies the epigenetic regulation of development and embryonic stem cells, especially the interactions between epigenetic modifiers and signalling pathways.



Wolf Reik, FRS



Olivia Casanueva



Myriam Hemberger



Jon Houseley



Gavin Kelsey



Llewelyn Roderick



Peter Rugg-Gunn

Immunology

The Lymphocyte Signalling and Development Programme performs world-leading studies into how cells of the immune system develop and function to provide life-long protection against a vast number of lethal or debilitating infectious diseases.

Maintaining immune cell homeostasis – the balance between the different types of white blood cells – is a major challenge. It often breaks down with age and can result in increased susceptibility to infections and various immune-related disorders. Understanding how immune cells communicate with each other and with their respective environments is therefore of considerable importance.

Group Leaders

Martin Turner, Programme Head, focuses on how the PI3 Kinase pathway and RNA-binding proteins regulate lymphocyte development and function.

Geoff Butcher focuses on GIMAPs (a family of small GTPases which exert profound influences on the establishment of lymphocyte populations), to identify the intracellular processes in which they participate and how they interact with established cell survival pathways.

Michelle Linterman is studying the cellular and molecular changes that occur in Tfh, Tfr and germinal centre B cells with age that contribute to the age-dependent decline in the germinal centre response, for example in response to vaccination.



Klaus Okkenhaug investigates the role of a family of enzymes called the PI3 Kinase in lymphocyte development, homeostasis and immunity.

Marc Veldhoen is interested in how cells of the immune system, T cells and innate lymphoid cells, interact with their surroundings with particular focus on sensory molecules such as the arylhydrocarbon receptor.

Elena Vigorito aims to understand how a class of small RNAs called microRNAs (miRNAs) impact on B cell function, as it is now apparent that miRNAs regulate many aspects of the immune system.



Martin Turner



Geoff Butcher



Michelle Linterman



Klaus Okkenhaug



Marc Veldhoen

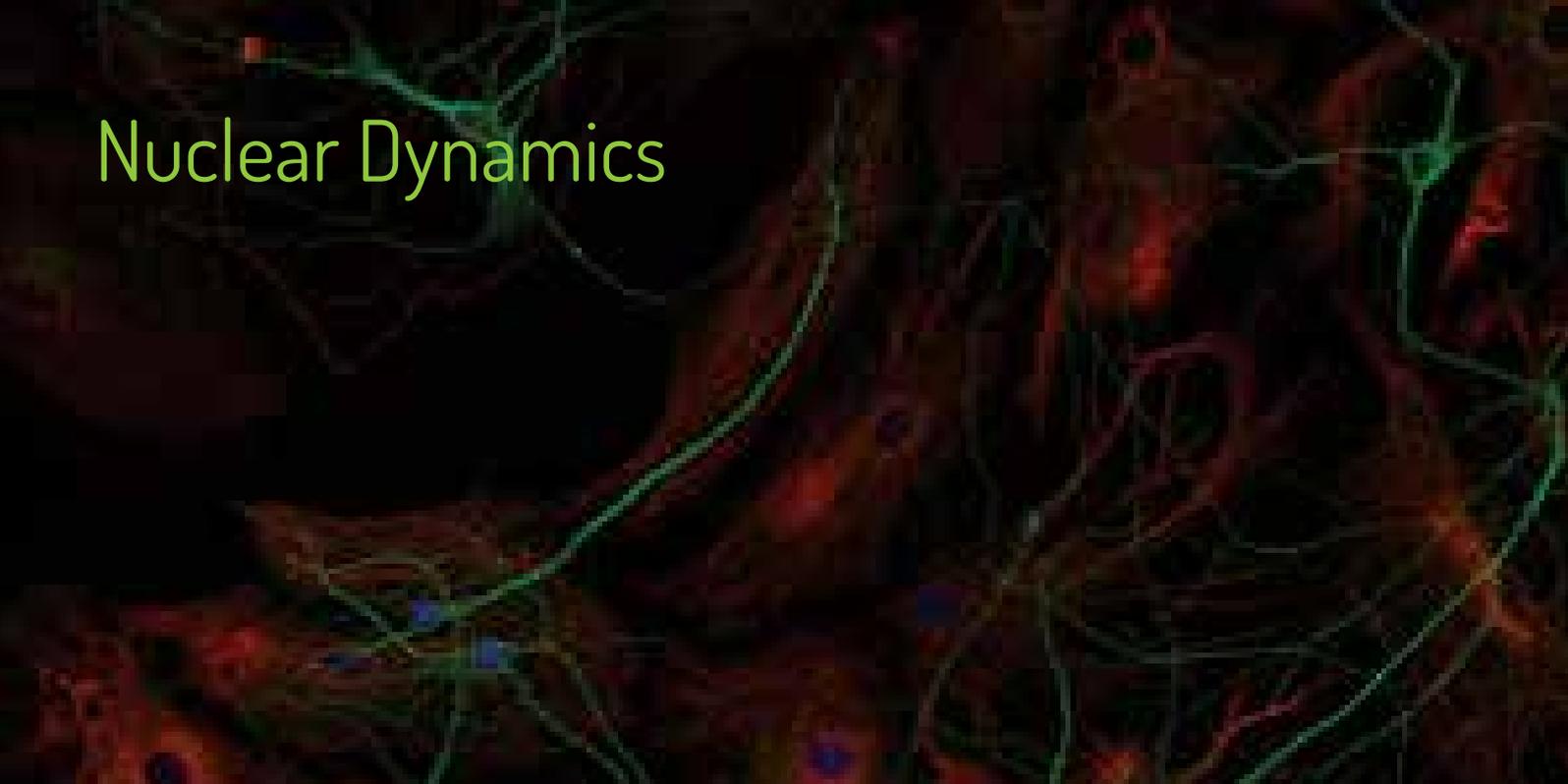


Elena Vigorito

Transgenic mouse models

Martin Turner's p110 delta flox mouse model has been non-exclusively licensed to a leading pharmaceutical company. Other genetically modified mouse models are also available for licensing.

Nuclear Dynamics



The Babraham Institute Nuclear Dynamics Programme is using a Systems Biology approach to understand nuclear organisation and genome function in haematopoiesis and the immune system.

We are integrating genome-wide transcriptome, epigenome and interactome studies to generate a 3D picture of nuclear organisation, and to pinpoint key molecules and pathways that affect the way we age.

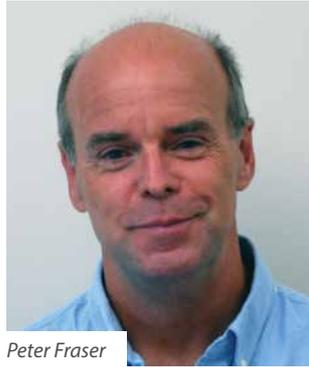
Group Leaders

Peter Fraser, Programme Head, studies chromosome and genome conformations controlling gene functions: long non-coding RNAs; long-range chromatin interactions and nuclear compartmentalisation affecting health, ageing and disease.

Anne Corcoran studies epigenetic mechanisms, in particular noncoding RNA transcription, that underpin normal immunoglobulin recombination and B cell development, and the ageing defects that result in impaired antibody response to infection.

Sarah Elderkin studies the role of polycomb complexes in gene expression during development, ageing and haematopoiesis, using genome-wide assays and mouse models to discover the role of polycomb in intra- and inter-chromosomal interactions throughout the genome.

Karen Lipkow focuses on the three-dimensional organisation of the eukaryotic genome. Her analysis is aimed at revealing common rules linking changes in genome organisation to the regulation of gene expression.



Peter Fraser



Anne Corcoran



Sarah Elderkin



Karen Lipkow



Mikhail Spivakov



Patrick Varga-Weisz

Mikhail Spivakov uses genome wide analyses to study how multiple regulatory inputs are integrated on the DNA of different cell types, biological conditions (such as age) and population diversity.

Patrick Varga-Weisz studies the molecular machinery involved in defining the epigenome during the cell cycle, development and ageing. His particular focus is on the control of heterochromatin propagation by energy-dependent chromatin remodelling factors.

Novel sequencing technologies – VDJ-Seq

Anne Corcoran has developed VDJ-seq, a high throughput Next Generation sequencing assay, that interrogates antibody repertoires at unprecedented depth and resolution. It provides quantitative characterisation of individual VDJ recombination events, including V, D and J gene usage, and other diversity inducing processes, in a novel unbiased manner compared to existing methods.

Signalling

The Signalling Programme focuses on the signal transduction pathways and networks that coordinate how cells and organs develop and respond to changes in their environment.

We are interested in defining how the PI3 Kinase, mTOR, MAPK and NAD signalling pathways are controlled and how they contribute to cellular homeostasis throughout life. There is good evidence that these pathways control key molecular aspects of the ageing process and are de-regulated during ageing. These signalling systems also coordinate age-related pathologies and we also have expertise in disease models and drug discovery.

Group Leaders

Len Stephens FRS, Programme Head, studies signalling by inositol lipids, especially PI3 Kinase, and their role in neutrophil activation and chemotaxis.

Michael Coleman studies signals controlling axonal protein trafficking and function, their decline with age and their role in neurodegeneration.

Simon Cook studies protein kinase signalling pathways and their role in cell proliferation, senescence, survival and cell death. Project management experience from US Biotech.

Oliver Florey is a cell biologist studying the interaction between the endocytic system and autophagy pathway and its physiological and pathophysiological function.

Phillip Hawkins FRS studies signalling by inositol lipids, especially PI3Ks, and their role in neutrophil activation and ROS generation.

Nicholas Ktistakis is a cell biologist studying the lipid signals that regulate autophagy and nutrient sensing.

Nicolas Le Novère is a mathematical biologist studying signalling pathways controlling neuronal transmission and is a leader in systems biology.

Michael Wakelam studies lipid signalling by phospholipases and is actively involved in Lipidomics method development. He is also Babraham Institute Director.

Heidi Welch studies signalling by Rho-family GTPases and their role in neutrophil biology including ROS generation and chemotaxis.



Len Stephens, FRS



Michael Coleman



Simon Cook



Oliver Florey



Phillip Hawkins, FRS



Nicholas Ktistakis



Nicolas Le Novère



Michael Wakelam



Heidi Welch

Acquired resistance to ERK1/2 pathway Inhibitors

Simon Cook, in collaboration with AstraZeneca and the MRC Cancer Cell Unit, has discovered how tumour cells acquire resistance to a new anti-cancer drug (AZD6244).

Scientific Facilities

The Babraham Institute provides its scientists with an extensive infrastructure of central, state of the art, scientific support services. Many of these services are available for use by external organisations.

The Institute's scientific facilities and services include:

- Bioinformatics
- Flow cytometry
- Imaging
- Lipidomics
- Mass spectrometry of proteins and nucleosides
- Next-generation sequencing
- Small-animal facility

The heads of the scientific services also provide training, and several run training courses.

Please contact us if you would be interested in accessing the Babraham Institute's scientific facilities.



Bioinformatics

Researchers in hundreds of academic institutions and companies worldwide are able to interpret their biological data thanks to software and training guides made freely available on the internet by the Institute's Bioinformatics Group. The benefits of the group's software and services have ranged from facilitating ground-breaking cell biology research that could benefit human health to helping a spin-out company market its products.

Contact us

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