In clinical medicine, if one doesn’t know what to do, one would be better to do nothing.
In the laboratory, precisely the reverse is true, if you don’t know what to do, you would be better off doing something.

Professor Sir Peter Ratcliffe FRS
This review undertakes to demonstrate the application of the Nuffield Department of Clinical Medicine’s core tenets of endeavor, discover, inspire.

It includes several groups, units and centres that, driven by the science, have recently joined other elements of the Medical Sciences Division to create the Radcliffe Department of Medicine and the Nuffield Department of Population Health.

Whilst formally known as the Nuffield Department of Clinical Medicine, to ensure its endeavours in clinical and basic science are equally conveyed, the Department is commonly referred to as the Nuffield Department of Medicine (NDM).
THE NUFFIELD DEPARTMENT OF CLINICAL MEDICINE
Endeavour, Discover, Inspire
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A MESSAGE FROM
the Nuffield Professor of Clinical Medicine

It is an exhilarating time to be working in medical science. We are witnessing a golden age in genetics, a new era in target drug discovery, and an unprecedented number of collaborations between research institutes and the pharmaceutical industry.

As one of the largest medical research departments in Europe, the Nuffield Department of Medicine (NDM) is fast becoming a world leader in medical science. The wide range of research fields we support, our multi-disciplinary, multi-institutional approach, industrial and pharmaceutical collaborations, and our world-leading infrastructure, all pave the way for a flourishing future, both here in Oxford and abroad.

As a clinician, I am a great supporter of the bench to bedside research philosophy. The Department’s significant achievements in the laboratory and in the clinic have been made possible through our provision of an open access environment, which encourages, supports and inspires our scientists to achieve the best academic and clinical outcomes. However, what really sets NDM apart is its commitment to the development of innovative infrastructure.

The infrastructure we have established in Oxford, Africa and Southeast Asia over the past decade allows our scientists to come together around the world to formulate ideas, collaborate, share resources, and take risks. This is the key to groundbreaking multidisciplinary research.

As the Nuffield Professor of Medicine, I am committed to ensuring the Department remains a major contributor to medical research worldwide, for the advancement of science and medicine, and the improvement of individual lives on a global scale.

Professor Sir Peter Ratcliffe FRS

“As one of the largest medical research departments in Europe, the Nuffield Department of Medicine is fast becoming a world leader in medical science.”
A MESSAGE FROM
the Associate Head of Department
(Academic Support and Finance)

Academic support within such a vibrant and energetic Department is a challenge, one that the Department support staff and the Central University have risen to exceptionally.

Growth over the last decade has been exponential. We have seen a dedicated group of business managers emerge, whose roles have changed from that of scorekeepers and guardians, to academic advocates and business partners. The trust placed in these staff and their teams — to help enable and support an environment that serves the needs of our academic community — is well placed.

The NDM is a confident organisation, which promotes a style of governance that fully enables academic freedom, in both local management and in setting strategic aims and goals at a unit, centre and institute level. It manages to achieve this whilst still embracing the tenets of collaborative research and the overarching purpose and strategy of the Department.

With facilitation in mind we attempt to always alleviate the administrative burden on academic staff, and we try to keep decision making and resources as close to the laboratory bench as possible. The positive results of this approach to supporting scientists can be attested to by the impacts highlighted throughout this book.

Darren Nash MBA BSc (Hons)

For many years the NDM has led the way in immunology, tropical medicine, structural biology, and human genetics. Prior to my appointment as the Nuffield Professor of Medicine, NDM had forged strong clinical links — in taking the Department forward, it was clear to me that the establishment of multidisciplinary institutes would provide a solid foundation for scientific growth. Peter has embraced this vision and continues to build on it for the improvement of the Department’s outputs and its overall clinical impact.

Regius Professor Sir John Bell FRS

The NDM is unique in that it is a clinical department with very powerful basic science infrastructure and goes from fundamental discovery all the way through to application in the wards and clinics of our hospitals. The Department is at the heart of the Medical Sciences Division at Oxford.

Head of the Medical Sciences Division, Professor Alastair Buchan FMedSci
i DEPARTMENT AND RESEARCH
The Nuffield Department of Medicine is one of the largest and most highly regarded departments of medicine in Europe. The motivation behind all research carried out by the NDM has been, and continues to be, the pursuit of academic excellence and a positive impact on the health and wellbeing of the global community.

Led by Professor Sir Peter Ratcliffe FRS, who is both an active researcher in cell biology and a practicing clinician, the NDM is committed to fostering research that moves beyond academia, from bench to bedside.

The Department is structured around several substantially autonomous subdivisions, in Oxford and abroad. These clinical medicine institutes, centres and units are supported by a central administrative team, NDM Strategic.

In Oxford, the NDM is based across multiple local sites, including the John Radcliffe and Churchill Hospitals, and the University of Oxford’s Old Road Campus – one of the largest centres for biomedical research in Europe.

The Department maintains research platforms across a number of disciplines including: cellular and molecular physiology, structural biology, structural genomics, human genomics, cancer research, experimental medicine, vaccine development, clinical biomanufacturing, epidemiology, clinical trials, and tropical medicine and global health.

Allied to UK based research in tropical medicine and global health, the Department operates major research programmes overseas too, with research units in Thailand, Laos, Vietnam and Kenya supporting activities at numerous sites in South East Asia and Sub-Saharan Africa. It also operates extensive epidemiological and clinical trial networks throughout China, India and South America.

Diverse research platforms within the NDM, both in Oxford and abroad, have significantly contributed to the depth and breadth of the Department’s medical research outputs. Over the past 20 years the NDM has had a profound impact on World Health Organization policy and clinical practice guidelines on a national and global scale.
It has also undertaken research, which has led to lasting clinical and medical impacts, such as the development of new vaccines, medication and clinical technology for the diagnosis, treatment, and control of disease and medical disorders.

Some of its greatest research achievements include the introduction of artemisinin combination therapy, the world’s number-one antimalarial treatment; the Million Women Study, which continues to have a positive impact on women’s health around the world; and the United Kingdom Prospective Diabetes Study, the first study of its kind to provide definitive answers to Type 2 diabetes sufferers.

These research highlights represent a snapshot of the outstanding work the NDM has supported since its establishment, and will continue to encourage well into the future.

The Department supports investigator-led research through a series of well-founded laboratories in an environment designed to foster the long-term career development of fellows and research staff.

NDM research covers every aspect of biological science related to medicine: from the bench to the bedside, from blue sky to full clinical trials, from technology development to spin-out. It covers many fields and many clinical disciplines.
The NDM’s significant achievements in the laboratory and in the clinic have been made possible through our provision of a global collegiate environment which encourages, supports and inspires our scientists and students to achieve the best academic and clinical outcomes.

By attracting the best people from around the world, we are securing the NDM’s future as one of the most productive medical research departments in the world, and ensuring it remains the destination of choice for those who are not afraid of hard endeavour, who want to make a difference to health with their discoveries, and who wish to inspire generations to come.

We recognise the demands on work/life balance and actively promote the provision of a family friendly working environment. We constantly strive to create a workplace that values outreach and collegiality, fosters an inclusive culture, promotes equality and values diversity.

The Athena SWAN Charter recognises and celebrates good practice on recruiting, retaining and promoting women in science, technology, engineering, maths and medicine (STEMM) in higher education. The Charter was launched in June 2005, and aims to address gender imbalance in STEMM, recognising the importance of the role that all members of the science community play in the progression and advancement of the field.
The NDM hosts research groups, where the laboratory space is embedded in the NHS.

**INFECTIOUS DISEASES AND MICROBIOLOGY**

This group is largely focused on translating new molecular technologies and advances in informatics into the investigation of microbial transmission, diagnosis of infectious disease and the identification of novel outbreaks of communicable disease.

This research, led by **Professors Derrick Crook** and **Tim Peto**, is undertaken through a joint programme of work funded by the Oxford BRC Infection Theme and the Modernising Medical Microbiology UK Clinical Research Consortium (UK-CRC), which consists of the Health Protection Agency (HPA), Wellcome Trust Sanger Institute and the University of Oxford combined with the ORH NHS Trust.

[www.modmedmicro.ac.uk/](http://www.modmedmicro.ac.uk/)

**THE PALLIATIVE CARE RESEARCH GROUP**

Based in the Sobell Study Centre (SSC) at Sir Michael Sobell House—a specialist palliative care service based at the Churchill Hospital—the Palliative Care Research Group led by **Dr Bee Wee** aims to improve symptom management, and provide psychosocial support for patients with progressive, life-limiting illnesses, and their caregivers.

The group’s clinical research programme has strong links within the Oxford University Hospitals NHS Trust, Oxford University and Oxford Brookes University. Sir Michael Sobell House is also a World Health Organization Collaborating Centre for Palliative Care giving it strong national and international links.

[www.expmedndm.ox.ac.uk/palliative-care](http://www.expmedndm.ox.ac.uk/palliative-care)

**RESPIRATORY TRIALS UNIT**

A specialist centre for the administration and recruitment of patients to respiratory trials this Unit is one of only a few UKCRN (UK Clinical Research Network) registered Clinical Trials Units specialising in respiratory research. Clinical Director of the Oxford Respiratory Trials Unit **Dr Najib Rahman** specialises in areas of respiratory medicine including pleural disease and the conduct and analysis of respiratory trials.

Based at the Churchill Hospital in Oxford, the Unit runs many of its projects in partnership with the MRC Clinical Trials Unit (MRC CTU) and as part of the Comprehensive Local Research Network (CLRN) portfolio.

[www.expmedndm.ox.ac.uk/respiratory-trials-unit](http://www.expmedndm.ox.ac.uk/respiratory-trials-unit)

The following chapters will focus on the Department’s broad research activities, and the impact this research has had on society, health and policy, on a local and global scale.
There are a number of barriers facing drug discovery and development today. Not only is the process of determining the biological function of a protein (for the establishment of useful drug targets) a cumbersome task, successfully translating this basic research into drug development is a lottery, with the current failure rate of protein target trials sitting at around 90 per cent.

Using a high-throughput structural analysis machine, SGC Oxford has sped up the research process, enabling the investigation of up to seven protein structures a month, and it has also enhanced the process of drug development through their unique approach to sharing knowledge.

By placing important drug target information in the public domain without restriction SGC Oxford has not only become a hub for academic collaboration – with nearly 200 collaborations with leading labs throughout the world – they have also established unique partnerships with patient advocacy groups and the pharmaceutical industry.

SGC Oxford has effectively broken down the barriers to drug discovery by creating a culture of collaboration and openness, which will ultimately revolutionise the impact of basic research on clinical outcomes.
SGC OXFORD

The Structural Genomics Consortium (SGC) Oxford seeks to solve the structures of human proteins of medical relevance and place them into the public domain without restriction. Using these structures and the reagents generated as part of the structure determination process as well as the chemical probes identified, they work with organisations within Oxford, the UK and the rest of the world to further the understanding of the biological roles of these proteins. They have particular interests in human protein kinases, metabolism-associated proteins, integral membrane proteins and proteins associated with epigenetics.

The SGC Oxford laboratories, under the direction of Professor Bountra, are housed within the University’s Old Road Campus Research Building. Scientists at SGC Oxford are affiliated with several University Departments including the Botnar Research Centre, Ludwig Institute, Target Discovery Institute, Kennedy Institute and Diamond Light Source at Harwell.

www.thesgc.org/oxford

THE DISCOVERY OF THE JQ1 PROBE

SGC Oxford are pioneers in placing all information, reagents and know-how into the public domain without restriction and they agree not to file for patent protection on any of their research outputs.

All this output is used by the SGC and its collaborators to successfully explore new classes of proteins with therapeutic potential. The SGC’s commitment to collaborations that are unrestricted by patents is revolutionising the way drug discovery research is conducted. We can quickly engage any scientist across the globe and work together to make key discoveries.

For example in just 18 months the JQ1 probe discovered by the SGC was freely distributed to more than 150 laboratories and cited in more than 60 scientific articles. This enabled the association of its novel epigenetics target of inflammation and cancer like myeloma and leukaemia; jump starting new research programmes within industry and enabling one of our collaborators to raise $15 million to start a biotech demonstrating how innovation can be driven at a global scale in the absence of patents.

www.thesgc.org/chemical-probes

IN FOCUS: WHAT IS THE STRUCTURAL GENOMICS CONSORTIUM?

The SGC is a not-for-profit, public-private partnership with the directive to carry out basic science of relevance to drug discovery. In its current configuration, the SGC includes active research facilities at the Universities of Toronto and Oxford. Current funders of the SGC include GSK, Eli Lilly, Pfizer, ABBVie, Boehringer-Ingelheim, Jansen, Takeda the Novartis Research Foundation, the Wellcome Trust, and Canadian granting agencies. Recently, these organisations together have committed greater than $80 million to the consortium for another four years of operation.

www.thesgc.org/about/what_is_the_sgc
Professor Sir Rory Collins

FROM THE HEART

Professor Collins has devoted the past 30 years to answering big questions about the causes and prevention of heart attacks and strokes, work that is now saving many thousands of lives around the world every year:

With Sir Richard Peto and colleagues at the Clinical Trial Service Unit and Epidemiological Studies Unit (CTSU), he has pioneered new approaches to research, including the use of large, streamlined trials to detect moderate, yet worthwhile, effects on survival for some widely prescribed treatments, including aspirin and statin therapy. His work on cholesterol in particular has helped to transform our understanding of the importance of cholesterol as a cause of heart disease and stroke.

He has also helped create some of the world’s most influential meta-analyses, which combine the results of different trials to provide better estimates of the effects of treatments in particular types of people.

More recently, thanks to CTSU’s expertise in the conduct of very large studies, he has successfully led the national UK Biobank study of half a million people that will provide new insights into the causes of disease for many decades to come.

Professor Collins is funded by the British Heart Foundation.
THE CLINICAL TRIAL SERVICE UNIT AND EPIDEMIOLOGICAL STUDIES UNIT (CTSU)

Co-directed by Professor Collins and Professor Sir Richard Peto FRS, the CTSU’s work primarily involves research into the causes and treatment of ‘chronic’ diseases such as cancer, heart disease and strokes. The Unit also studies other major conditions in developed and developing countries worldwide.

CTSU administers large-scale randomised and observational studies to provide evidence that is used to investigate the causes, prevention and treatment of premature death and disability across the globe.

Research on this scale requires widespread collaboration, with over 200 people working in Oxford and several hundred working full- or part-time on studies outside of the city.

www.ctsu.ox.ac.uk

THE CANCER EPIDEMIOLOGY UNIT

Led by Professor Dame Valerie Beral, the main emphasis of research in the Unit is on providing large-scale reliable evidence on the relationship between common exposures (such as diet, reproductive factors, and the use of oral contraceptives and hormone replacement therapy) and common conditions of public health importance such as breast, prostate, and cervical cancers, cardiovascular disease and fractures.

Much of this work centres on the two large scale cohort studies run by the Epidemiology Unit (the Million Women Study and EPIC-Oxford), and on the several International Collaborative Groups based in the Unit. Current research areas also include work on statistical and epidemiological methodology, and a programme of work related to the NHS screening programmes for breast, cervical and bowel cancers.

www.ceu.ox.ac.uk

IN FOCUS: UK BIOBANK

With extensive data on half a million people from across the UK, UK Biobank is one of the most detailed large-scale health resources ever created for research into the causes of disease. Led by Professor Collins, UK Biobank is following its participants to see how health is affected by the interaction of lifestyle, environment and genes.

The giant repository will allow scientists to study a wide range of diseases including cancer, heart disease, stroke, dementia, depression, arthritis, loss of hearing and eye problems.

www.ukbiobank.ac.uk
Understanding which variations in our DNA affect susceptibility to diseases can provide new insights into the disease process and lead to new treatments. Since 2005 Professor Donnelly has chaired the Wellcome Trust Case Control Consortium (WTCCC), in collaboration with 50 research groups across the UK, applying statistical methods to extract maximal information from large human genetic studies.

The most recent study from the WTCCC, involved the analysis of 14,000 cases for seven common diseases along with 3,000 shared controls. This was the largest study of its kind at the time of publication and was responsible for the discovery of several novel genetic associations for a number of disorders and diseases including: bipolar disorder, coronary artery disease, Crohn’s disease, rheumatoid arthritis, type 1 diabetes, and type 2 diabetes.

A subsequent ongoing collaborative study, the WTCCC2, also chaired by Professor Donnelly, includes a centralised data analysis group based at the Centre, which aims to examine DNA samples from 60,000 individuals, with the goal of understanding the genetic basis of susceptibility to 15 human diseases and conditions. One such study, on genetic susceptibility to visceral leishmaniasis among populations in Brazil and India, showed a shared genetic risk factor for the disease in both geographically divided populations.

This work has improved academic understanding of the genetic causes behind human disease, and may lead to enhanced therapies for a number of diseases and disorders.
THE WELLCOME TRUST CENTRE FOR HUMAN GENETICS

The Centre is a research institute funded by the University, the Wellcome Trust and numerous other sponsors. Their objective is to undertake research into the genetic basis of human diseases.

Specifically, their aim is to: identify the genes and DNA variants involved; understand how these DNA variants may contribute to risk of disease in the population; understand how such genetic factors contribute biologically to a disease process; and develop statistical and experimental tools to support these investigations. They work through the Centre’s multidisciplinary research teams in human genetics, functional genomics, bioinformatics, statistical genetics, genomic epidemiology and structural biology, and by collaborating with research groups across the world.

www.well.ox.ac.uk

OXFORD GENOMICS CENTRE

The Oxford Genomics Centre is based at the Wellcome Trust Centre for Human Genetics (WTCHG).

The Centre is one of the largest genomics facilities in the UK. The central objective of the Centre is to bring together genomics and analysis services to support scientists from Oxford and elsewhere wanting to exploit the latest in high-throughput genomics techniques in their research.

A real strength of the WTCHG are the scientists who lead the world in the development of bioinformatics tools and analysis methods for high-throughput sequencing and other genomics technologies. They are uniquely placed to apply these tools to the high-quality data we produce.

The Centre has been specifically set up to support a wide range of applications aimed at accelerating the pace of research into the underlying genetic cause of common diseases.

www.well.ox.ac.uk/ogc/home

IN FOCUS:

STUDENT MANUEL RIVAS

“During the past year, I have been working on several efforts to map disease genes to the human genome related to breast cancer, Type 2 Diabetes, and coronary artery disease using next generation DNA sequencing technology.

“The approach I have focused and worked on with my advisors Peter Donnelly and Mark McCarthy is currently being applied across various disease studies and will hopefully elucidate functional mechanisms fundamental to disease biology.”
While the majority of vaccines available today offer long-term protection against infection and disease, effective protection from the common flu still requires seasonal vaccination, due to the ever-evolving nature of influenza.

To overcome this problem, Professor Gilbert and her colleagues have spent the past decade building a T-cell-based flu vaccine, MVA-NP+M1, for long-term and universal protection against all strains of flu.

The MVA-NP+M1 vaccine is designed to boost cross-reactive T-cell responses to internal antigens of the influenza A virus, which are conserved across all subtypes of influenza. This should allow the vaccine to protect against both influenza disease, and all influenza A viruses.

After demonstrating the safety and immunity of the vaccine in phase 1 trials in 2008, a phase 2a vaccination and influenza clinical trial was conducted in healthy adult volunteers. This trial, which was published in 2012, showed that patients who received the MVA-NP+M1 vaccine developed a stronger response from their T cells than those who did not. This trial was the first to show the clinical efficacy of a T-cell-based influenza vaccine, for long term, universal use against all strains of flu.
The Clinical Bio-manufacturing Facility (CBF) is the University of Oxford’s Good Manufacturing Practice (GMP) manufacturing facility. The CBF has over 16 years experience producing biological Investigational Medicinal Products (IMPs) according to the principles of GMP for early phase clinical trials. They aim to provide the link between academic research and clinical drug development, to allow all our collaborators to make rapid progress into clinical trials. They use the existing GMP manufacturing facility to meet the special demands for phase I/II clinical trials of novel biotech products within the academic and commercial sectors and deliver effective short term treatments to the clinic providing long term benefits to the patient.

www.cbf.ox.ac.uk

Current vaccines against seasonal or pandemic influenza work by inducing antibodies to highly variable surface proteins of influenza, and have to be reformulated each year to take account of antigenic drift and shift. Information on the viruses to be included in the vaccine is only available a few months before the vaccine is required for use, so that manufacturers have a limited time to produce the vaccine, and if delays in the process occur there are shortages of vaccine for that year.

At the Jenner Institute they are working on an entirely different approach to influenza vaccination, based on T cell immunity to the highly conserved internal antigens of influenza. They aim to generate a vaccine suitable for use in all ages, providing protection against currently circulating seasonal influenza as well as avian subtypes that may in future gain the ability to transmit between humans and bring about a new pandemic.

www.jenner.ac.uk/humanflu

IN FOCUS:
OXFORD MARTIN PROGRAMME

The Oxford Martin School is a unique, interdisciplinary research community of over 300 scholars working to address the most pressing global challenges and opportunities of the 21st century.

The school supports over 30 individual research teams from across the University who aim to have a significant impact beyond academia and to make a tangible difference to any of today’s significant global challenges. ‘Vaccines to Tackle Variable Pathogens’ is a programme which aims to prevent globally important diseases such as pandemic influenza, dengue, malaria and hepatitis C and major UK diseases.

www.oxfordmartin.ox.ac.uk
Tuberculosis (TB) is the second leading cause of death from an infectious disease, killing an estimated 1.5 million people worldwide each year. Although the tuberculin skin test has been the standard method of detecting TB infection for over 100 years, its inability to distinguish reliably latent TB from other mycobacterial infections, and to differentiate between TB vaccination and infection has greatly affected diagnostic outcomes.

In the mid-1990s Professor Hill and his team applied an ‘ELISPOT’ testing method they had previously used in detecting malarial infection, to identify TB infection.

After performing clinical trials using this method, Professor Hill and his colleagues found that their ‘T-SPOT’ test could diagnose TB-infected patients more rapidly, specifically and sensitively than the skin test. The T-SPOT test has since brought accurate and effective TB testing to many new patient groups where the skin test had previously given poor or unreliable results.
THE JENNER INSTITUTE

The Jenner Institute, housed within the Old Road Campus Research Building, was founded in November 2005 to develop innovative vaccines against major global diseases. Uniquely it focuses both on diseases of humans and livestock and tests new vaccine approaches in parallel in different species. A major theme is translational research involving the rapid early-stage development and assessment of new vaccines in clinical trials.

The Institute comprises the research activities of over 20 Jenner Investigators who head leading research groups spanning human and veterinary vaccine research and development. Together the institute investigators comprise one of the largest non-profit sector research and development activities in vaccinology.

Institute investigators, through the support of many funders, are developing new vaccine candidates against major global infectious diseases. New vaccines against malaria, TB and HIV are currently in field trials in the developing world. Research is also underway on livestock vaccines against foot and mouth disease, avian influenza, bovine tuberculosis and other major causes of economic loss.

www.jenner.ac.uk

‘GRAND CHALLENGES IN GLOBAL HEALTH’ PROJECT

AIDS, TB and malaria remain a huge health and economic burden in the developing world. Preventive measures through the development of safe, effective, and accessible vaccines are seen as the most sustainable means to win the fight against these global diseases.

In 2005, the Gates Foundation, in partnership with the Foundation for the National Institute of Health, the Wellcome Trust and the Canadian Institute of Health Research, set up the Grand Challenges in Global Health (GCfGH) initiative with the ambition to boost international efforts in the fight against infectious diseases that severely affect the developing world.

The overarching goal of the GCfGH initiative is to address the scientific challenges needed to eradicate infectious diseases that affect the developing world. $450 million in grants were awarded in 2005 to fund 43 projects worldwide working to tackle 14 Grand Challenges covering prophylactic measures, therapeutics, limiting drug resistance, improving nutrition and accurate measures of health status.

www.grandchallenges.org

IN FOCUS: STUDENT STEPHEN J CHAPMAN

“Within Professor Hill’s group in the NDM I developed an interest in genetic susceptibility to severe respiratory infectious disease.

“My research experience provided an excellent foundation for a career in academic medicine. I currently work as a Consultant and Senior Lecturer in Respiratory Medicine, Oxford University Hospitals NHS Trust, and I divide my time between clinical care of patients with lung infection and cystic fibrosis and ongoing research into the genetic basis of severe lung infection.”
Type 2 diabetes is a chronic condition resulting in multiple complications including blindness, kidney failure, amputation, heart attack and stroke. In 2011, 346 million people worldwide were known to have diabetes. With these numbers increasing every year, the World Health Organization has projected that deaths from diabetes will double between 2005 and 2030.

Conceived and initiated by Professor Holman and the late Professor Robert Turner at the Diabetes Trials Unit, the UKPDS was designed to determine whether improved blood glucose and improved blood pressure control could prevent complications and reduce the incidence of mortality.

This landmark 30-year clinical trial, reported in over 80 academic research papers between 1983 and 2008 showed beyond doubt that diabetic complications (previously thought to be inevitable consequences of the condition), could be delayed or prevented by improved treatment from the time of diagnosis.

These landmark studies in the treatment of type 2 diabetes have since influenced diabetes treatment guidelines and standards of care worldwide, leading to earlier and more effective therapy for people with diabetes.
OCDEM is a pioneering centre which combines clinical care, research and education in diabetes, endocrine and metabolic diseases. By promoting world-class research, it aims to enhance understanding of these diseases and to accelerate the search for new treatments and cures.

It comprises diverse groups of scientists, clinicians and health care workers in relevant fields of expertise.

Since its formation in 1999 OCDEM representatives have been moving towards a more collaborative approach on research and clinical projects and starting to build a cohesive corporate identity for the new organisation. The current facility of research, teaching and clinical care is based at the Churchill Hospital site in Headington, Oxford.

www.ocdem.ox.ac.uk/home

THE DIABETES TRIAL UNIT

The Diabetes Trials Unit (DTU) was founded in 1985 by Professor Holman. It is a fully registered UKCRC Clinical Trials Unit that specialises in performing diabetes-related national and multinational megatrials in partnership with the BHF, DUK, MRC, NHS, NIH, NIHR, academic institutions and industry. The DTU runs trials in 40 countries and in Beijing has set up the Oxford University (Beijing) Science and Technology Co. Ltd (OUBST), a wholly owned subsidiary company of the University of Oxford, to support trial work undertaken in China.

The DTU Translational Research Group (TRG) undertakes academic-led translational trials of novel therapeutic agents, complex interventions and new devices. The TRG receives support from the Oxford Biomedical Research Centre, for which Professor Holman is the Diabetes Theme Leader.

The DTU also performs major modelling and statistical programmes to fully utilise the data available from our many studies, with a particular emphasis on modelling diabetes and cardiovascular disease processes. The UKPDS Outcomes Model has been used by NICE and others to assess the economic impact of diabetic populations in the United Kingdom, Australia and Canada.

www.dtu.ox.ac.uk

IN FOCUS:
STUDENT
NICOLA BEER

“My DPhil work focused on furthering our understanding of the key glycolytic enzyme glucokinase, one of the most important regulators of blood glucose levels, and a well-established type 2 diabetes drug target.

“The training I received as a postgraduate student within the NDM was exceptional, and gave me the best possible start in my scientific career.”
More than 250,000 people in the UK are diagnosed with cancer every year. Cancer is caused by uncontrollable cell division and growth, leading to the formation of malignant (cancerous) tumours.

Cells communicate through receptors, which are embedded on the surface of proteins. By studying the shape and structure of proteins, researchers can identify key receptors responsible for cell communication (including division and growth). Once identified these protein structures can be used as potential drug targets for cancer.

Professor Jones is a leading expert in the field of structural biology – the study of molecular structures (such as proteins). Using sophisticated x-ray and microscopic techniques Professor Jones has identified the shapes and structures of several proteins and their functions. These structures have since been used in the study and design of new drugs and vaccinations for cancers such as melanoma.

Director of the Cancer Research UK Receptor Structure Research Group, Professor Jones and her team are now focusing on cell guidance cues and on Wnt proteins, which have also been linked to cancer. Structural information about these proteins will lead to a better understanding of how cancer cells communicate, leading to new cancer drug targets.
THE OXFORD PARTICLE IMAGING CENTRE (OPIC)

The Centre is located in the Henry Wellcome Building for Particle Imaging and forms part of the Division of Structural Biology (STRUBI). The biosafety containment facility allows scientists to study pathogenic human and animal viruses, using a range of imaging, structural biology and biophysical techniques.

To understand the biology of viruses and how they infect their host cells, it is important to be able to study the viruses in their infectious native state and also in their cellular context.

Groups in OPIC focus in studying structures of purified virus particles and virus host-cell interactions. OPIC houses state-of-the-art biosafety containment laboratories at ACDP category 3 and DEFRA 4 levels of containment. This facilitates the study of a number of viruses that are important to human and animal health.

www.opic.ox.ac.uk

INSTRUCT

STRUBI is the coordinating member of Instruct, a project initiated within the European Strategy Forum for Research Infrastructures to provide access to high value technologies and expertise for European structural cell biology.

Initially funded by the EU under the Framework 7 programme, Instruct is now supported wholly by national and institutional funds from nine member countries. Instruct is open to access proposals, has an actively funded training programme and committed funding for six Research and Development awards in 2013.

www.structuralbiology.eu

IN FOCUS: STUDENT

CHRISTIAN BELL

“During my DPhil I completed three different projects that were all related to the general topic of chemotaxis which is the ability of a cell to change its motility in response to environmental stimuli. This is an important signal transduction mechanism and can be found in all kingdoms of life.

“These studies were performed at STRUBI under the supervision of Professor Jones and Dr Christian Siebold. In all cases I had the chance to learn to combine X-ray crystallography with other biophysical methods, like surface plasmon resonance or analytical ultracentrifugation.”
In Southeast Asia the Plasmodium falciparum parasite is becoming resistant to the antimalarial drug artemisinin. This is just one example of how Plasmodium parasites have, over the years, consistently evolved new genetic mechanisms to resist human efforts to control malaria. In order to detect and eliminate new forms of resistance as soon as they emerge, Professor Kwiatkowski and his team have pioneered methods to sequence the genome of parasites directly from clinical blood samples.

The team also leads a MalariaGEN community project, which enables groups around the world to generate genome sequence data on parasite samples collected as part of their own research. This data is then aggregated and used to perform analysis to understand how parasite populations are evolving.

The work has led to the discovery of an unusual pattern among parasite populations at the epicentre of artemisinin resistance in western Cambodia, which is due to the rapid expansion of multiple independent strains of artemisinin-resistant parasites. Based on this discovery, the team has identified genetic markers to track artemisinin resistant strains of P. falciparum, and the routes by which they are spreading.

Professor Kwiatkowski and his team are working to translate these discoveries into practical tools for surveillance, to be used by malaria control and elimination programmes in Southeast Asia and around the world.
MalariaGEN

The Malaria Genomic Epidemiology Network (Malaria GEN) is a community of researchers in over 20 countries, who are working together, to understand how genome variation in human, Plasmodium and Anopheles populations affect the biology and epidemiology of malaria.

This knowledge is then used to develop improved tools for controlling malaria. MalariaGEN is supported by a resource centre of technical and scientific experts based at Oxford University, Mahidol-Oxford Research Unit in Bangkok and the Wellcome Trust Sanger Institute, one of the world’s leading genome centres.

www.malariagen.net
www.sanger.ac.uk

MRC CENTRE FOR GENOMICS AND GLOBAL HEALTH

The MRC Centre for Genomics and Global Health, located at the Wellcome Trust Centre for Human Genetics, brings together leading expertise to translate recent advances in genome science into effective disease surveillance tools.

The Centre does this by providing physicians and public health workers with powerful means to decrease the massive burden of infectious diseases, afflicting the poorest countries in the world.

The Centre has developed informatics systems and analysis tools to underpin global data-sharing networks for infectious disease surveillance, backed up by work to understand the ethical issues and policies needed for effective and equitable sharing of genomic data between different countries and cultures.

www.cggh.org

IN FOCUS:

STUDENT LUCAS AMENGA ETEGO

“I completed my Masters and Doctorate with MalariaGEN and have now returned to my home institute in Northern Ghana to continue my work in genomic epidemiology of malaria.

“I have been part of MalariaGEN for the majority of my scientific career and I count myself very lucky. It has advanced me academically, been an opportunity to grow in terms of connections and networking, and it has accelerated my institute in terms of being able to carry out modern research in genome science.”
Professor Xin Lu
CONTROLLING THE SPREAD AND GROWTH OF TUMOURS

In the latter stages of cancer, tumour cells often spread to other parts of the body – this process is called metastasis. Once cancer cells begin the metastatic process it is very difficult to control the spread of disease.

Professor Lu has spent her career working to identify the molecular mechanisms that naturally suppress tumour growth and metastasis, with a particular focus on tumour protein 53 (p53). A crucial protein in cellular regulation, p53 suppresses the growth of tumours for the prevention of cancer.

While researching the function of p53 Professor Lu identified a family of proteins called ASPP; this led to the discovery of novel mechanisms that selectively regulate the apoptotic function of p53, causing the suppression of tumour cells.

As a result of this finding Professor Lu is now researching the role of ASPP proteins and how communication between other proteins and p53 signalling pathways might affect the growth and spread of tumours. This may lead to the identification of new therapeutic targets for cancer.
THE OXFORD BRANCH OF THE LUDWIG INSTITUTE FOR CANCER RESEARCH

Established in 1971 by Daniel K. Ludwig, the Institute (LICR) engages leading scientists and clinicians in an integrated effort to understand and confront the global challenge of cancer.

It is one of the two largest branches of LICR, with nine branches in seven countries across Australasia, Europe, and North and South America, and numerous affiliates in many other countries.

LICR has also expanded its activities into countries, such as China, Russia, Ukraine, South Africa, and Turkey, through its James R. Kerr Program. While such countries have a number of talented scientists, they have had little opportunity for international collaboration in cancer research until now.

Since moving from London in 2007, the Oxford branch of the LICR has pursued its goal of identifying key molecular switches that drive cancer heterogeneity, with the aim of benefiting patients. Led by Professor Lu, the Oxford branch is now the largest LICR branch in the world, and is located in the Old Road Campus Research Building.

www.ludwig.ox.ac.uk

DR SARAH DE VAL

Dr De Val is based within the LICR, under the mentorship of Professor Lu. The long-term goal of her research is to define the underlying mechanisms controlling vascular specification and differentiation in both normal and disease states, potentially informing or identifying mechanisms for inhibiting vessel growth.

Dr De Val was successful in winning an Oak Fellowship in 2010, which is awarded to attract and foster the most promising postdoctoral scientists working in two research fields of strategic importance to medicine today (cancer and global health). She appointed her first two PhD students in October that year, one of whom was awarded a prestigious Prize Studentship and a Clarendon Scholarship. She has since also appointed a postdoctoral scholar with a background in transcriptional regulation research.

Dr De Val’s previous research has shown that many vascular genes contain a conserved Fox/Ets' motif, which is essential for gene expression during early vessel development. Her team is now studying the role of this motif when binding proteins, and how this may play out in the regulation of later vasculature development.

www.ludwig.ox.ac.uk/
sarah-de-val-group-page

IN FOCUS:

STUDENT

MARIO NOTARI

“I’ve always been curious about understanding the principles that regulate life. My research to date has focused on the intracellular signaling pathways that are at the basis of cancer development. For the past four years, I have been reading for my postdoctoral degree under the supervision of Professor Lu and I’ve developed a wide variety of skills.

“My DPhil experience in Oxford was just amazing, I love the fact that the University is a melting pot of different cultures, and that the exchange of ideas is emphasised.”
T cells are an indispensable part of our immune system – they can eliminate disease-causing microbes (pathogen) from our bodies. Identifying these pathogen-specific T cells had previously been a cumbersome task, as only a small proportion of our T cells can detect a given pathogen.

In collaboration with Stanford University, Professor McMichael’s University of Oxford based team were the first to use complexes of four MHC class I proteins (a MHC tetramer) to detect antigen specific cytotoxic T cells. They found that MHC tetramers assembled with viral proteins could bind to the same T cells that killed virus-infected cells; and that these T cells were present at levels more than ten times higher than previous estimates.

This groundbreaking research has since been applied to the study of T cells specific to HIV, Epstein Barr virus and influenza. It has also been used in experimental vaccination strategies for the treatment of melanoma, the design of personalised cell-based therapies, and the study of self-reactive autoimmune T cells in multiple sclerosis patients.
THE WEATHERALL INSTITUTE FOR MOLECULAR MEDICINE

Housing around 400 scientists, the Weatherall Institute of Molecular Medicine (WIMM) fosters research in molecular and cell biology with direct application to the study of human disease. The Institute is at the forefront of an exciting research field impacting on our understanding and treatment of diseases ranging from cancer to AIDS.

It was founded by Professor David Weatherall in 1989. Their three main sponsors of research are the University of Oxford, The Medical Research Council and Cancer Research UK. Significant funding also comes from the Wellcome Trust and other medical research charities.

The Institute continues to develop new themes, whilst maintaining its scientific excellence. There is a healthy turnover of senior staff which enables us to make exciting new appointments and to encourage the careers of younger medical scientists.

www.imm.ox.ac.uk

THE MRC HUMAN IMMUNOLOGY UNIT

The increasing globalisation of infectious disease is a major challenge to human health. The MRC Human Immunology Unit, sat within WIMM, is a key player in international efforts to combat this threat, and in research into other diseases involving the immune system.

The immune system is crucial to human health. Our ability to identify and destroy invading pathogens involves complex networks of interacting cells and molecules. Understanding precisely how the system works at the cellular, genetic and molecular levels will help in the development of new therapies for diseases such as AIDS, avian flu, multiple sclerosis, arthritis and eczema.

Directed by Professor Vincenzo Cerundolo, it is no coincidence that the unit sits only a few yards from the bustling entrance of one of the world’s most famous teaching hospitals, the John Radcliffe: the work of the unit lies squarely at the intersection of fundamental molecular science and clinical research.

www.hiu.ox.ac.uk

IN FOCUS: STUDENT RICARDO FERNANDEZ

“The WIMM offer me cutting edge research. These four years studying here have given me the confidence to pursue a career in science and keep myself busy with interesting problems in biology.

“I have been trying to understand how signals are transmitted across the T cell membrane upon interaction between the T cell receptor and its ligand, the major histocompatibility complex (MHC)-peptide. This is a fundamental question in biology: how does receptor triggering work?”
There are around nine million new cases of tuberculosis (TB) and 1.7 million deaths due to TB every year.

The current TB vaccine BCG was first developed in 1921 and has since been widely used throughout the world. While BCG protects against TB meningitis, it does not effectively protect against lung disease – one of the most common causes of TB related mortality and morbidity.

For the past 12 years Professor McShane has been working on developing a new TB vaccine, to be given at birth in addition to BCG to enhance its protective efficacy. Due to the geographical overlap between the TB and HIV epidemic, the development of an improved TB vaccine is particularly relevant to those living in developing countries.

Professor McShane’s new vaccine, MVA85A, which showed encouraging results in Phase I and IIA clinical trials, underwent the first efficacy trial of a new TB vaccine in infants since BCG. The results of this trial, published in 2013, showed the vaccine to be safe, but unfortunately it showed no improvement in protection over BCG alone. As the immune responses induced in this trial were lower than those seen in the adult trials, Professor McShane’s group is now using samples from the trial to better understand which immune responses are protective, and to work on strategies to improve responses in infants.
The Jenner Institute works closely with the Pirbright Institute in human and veterinary vaccine development. Pirbright, formerly known as the Institute for Animal Health, is a world leading centre of excellence in research and surveillance of virus diseases of farm animals and viruses that spread from animals to humans.

Investigators from the Jenner and the Animal Health and Veterinary Laboratories Agency are testing the protective efficacy of prime-boost vaccination regimens as currently being tested in the Human TB vaccine Programme.

www.pirbright.ac.uk

HUMAN TUBERCULOSIS VACCINE PROGRAMME

In 2002, a series of small scale clinical trials with the MVA85A vaccine to investigate its safety and immunogenicity when used alone, when used as a booster vaccine for BCG primed subjects, and when used as a post-exposure vaccine in subjects latently infected with M. tuberculosis.

Professor McShane’s group found that MVA85A is extremely safe and highly immunogenic when administered to BCG naïve subjects, and is significantly more immunogenic when administered to subjects previously primed with BCG.

Heterologous prime-boost vaccination regimens provide an effective way to induce high levels of cellular immunity, this led to the development of a new vaccination strategy for human tuberculosis using BCG as a priming vaccination and boosting with a recombinant modified vaccinia Ankara expressing antigen 85A (MVA85A). The inclusion of BCG in a new regimen allows the retention of the protective effects of BCG in childhood against severe disease.

www.jenner.ac.uk/humantb

IN FOCUS: A WELLCOME SENIOR CLINICAL FELLOW

Professor McShane was originally one of Professor Adrian Hill’s PhD students; she began her doctorate in 1997. In the same year she was awarded a Wellcome Clinician Scientist Fellowship, evaluating new TB vaccines in the clinic. This fellowship also allowed her to complete her clinical training and she was awarded a CCST in HIV and GU Medicine in 2003. In 2005, she was awarded a Wellcome Senior Clinical Fellowship, which she took up in 2006.

Her research team continues with the programme of translational vaccinology, and is involved in developing new assays for monitoring vaccination induced cellular immune responses, developing a BCG challenge model in humans and the aerosol delivery of vaccines.
Why patients developed the acquired immune deficiency syndrome (AIDS) was the subject of intense speculation. Once the causative virus of this infection, human immunodeficiency virus (HIV) was discovered in the early 1980s, two disease hallmarks became clear: First, the virus persists despite strong host immunity; and second, the infection undermines this immunity, and is eventually fatal. To gain a better understanding of why, a new research agenda was set.

From 1989, Professor Phillips studied the immune response to the human immunodeficiency virus (HIV-1) in tandem with analysis of genetic variation at sites in the virus, to which these responses were directed. Through this research, Phillips and his colleagues documented mechanisms by which HIV-1 eludes the cellular arm of human immune response. In a series of studies, Professor Phillips’ research showed that the anti-HIV cytotoxic (‘killer’) T lymphocytes (CTL) response could select for viral variants, which were invisible to human immunity. He also showed that the immune system exerted Darwinian selection on HIV throughout the course of the disease.

This research explained, in part, why HIV persists to kill, and so addressed the first major question. The second major question, of slowing or stopping the insidious march of the disease in individuals, has since been a focus of Professor Phillips’ research.
ANTIRETROVIRAL DRUGS

As Director and Chairman of the Peter Medawar Building for Pathogen Research since 2001 Professor Phillips has continued to investigate the interaction of HIV-1 with human hosts, in the light of antiretroviral treatment. Initial work showed that antiretrovirals produced no durable improvement on viral control by the immune system in the chronic phase of infection. In more recent work, SPARTAC, a clinical trial, showed that the early use of antiretroviral drugs could postpone progression of HIV-1 induced disease. This trial has determined the worldwide standards for the treatment of very early HIV infection. It has also set the stage for more intense efforts to abort the infection completely and so eradicate the virus permanently from its host.

www.medawar.ox.ac.uk

HARNESSING FORCES TO CLEAR PERSISTENT VIRUSES

At the Peter Medawar Building, an interdisciplinary centre has been set up to go deeper into the science of virus persistence. Professor Phillips has promoted true cross disciplinary research by sponsoring and recruiting scientists from Medicine, Statistics, Biochemistry and Zoology, who combine laboratory work with detailed mathematical and genetic analysis.

With Professor Angela McLean FRS, as co-director of the Institute for Emerging Infections (part of the Oxford Martin School), this programme has since spun out two consortia.

www.oxfordmartin.ox.ac.uk

IN FOCUS: NATIONAL CONSORTIA

Two programmes to study the eradication of persistent viruses are led by senior research fellows who trained in the centre.

STOP-HCV is a hepatitis C consortium led by Dr Ellie Barnes. A collaboration between 22 partners from around the UK, it will use a clinical database and a bio-repository of blood samples from hepatitis C infected people, to decipher the genetic makeup of both the virus and the patient.

www.stop-hcv.ox.ac.uk

CHERUB is an HIV consortium led by Dr John Frater. It brings together five UK universities to work on the immensely difficult challenge to clear HIV completely from individuals harboring the virus.

www.cherub.uk.net
A healthy immune system is capable of differentiating between the harmless (or even helpful) intestinal bacteria we need, and the dangerous pathogens our bodies must destroy. In contrast an overactive intestinal immune system will attack both the harmless and pathogenic gut bacteria, causing severe inflammation leading to inflammatory bowel diseases, such as Crohn’s Disease.

In order to find out why certain immune systems overreact to gut bacteria, Professor Powrie set out to understand how healthy immune systems can differentiate between harmless and pathogenic intestinal bacteria.

By modifying regulatory T cells in mice, Professor Powrie developed one of the first mouse models for inflammatory bowel disease. Using these mouse models she showed why healthy immune systems do not attack beneficial bacteria in our intestinal tract. This research has had a significant impact on our understanding of bacterial intestinal flora and the immune system. Professor Powrie is now using this research to develop new treatments for inflammatory bowel diseases.

For her significant contributions to gastrointestinal research Professor Powrie was awarded the Louis-Jeantet Prize for Medicine in 2012.
EXPERIMENTAL MEDICINE

This research is based across multiple Oxford sites, including: the John Radcliffe Hospital, Churchill Hospital, Peter Medawar Building and the Weatherall Institute of Molecular Medicine.

Research within Experimental Medicine spans fundamental basic science to translational and experimental medicine approaches including clinical trials. We seek to understand the pathophysiology of disease and apply this knowledge to develop enhanced diagnostics and treatments for human disease.

Experimental Medicine’s thematic research includes immunology, dermatology, stroke medicine, gerontology, behavioural science, infectious diseases, gastroenterology, palliative care and respiratory medicine. The research is undertaken within different groups and research units and includes clinical trials.

www.expmedndm.ox.ac.uk/home

THE TRANSLATIONAL GASTROENTEROLOGY UNIT

The Oxford Gastroenterology Unit is acknowledged as one of the premier units for clinical care and research in Europe and has attracted clinical and research fellows from all over the world.

The unit has a particular reputation for the clinical care of ulcerative colitis and Crohn’s disease patients as well as in the management of coeliac disease, irritable bowel syndrome, nutritional support and intestinal failure, cancer, autoimmune liver disease and viral hepatitis. In addition we perform clinical trials of novel therapies for gastrointestinal and liver diseases.

www.expmedndm.ox.ac.uk/gastroenterology-unit

IN FOCUS: PATIENT HELEN BARTLETT

Helen was diagnosed with Crohns, an inflammatory bowel disease, when she was just 20 years old. She had tried several treatments but was starting to run out of options.

During a routine consultation she was offered the choice of participating in Professor Powrie’s trial, “It was a complete no brainer, I didn’t want to go through any more operations.” The Unit’s ethos is to integrate science and clinical trials with patient care.

Helen noticed a significant improvement in her health after receiving the treatment for two years. “This trial that I’m on has made a huge difference. I still have problems, but I’m not in constant pain anymore – I’m not quite normal, but I’m getting there.”
Oxygen is essential for all animal life. In humans, organs such as the lungs, heart and blood vascular system, deliver oxygen in the right quantities to the body’s cells and tissues, monitoring supply and demand of oxygen levels.

Much of our current understanding of how low oxygen (hypoxia) is sensed has emerged from the laboratory of Professor Ratcliffe, established in Oxford in 1989. Trained as a specialist in kidney medicine, Professor Ratcliffe set out to understand how hypoxia leads to the production of erythropoietin, a hormone that comes from particular kidney cells and corrects the problem by stimulating the production of more oxygen-carrying red blood cells.

Professor Ratcliffe’s group also showed that essentially all types of animal cells, not just kidney cells, have the capacity to monitor oxygen levels; a process that controls the growth of blood vessels, and even whether cells live or die. Building on these discoveries, the Ratcliffe group uncovered the actual molecular chain of events that cells use to sense oxygen.

As hypoxia is a key part of most human diseases, the hope is that by manipulating these oxygen sensing molecules, it will be possible to treat disease; for instance, by switching them on to treat anaemia or poor circulation, or by switching them off to restrict blood supply to cancer.
THE CENTRE FOR CELLULAR AND MOLECULAR PHYSIOLOGY (CCMP)

The Centre brings together a close-knit group of clinician scientists to study areas of cell physiology that are of major medical importance. The ethos of the centre is to create a highly collaborative multi-disciplinary working environment in which obtaining solutions to problems is not restricted by technology boundaries.

The programs range across studies of adaptive and innate immunity, vaccinology, cancer, cardiovascular disease and ‘hypoxia’ biology and encompass both molecular genetic approaches and studies of integrated physiology in the intact organism. The aim is to use complimentary approaches cutting across conventional boundaries to accelerate discovery.

www.ccmp.ox.ac.uk

THE TARGET DISCOVERY INSTITUTE

The Target Discovery Institute (TDI) is a major new collaborative research initiative led by Professor Ratcliffe. Funded by strategic investment from the Department and collaborative use of research resources from the Department of Cardiovascular Medicine and the Department of Oncology. The TDI has recently won a major award from HEFCE’s UK Research Partnership Investment Fund.

The Institute investigates drug target discovery across various diseases drawing on the expertise of the research staff on the Old Road Campus, and the wider University, capitalising on existing strengths in genetics and genomic medicine, molecular and cell biology, structural biology, chemistry, pharmacology and medicine.

www.tdi.ox.ac.uk

IN FOCUS: AWARD WINNING RESEARCH

Fellow of Magdalen College, Professor Ratcliffe has earned several plaudits in his field of research. In 1998, he received The Graham Bull prize which was set up to provide money for young researchers under the age of 45 who have made a major contribution to clinical science. In 2009, he won the Louis-jeantet Prize for Medicine for his pioneering research on the mechanisms by which cells detect levels of available oxygen.

In 2010 he won a Canada Gairdner Award; one of the most prestigious prizes for medical research. Since the inception of the Awards in 1959, there have been 298 awardees, of which 76 have gone on to win the Nobel Prize in Physiology or Medicine. In the 2014 New Year Honours list he was knighted for services to clinical medicine.
The human immunodeficiency virus (HIV) is one of the world’s most deadly infectious diseases, and a major public health concern for sub Saharan Africa.

Professor Rowland-Jones has dedicated her career to finding out how immune responses modify the outcome of HIV.

A turning point came in 1995 when Professor Rowland-Jones studied HIV-1 exposed sex workers in the Gambia, who had developed a natural defense against the virus. This study showed that a high percentage of these women had elevated numbers of killer T cells (cytotoxic lymphocytes), which were able to kill virus-infected cells.

Professor Rowland-Jones went on to study the killer T cell response in HIV-2 – the second strain of HIV, found predominantly in West Africa and known for having a high proportion of infected people with a non-progressive virus. Similarly to the sex workers case, this research showed that people with non-progressive HIV-2 infection have a much stronger T cell response than those with the progressive virus.

Working closely with colleagues in Kenya, the Gambia and China to study immune responses to local strains of HIV-1 and HIV-2, Professor Rowland-Jones’ detailed research into immune responses to HIV has provided valuable information for vaccine design.
THE MRC UNIT IN THE GAMBIA

The Unit is the UK’s single largest investment in medical research in a developing country and is internationally recognised for its track record of research into tropical infectious diseases. Its success is based on innovative lab-based research, excellent clinical studies and field-oriented science, and the translation of research into clinical and public health practice.

The Unit’s vision is to lead scientific research to save lives and improve health across the developing world, and it aims to deliver this through investment in three major research themes: Child Survival, Vaccinology and Disease Elimination and Control.

The close proximity of the International Nutrition Unit in The Gambia provides the opportunity to further enhance investigations of the important role of nutrition in each research theme.

www.mrc.gm

CAIO – GUINEA BISSAU

The Manjago village population of Caio, which currently numbers around 10,000, has occupied the MRC Unit since 1988. Caio is dispersed into several settlements among the cashew and palm forest. Rice growing, palm oil, palm wine and cashew nut production are the main economic activities.

For 25 years, unique community-based epidemiological and immunological studies of HIV-1, HIV-2 and HTLV-1 have been conducted in Caio. An old shop was converted into a laboratory, and the shop keeper’s house was upgraded to offices and living quarters. Building on this remarkable base, a number of laboratory and epidemiological studies have been concluded in recent years, including Professor Rowland-Jones', who was the director there between 2004-08.

www.mrc.gm/research-sites/caio-guinea-bissau

IN FOCUS: STUDENT ALEKSANDRA LEIGDOWICZ

“My DPhil research focused on HIV-2 immunology studying a community cohort in Guinea Bissau, West Africa. Approximately one million people worldwide are infected with this virus, most of whom live in West Africa. The project’s aim was to determine how the cellular immune system in HIV-2 infected subjects prevents disease progression in the majority of the patients.

“The cohort offered the unique opportunity to study individuals in a community versus a clinical setting, the latter of which skews results to the proportion of patients with progressive disease.”
Highly Active Anti-Retroviral Therapy (HAART) is a combination of drugs used to effectively control HIV infection. Since 1987 Nucleoside Reverse Transcriptase Inhibitors (NRTIs) had been used in HAART combinations to specifically target HIV-1 reverse transcriptase, however, resistance and side effects soon prompted the need for an alternative.

Following the 1989 discovery of Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTIs) and the publication of the crystal structure of HIV-1 RT in 1992, Professor Stuart produced the first high-resolution RT-NNRTI structures, providing enough detail for use in drug design.

Joined by Professor David Stammers in 1996, the Stuart Group provided a database of information to British pharmaceutical company GlaxoWellcome, prior to the intellectual property becoming public domain. This facilitated the early development of NNRTI drug therapy.

NNRTIs have since been developed for clinical use, and clinical guidelines worldwide now recommend NNRTIs in combination with NRTIs as the first line therapy for HIV. This research has had a profound impact on the quality of life of those living with HIV, and continues to inform the development of improved HIV therapies.
THE DIVISION OF STRUCTURAL BIOLOGY

The Division of Structural Biology (STRUBI) is based in the Wellcome Trust Centre for Human Genetics. The Division includes the Oxford Protein Production Facility and the Oxford Particle Imaging Centre.

The Division applies the techniques of structural biology, particularly macromolecular crystallography and electron microscopy, to the study of biomedically important processes.

The research interests of the Division include the structural study of viral proteins and intercellular recognition. The work of the laboratory is supported by many sources, but principally the MRC, Cancer Research UK, the BBSRC, the Royal Society, the EU FP6 and FP7 and the Wellcome Trust.

www.strubi.ox.ac.uk

OXFORD PROTEIN PRODUCTION FACILITY (OPPF-UK)

The OPPF-UK is a structural proteomics facility funded by the Medical Research Council and Biotechnology and Biological Sciences Research Council as a National Resource Centre for protein production and crystallisation.

It aims to promote and facilitate high throughput structural biology for the UK academic community. It is the first stage in a structural proteomics programme for the UK and represents an essential stepping stone toward the practical exploitation of the wealth of information coming from the human genome sequencing projects.

www.oppf.ox.ac.uk

IN FOCUS: STUDENT THOMAS BOWDEN

“I was attracted to study for a DPhil at Oxford because of its reputation in the field of structural biology; particularly its landmark achievements in virology and cell-surface recognition.

“I enrolled in the Wellcome Trust Structural Biology Programme in the NDM in October 2005. What particularly impressed me about the course was the incorporation of an initial taught segment, which included training in a variety of biophysical techniques. These teaching modules complemented the rigorous research curriculum extremely well.”
Malaria kills more than half a million and affects over 225 million people every year.

While Chinese herbalists have been using artemisinin (from the leaves of annual wormwood Artemisia annua) as a treatment of malaria for thousands of years, Chinese researchers only officially discovered the artemisinin compound capable of treating malaria in 1972.

More than a decade after this discovery, Professor White and his Bangkok based research team began undertaking clinical trials to test the relative effectiveness of artemisinin as an antimalarial treatment.

Following a number of groundbreaking clinical trials, between 1990 and 2005 the team successfully demonstrated the effectiveness of artemisinin for treating malaria in adults, infants and children. Professor White also pioneered artemisinin combination therapy (ACT). This led the World Health Organization to recommend ACT as the preferred antimalarial treatment for both adults and children in 2006.

Due to Professor White’s research ACT is now the first line treatment for malaria worldwide, resulting in the successful cure of millions of malaria sufferers, many of whom are infants and children from African nations.
THE UK CENTRE FOR RESEARCH IN CLINICAL TROPICAL MEDICINE

The UK Centre in Oxford provides support to Oxford Fellows working overseas and to the Oxford Major Overseas Programmes in Kenya, Thailand and Vietnam. Dr Brian Angus, the Director of the Centre, originally worked in Thailand studying pharmacokinetics in severe malaria and melioidosis. The UK Centre for Clinical Tropical Medicine is an integrated part of the administration team handling the Tropical Medicine Centre’s grants, finances and personnel management.

www.tropicalmedicine.ox.ac.uk/uk-centre

THE WORLDWIDE ANTIMALARIAL RESISTANCE NETWORK

The Worldwide Antimalarial Resistance Network (WWARN) aims to provide the most comprehensive, timely, quality-assured intelligence needed to track the emergence and spread of malaria drug resistance.

A multidisciplinary, global network of experts, WWARN’s core team comprises an Oxford, UK-based Secretariat; six scientific groups and three regional centres.

The Network, chaired by Professor Nick White, provides high-quality data resources, customised research tools and services, and a global platform for exchanging scientific and public health information on malaria drug resistance.

The regional centres, located in malaria-endemic regions, work with all stakeholders, advocating for increased investment in surveillance, and further research to expand knowledge of malaria drug resistance, all on a foundation of informal, sustainable scientific networks.

www.wwarn.org

IN FOCUS: A WORLD AUTHORITY

Professor White is a world authority on tropical medicine, especially within the area of malaria. He is chairman of the Wellcome South-East Asia and African Major Overseas Programme, which covers the Bangkok unit; this is led by Professor Nick Day, the Vietnam unit led by Professor Jeremy Farrar and the Kenya unit led by Professor Kevin Marsh.

He is also a member of the World Health Organization’s Malaria Policy Advisory Committee.
GLOBAL RESEARCH ACTIVITY

From research to real-world solutions

The Department’s long-established tropical medicine research programmes have pioneered a strong partnership between Oxford faculty members based overseas and local doctors and researchers.

The outstanding success of these collaborations has directly influenced World Health Organization policies and treatment recommendations for a series of diseases.

Research is targeted to meet the information needs of the Ministries of Health in Africa and Asia. Strong links with these Ministries ensure the NDM’s research feeds directly into public health policies across both continents.

The NDM is committed to providing practical solutions that will not only save lives, but also train and inspire the next generation of health leaders in the developing world.

TROPICAL MEDICINE

The NDM Tropical Medicine research groups are permanently based in Africa and Asia, with support provided by the UK centre. Research ranges from clinical studies to behavioural sciences; capacity building is integral to all activities.

The majority of Tropical Medicine research is conducted at three Wellcome Trust Major Overseas Programmes in Kenya, Thailand and Vietnam. Tropical Medicine also brings together a number of sister groups in Laos, Tanzania, Indonesia and Nepal, and collaborators around the world.

www.tropicalmedicine.ox.ac.uk

KENYA – KILIFI AND NAIROBI

Kemri Wellcome Trust Research Programme

Professor Kevin Marsh

Based at the Kenya Medical Research Institute (KEMRI), the KEMRI-Wellcome Trust Research Programme is known internationally for its work tackling malaria and other infectious diseases, particularly bacterial and viral childhood infections.

The Programme was formally established in 1989 as a partnership between KEMRI, the University of Oxford and the Wellcome Trust. It conducts basic, epidemiological and clinical research in parallel, with results feeding directly into local and international health policy. It aims to expand Kenya’s capacity to conduct multidisciplinary research that is strong, sustainable and internationally competitive. Strong community links are at the heart of the Programme, with an emphasis on building scientific leadership.

www.kemri-wellcome.org
THAILAND – BANGKOK AND MAE SOT

Mahidol Oxford Tropical Medicine Research Unit (MORU)

Professor Nick Day

MORU develops effective and practical means of diagnosing and treating Malaria and other neglected diseases such as Typhus, Melioidosis, and Leptospirosis. A collaboration between Mahidol University, Oxford University and the Wellcome Trust, it was established in 1979. Its main office and laboratories are located within the Faculty of Tropical Medicine at Mahidol University in Bangkok, Thailand, with study sites and collaborations across Thailand and other parts of the developing world including: Laos, Bangladesh, India, Kenya, Tanzania, Mozambique, Ghana, and The Gambia. The Shoklo Malaria Research Unit was established in Shoklo, as part of the MORU, in 1986. Now based in Mae Sot, the Unit treats and cares for patient populations living along the Thai-Myanmar border. It also aims to define the epidemiology, entomology, and clinical features of malaria in this area of low transmission.

www.tropmedres.ac
www.shoklo-unit.com

VIETNAM – HO CHI MINH CITY AND HANOI

Oxford University Clinical Research Unit (OUCRU)

Professor Jeremy Farrar

The OUCRU is a large-scale clinical and public health research unit with campuses in Ho Chi Minh City and Hanoi, Vietnam; Kathmandu, Nepal; and Jakarta, Indonesia. It is hosted by the Hospital of Tropical Diseases in Ho Chi Minh City, and the National Hospital for Tropical Diseases in Hanoi. As a Wellcome Trust Major Overseas Programme, OUCRU has received considerable support from the Trust for almost two decades. The OUCRU has also led an enormous effort in developing infrastructure and capacity for clinical trials and basic scientific research and supports an integrated clinical science programme. Dr Guy Thwaites is now directing the programme

www.oucru.org

CHINA

“Engaging with Chinese partners is a vital part of our research strategy. The Chinese government’s investment in biomedical science and technology in recent years, the size and relative genetic uniformity of the Chinese population and the opportunity for innovation in rapidly developing health-care systems make China a partner of choice for many of our programs. We look forward to developing new and exciting collaborations with Chinese scientists across a broad range of biomedical fields.”

Professor Sir Peter Ratcliffe FRS

www.ndm.ox.ac.uk/china

Oxford University (Beijing) Science and Technology Co. Ltd

Oxford University (Beijing) Science and Technology Co. Ltd is a wholly owned subsidiary company of the University of Oxford. It was set up in the Haidian District of Beijing to act as the Diabetes Trials Unit vehicle for carrying out the Acarbose Cardiovascular Evaluation (ACE) trial in China.

www.ocdem.ox.ac.uk/externally-funded-research

Collaborating Centre for Oxford University and CUHK for Disaster and Medical Humanitarian Response is a new collaborative centre

www.ccouc.ox.ac.uk/home
INFRASTRUCTURE AND SUPPORT

As the NDM is structured around several scientifically autonomous sub divisions, this brings with it varying resource requirements related to administration and support. The Department’s Business Managers and Senior Administrators each represent their own support teams, consisting of functional managers, officers and assistants. The support teams cover: human resources, finance, pre and post award grant management, and laboratory and facilities support. The Department has approximately 100 administrative and support posts across its units in Oxford, as well as 50 overseas.

Led by Darren Nash, Associate Head of Department (Academic Support and Finance), NDM Strategic is a small team of specialist staff dedicated to specific functional areas. The primary aim of these posts is to assist heads of units, senior academics and the business managers.
1. **Darren Nash** – Associate Head of Department (Academic Support and Finance)
   - Director – Oxford University (Beijing) Science and Technology Co. Ltd.
   - Director – Instruct Academic Services Ltd.
2. **Gary Strickland** – Business Manager
   - The Jenner Institute
   - Structural Genomics Consortium Oxford
   - Oxford Branch, Ludwig Institute for Cancer Research
3. **Karen Valentine** – Head of Operations, NDM Strategic
4. **Peter Bond** – Business Manager
   - The Wellcome Trust Centre for Human Genetics
   - The Centre for Cellular and Molecular Physiology
   - The Structural Biology Division
5. **Edward Gibbs** – Business Manager
   - Tropical Medicine
   - Also representing
     - **Sarah Barton**, Vietnam
     - **Dr Catherine Kenyatta**, Kenya
     - **Jonathan Truslow**, Thailand
6. **Jamie Newman** – Operations Projects Manager, NDM Strategic
7. **Leonora Dempsey** – Business Manager
   - NDM Research Building – Incorporating The Target Discovery Institute
8. **Elena Mc Philbin** – Head of Human Resources, NDM Strategic
9. **Joanne Hovard** – Business Manager
   - Experimental Medicine Division – Including The Peter Medawar Building
The NDM is committed to the on-going support of its students, at graduate level and beyond. A thriving learning and working environment, advanced training, and skills development opportunities, enable our students to reach the highest standards of research. One of the notable features of NDM's student body is the wide range of cultural backgrounds it represents; this diversity has made a positive contribution to the environment within the Department.

Four-year NDM Prize Studentships are principal fully funded awards, open to outstanding candidates from any country. Support for this programme comes from a variety of sources including the Department, the Medical Research Council, the Ludwig Foundation and Clarendon Funds. This Prize Studentship allows students to carry out research in a single laboratory for a full four years. There is no period of rotation between laboratories, however, the NDM encourages its students to use a portion of this time to attend courses and establish collaborations with other groups within, or outside of, Oxford.

NDM is also responsible for the administration of the National Institutes of Health (NIH) Oxford-Cambridge Scholars Programme, first established in 2001. This four-year doctoral programme is based in the Medical Sciences Division at Oxford. The Programme allows students to undertake a collaborative project in biomedical research involving two supervisors – one at the NIH intramural campus in Bethesda, Maryland, and one at either Oxford or Cambridge University.

“Over the course of history our scientists have had a profound impact on our understanding of disease globally. By attracting the best and brightest students from around the globe, we are securing NDM’s future as one of the largest and most wide-reaching medical research departments in the world.”

NDM Director of Graduate Studies, Professor Richard Cornell
Under the direction of Professor Rajesh Thakker and Professor Paul Klennerman, this three-year Fellowship programme aimed at clinical trainees, enables students to study in a basic-science environment, while working towards a PhD. The principal aim of the programme is to provide high-quality research training in basic and applied molecular science, which is tailored specifically to the needs of talented clinicians, who aspire to a career in academic medicine.
“It was amazing to have a chance to be an intern at such a top university. Oxford is a very peaceful and beautiful place. The Structural Biology lab is modern and everyone there is very kind so I felt that I learned a lot at Oxford. To me, the department felt like a big family.”

Ruyi Chen, summer intern, 2012

“During the two months that I spent working at the Wellcome Trust Centre of Human Genetics, the PI I was working with helped me a lot. He and his team members taught me how to conduct research and how to write papers. But, most importantly, I got to experience the way the researchers at Oxford were thinking, living, studying and working.”

Xiangzhen Zhu, summer intern, 2012

“This was the first time that I had stayed alone in a foreign country. At first, I was really worried about coming to Oxford because I could not imagine what it would be like. However, thanks to support from the NDM department, my time at Oxford was trouble-free and I really enjoyed working in a laboratory. Communicating with people from all over the world and doing experiments in a different environment broadened my viewpoint. I felt that I had become a part of the laboratory in a short time.”

Yuka Tsukamoto, summer intern, 2012
The NDM offer Graduate Research Prizes. The Graduate Studies Committee awards annual prizes to students of NDM supervisors on the basis of their publication record, the impact and novelty of their research, references, and the impact of their research within the Department.

Previous students have gone on to a variety of posts in research, medicine and industry worldwide. Some examples of NDM alumni in academic posts include Tan Chorh Chuan, President of the National University of Singapore; Patrick Maxwell, Head of the Division of Medicine, University College, London; Ben Ebert, Assistant Professor of Medicine, Harvard University; Jonathan Gleadle, Professor of Renal Medicine, Flinders University, Adelaide; and Colin MacKenzie, Senior Lecturer at the Tropical Metabolism Unit, Jamaica.
iii ACTIVITIES
OUTREACH AND IMPACT

The NDM is committed to the pursuit of academic excellence and the positive impact of its research on the health and wellbeing of the global community. Reaching out to the wider community, through public engagement, is an increasingly important component of medical research. In addition, the societal and economic impact of medical research is fast becoming an integral part of research assessment. NDM Strategic is dedicated to supporting its researchers in actively engaging with the public, as well as ensuring everyone in the Department is aware of the options available to them for translating research into impact.

IMPACT

Research Council UK (RCUK) encourages researchers to be actively involved in translating research into social and economic impacts, in a wider context. All RCUK grants now require a Pathways to Impact statement, which must outline potential economic and societal impacts, as well as the proposed pathways toward realising these impacts: who might benefit from this research, and how might they benefit from this research.

NDM has culturally moved towards highlighting the importance of impact and public engagement, and is committed to ensure all job descriptions include participation in events and activities.

PUBLIC ENGAGEMENT

Public engagement is a broad term for a number of activities aimed at sharing research with the public. It is an exchange of knowledge, allowing researchers to meet with the wider community, to interact, listen and learn about who might benefit from their research, and how their research might meet the needs of society. Public engagement is also a way of encouraging people to take an active interest in research. As a signatory to Concordat for Engaging the Public with Research the University of Oxford and the NDM is committed to the following four principles:

1. Taking a strategic approach to public engagement
2. Recognising researcher involvement in public engagement
3. Enabling researchers to participate in public engagement
4. Undertaking regular reviews of the wider research sector’s progress in fostering public engagement across the UK.

PODCASTS

The Department has published over 70 podcasts, covering the depth and breadth of its research impact. These are available at: www.ndm.ox.ac.uk/podcast-meet-our-researchers
IN FOCUS:
OXFORD OPEN DOORS

As part of the 2013 Oxford Open Doors weekend, the NDM held two successful outreach events at Magdalen College and the Old Road Campus. Over the course of the weekend researchers and NDM Strategic staff led a total of eight guided walking tours of the Old Road Campus, and the newly opened NDM Research Building, as well as a thriving mini-science fair in the grounds of beautiful Magdalen College. NDM volunteer Georgina Berridge, from the Structural Genomics Consortium, was thrilled with how interested the general public was. “I’ve never done any public engagement before, I expected that it would be busy and fun, but it was busier and more fun than I expected,” Georgina said. “I really enjoyed meeting the public. It was great to see that people really do care and are genuinely interested in what we do.”

OXFORD IMPACTS

High impact research from NDM has been published in the University of Oxford’s Oxford Impacts series. This series celebrates the range of impacts the University has had on the world of policy, health, business and culture, enabled by the world-leading research of Oxford academics. The series now includes two stories of impact from NDM, highlighting Professor Adrian Hill’s involvement in the development of the T-SPOT test for tuberculosis, as well as Professor Nick White’s groundbreaking research into artemisinin-combination therapy; the world’s first-line treatment for Malaria.

www.ox.ac.uk/research/research-impact

Other Public Engagement and Outreach events
NDM has supported and will continue to support in the future include:

- Science Oxford’s Evening Lecture Series
- The Oxfordshire Science Festival
- The Cheltenham Literature Festival
- The Cheltenham Science Festival
- The Oxford Preservation Trust’s Oxford Open Doors
- Oxfordshire’s Young Scientists of the Year Awards
- Bright Club Oxford
- The Nationwide STEM Ambassadors Scheme

Making DNA bracelets at Oxford Open Doors

Year 5 pupils (aged 10) extracting DNA from fruits and vegetables
CLINICAL CARE

In partnership with the Oxford University Hospitals NHS Trust (OUHT), the Medical Sciences Division and NDM is committed to maintaining the highest standards of clinical care. More than 30 senior staff hold Honorary Contracts with OUHT and an equal number of full-time or maximum part-time NHS Consultant Staff hold Honorary University contracts with the Department.

Several senior staff within the Department, including Professor Ratcliffe, contribute to the on-call rota for Oxford's Acute General Medicine service, whilst many other staff are active in speciality medicine including Clinical Immunology, Dermatology, Gastroenterology, Genito-Urinary Medicine, Geratology, Infectious Diseases, Intensive Care Medicine, Musculo-skeletal Medicine, Palliative Care, Radiology, Renal Medicine, Respiratory Medicine, and Tropical Medicine.

The OUHT is one of the largest NHS teaching trusts in the country. It provides a wide range of general and specialist clinical services and is a base for medical education, training and research. In partnership with the University, the OUHT was selected in 2006 to host one of the NIHR's five comprehensive Biomedical Research Centres with a budget in excess of £11 million per annum.

www.ndm.ox.ac.uk/clinical-care

“As the Associate Head for Clinical Affairs with the NDM, my role is to act as a link between the NDM and the Oxford University Hospital NHS Trust and between the academic department and the NHS physicians. The aim is to promote an academic view of the practice of internal medicine within the Trust, to promote teaching and to improve practice. In addition, I sit on the Medical Sciences Divisional Board to provide an NHS perspective to discussions and decisions.”

Dr Christopher P Conlon
“Clinical academia comes in many shapes and sizes, with varying synergies between the pure science and the clinical ends of the spectrum, in order to move healthcare forwards both need to flourish. We are fortunate in Oxford to be part of a world leading university with strengths right across this range, and one of our strongest clinical partners is the NDM.”

Professor Chris Pugh

THE OXFORD UNIVERSITY CLINICAL ACADEMIC GRADUATE SCHOOL (OUCAGS)

OUCAGS was founded in partnership with the Oxford Deanery and NHS Education South Central. The School aims to support and strengthen clinical academic training and to provide an infrastructure for Oxford’s Academic Foundation doctors, Clinical Research Fellows and Clinical Lecturers, which explicitly values and protects the development of academic excellence.

The UK has a remarkable history of excellence in medical research that has benefited people around the world and to which Oxford has made a significant contribution. To build on this record of distinction, promotion of translational research from bench to bedside is essential. Developing innovative healthcare practice as well as delivering world-class medical education requires talented, committed clinical academics.

www.oucags.ox.ac.uk
ENVIRONMENT

The NDM is based across multiple local sites, including the John Radcliffe and Churchill Hospitals, and the University’s Old Road Campus – one of the largest centres for biomedical research in Europe. With over £200 million invested in capital projects and research infrastructure over the past decade, this rapidly growing campus provides a vibrant, highly interactive environment for research development, and career development for young scientists.

Research carried out at the NDM spans several cutting edge technologies and platforms, including:

- **EXPRESSION PROFILING**
- **CONFOCAL MICROSCOPY**
- **MASS SPECTROMETRY**
- **MEDICAL STATISTICS**
- **FLOW CYTOMETRY**
- **IN VIVO IMAGING**
- **DRUG TARGET DISCOVERY**
- **IMMUNOHISTOCHEMISTRY**
- **STEM CELLS**
- **HOMOLOGOUS RECOMBINATION**
- **VACCINE PRODUCTION**
- **CELLULAR IMMUNOLOGY**
- **TRANSGENESIS**
- **GENE THERAPY**
- **STATISTICAL GENETICS**
- **CHROMOSOME MAPPING**
- **IN SITU HYBRIDISATION**
- **ELECTRON MICROSCOPY**
- **PROTEIN INTERACTION**
- **CRYSTALLOGRAPHY**
The University’s Research Services Team have developed a database which provides information on research equipment and on the University’s Small Research Facilities (SRFs). The purpose of the database is to promote and encourage the sharing of equipment across the collegiate University.

**Examples of SRFs include**

**High Throughput Sequencing**
Genomic technologies, and in particular High-Throughput sequencing, are revolutionising modern biomedical genetics, both in pure research and in translating research discoveries into the clinic.

The facility maintains six Illumina HiSeq instruments, three of which are the latest HiSeq2500 and two Illumina Miseq systems. Both of these platforms utilise Illumina’s proven and widely-adopted, reversible terminator-based sequencing-by-synthesis chemistry in combination with innovative scanning technology.

[www.well.ox.ac.uk/ogc/home](http://www.well.ox.ac.uk/ogc/home)

**The Proteomics Service**
Proteomics is the large-scale study of proteins, particularly their structures and functions.

The Central Proteomics Facility consists of two proteomics facilities, one located at Old Road Campus and the second site at the Dunn School of Pathology on South Parks Road, also in Oxford. The major goal of the Old Road based site is to provide a proteomics platform for the research community located at the Headington campus.

The equipment is operated by dedicated specialists. The current proteomics platform includes equipment for 1D and 2D gel electrophoresis and protein purification (HPLC and FPLC).

[www.ccmp.ox.ac.uk/proteomics](http://www.ccmp.ox.ac.uk/proteomics)

**The Clinical Bio Manufacturing Facility**
The Clinical Bio Manufacturing Facility is the University’s Good Manufacturing Practice (GMP) manufacturing facility. It aims to provide the link between academic research and clinical drug development, to allow all our collaborators to make rapid progress into clinical trials.

It has over 16 years’ experience producing biological Investigational Medicinal Products according to the principles of GMP for early phase clinical trials. It has the Manufacturer’s Authorisation for Investigational Medicinal Products accreditation from the Medicines and Healthcare products Regulatory Agency and has three nominated Qualified Persons.

[www.cbf.ox.ac.uk/home](http://www.cbf.ox.ac.uk/home)

**The Flow Cytometry Core Facility**
Flow cytometry allows the simultaneous measurement of certain characteristics of individual cells based on light signals generated when fluorescently labelled cells are made to flow past one or more laser beams. Prime examples of cell characteristics that can be analysed include size, granularity, phenotypic markers, intracellular proteins, DNA content and calcium flux.

Based at the Old Road Campus, the facility provides two main flow cytometer based services: flow analysis and flow sorting. These services are available to all members of the University, other academic institutions, and industry.

[www.jenner.ac.uk/flowcytometry](http://www.jenner.ac.uk/flowcytometry)
THE NDM IN OXFORD

Old Road Campus

1. Old Road Campus Research Building
   - The Jenner Institute (JENNER)
   - Ludwig Institute for Cancer Research Oxford Branch (LICR)
   - Structural Genomics Consortium (SGC)

2. Richard Doll Building
   - Cancer Epidemiology Unit (CEU)
   - Clinical Trial Service Unit and Epidemiological Studies Unit (CTSU)

3. NDM Research Building
   - The Target Discovery Institute
   - Translational Immunology
   - Tropical Medicine and Global Health (TROPMED)

4. Henry Wellcome Building of Genomic Medicine
   - Wellcome Trust Centre for Human Genetics (WTCHG)
   - Division of Structural Biology (STRUBI)
   - Oxford Particle Imaging Centre (OPIC)

4. Henry Wellcome Building for Molecular Physiology
   - Centre for Cellular and Molecular Physiology (CCMP)
   - Offices of the Nuffield Professor of Medicine (NDMS)
5. The John Radcliffe Hospital
   • Experimental Medicine Division (EXPMED)

Weatherall Institute of Molecular Medicine
   • MRC Human Immunology Unit

6. The Churchill Hospital
   Centre for Clinical Vaccinology and Tropical Medicine
   • Tropical Medicine and Global Health (TROPMED)

Oxford Centre for Diabetes, Endocrinology and Metabolism
   • Diabetes Trial Unit

7. The Peter Medawar Building for Pathogen Research
   • Experimental Medicine Division (EXPMED)
View of Oxford from South Parks. Photography Greg Smolonski
APPENDIX
1000 staff in the UK, also provides indirect employment for 1500 staff overseas

850 research staff in the UK

55 Expats

60 Clinical consultants

50 Professors

100 clinically qualified staff

50 University Research Lecturers/Readers

260 DPhil students
25,000m² of research and support space

£200m University investment in the last decade

12 Buildings on four sites in Oxford

£155m per annum income has risen from £35m over the past 10 years

521 individual active research grants

180 successful new grant average per annum

1,113 collaborations with 26 other Oxford University departments

£600m of awards

40 industrial projects

Managed by University of Oxford and two subsidiary companies
The NDM is acutely aware that it must provide value for money for its external sponsors by not only identifying clear research goals and deliverables in line with the sponsors’ own strategies, but also by ensuring that it leverages additional appropriate support from government and other sources to sustain and develop infrastructure.

Higher Education Funding Council for England (HEFCE) support remains critical to the success of the Department.

Research carried out at the NDM has been generously funded by a wide range of sponsors, including:

Abbott Laboratories Ltd
AbbVie Limited
Academy of Finland
Academy of Medical Sciences
Action Medical Research
Advocacy for Neuroacanthocytosis Patients
Aeras Global TB Vaccine Foundation
American Cancer Society
Amgen Inc
Animal Health and Veterinary Laboratories Agency
Arrow Therapeutics Ltd
Arthritis Research Campaign
Arthritis Research UK
Asahi Kasei Pharma Corporation
Association for International Cancer Research
AstraZeneca AB
AstraZeneca UK Ltd
Autism Speaks
Autistica
Bayer HealthCare LLC
Bayer Schering Pharma AG
Bill & Melinda Gates Foundation
Biotechnology & Biological Sciences Research Council
BIS - Department for Business, Innovation and Skills
Boehringer Ingelheim Pharma GmbH & Co. KG
British Council
British Heart Foundation
British Infection Society
British Lung Foundation
British Medical Association
British Renal Society
British Skin Foundation
BUPA Foundation
Burdett Trust for Nursing
Cancer Research Institute USA
Cancer Research Technology Ltd
Cancer Research UK
Centocor B.V.
Cephalon UK Ltd
Chroma Therapeutics
DEFRA - Department for Environment Food & Rural Affairs
Department for International Development
Department of Health
Deutsche Forschungsgemeinschaft
Diabetes UK
Diamond Light Source
Dilaforette AB
Drs Richard Charles and Esther Yewpick Lee Charitable Foundation
Drug Delivery Solutions Ltd (MC2 Biotek Group)
Ecole des Neurosciences de Paris Ille-de France
Eli Lilly and Company Ltd
EMBO
Emergent BioSolutions Ltd
Engineering & Physical Sciences Research Council
Euroimmun
European & Developing Countries Clinical Trials Partnership
European Commission
European Research Council
European Society of Clinical Microbiology and Infectious Diseases
European Vaccine Initiative - EEIG
F. Hoffmann La Roche Ltd
Fondation Lejeune
Fondation Louis Jeantet
Food Standards Agency
Foundation for Innovative New Diagnostics
Foundation for National Institutes of Health
GAVI’s PneumoADIP
George Institute UK
Gilead Sciences Inc
Glaxo Research & Development Ltd
GlaxoSmithKline
Global Fund to Fight Aids, Tuberculosis and Malaria
Grand Challenges Canada
Harley Street Clinic
Harry J. Lloyd Charitable Trust
Harvard Graduate School of Education - USA
Health & Safety Executive
Health Protection Agency
Health Research Board
Healthcare Infection Society
Hereditary Disease Foundation
Higher Education Funding Council
HIV Research Trust
Human Frontier Science Program
ICF Macro
IMAXIO SA
Immunocore Ltd
Institut Merieux
Institute for Animal Health
Intensive Care Society
Intercept Pharmaceuticals Inc
International Agency for Research on Cancer
International AIDS Vaccine Initiative
International Society for Infectious Diseases
IRASEC - Research Institute on Contemporary Southeast Asia
Isis Innovation Limited
FUNDING IN FOCUS

**Wellcome Trust**

Our vision is to achieve extraordinary improvements in human and animal health. In pursuit of this, we support the brightest minds in biomedical research and the medical humanities.

[www.wellcome.ac.uk](http://www.wellcome.ac.uk)

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**Medical Research Council**

The heart of our mission is to improve human health through world-class medical research. To achieve this, we support research across the biomedical spectrum, from fundamental lab-based science to clinical trials, and in all major disease areas.

[www.mrc.ac.uk](http://www.mrc.ac.uk)

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**The National Institute for Health Research**

The mission of the National Institute for Health Research (NIHR) is to maintain a health research system in which the NHS supports outstanding individuals, working in world-class facilities, conducting leading edge research focused on the needs of patients and the public.

[www.nihr.ac.uk](http://www.nihr.ac.uk)
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A special thank you to all academics, staff, students and patients who have contributed to this book and the members of the public who have contributed to NDM research.