



# NUFFIELD DEPARTMENT OF CLINICAL NEUROSCIENCES

We host world-leading programmes in basic, translational and clinical neuroscience research. Our integrated approach allows for the swift transfer of basic biomedical findings to the clinical setting. We deliver evidence-based therapies of high impact for the benefit of society and the economy.



## Annual Report 2014/15





The Nuffield Department of Clinical Neurosciences (NDCN) was formed on 1 November 2010, and is one of 16 departments in the University of Oxford's Medical Sciences Division. Its constituent parts are: the Division of Clinical Neurology; the Nuffield Laboratory of Ophthalmology; the Nuffield Division of Anaesthetics; the Oxford Centre for Functional MRI of the Brain; and the Centre for the Prevention of Stroke and Dementia.

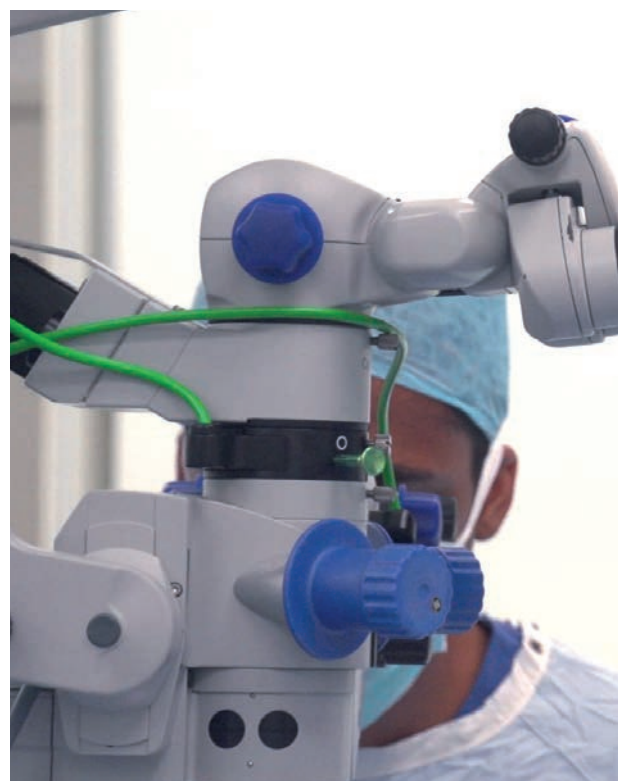
Our research spans all aspects of neuroscience from cellular and molecular studies, systems neuroscience through translational studies to clinical research involving largely neurological and ophthalmological, but also many other types of patients. We also teach medical students and have a large postgraduate community.

The Department is strongly supported by NHS clinical colleagues in the Oxford University Hospitals NHS Foundation Trust and by the NIHR Oxford Biomedical Research Centre. This enables us to provide the highest quality teaching, training and career development in clinical neurology, ophthalmology and anaesthetics.

NDCN has rapidly come to be recognised as one of the leading clinical neuroscience departments in the UK and internationally. The quality of our research (along with that of the Departments of Experimental Psychology and Psychiatry) was ranked *first in the UK* by HEFCE in Unit of Assessment 4 of the Research Excellence Framework (REF) 2014.

**Chris Kennard**

# The Year in H



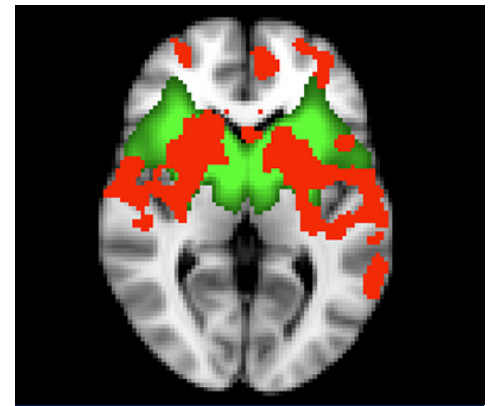
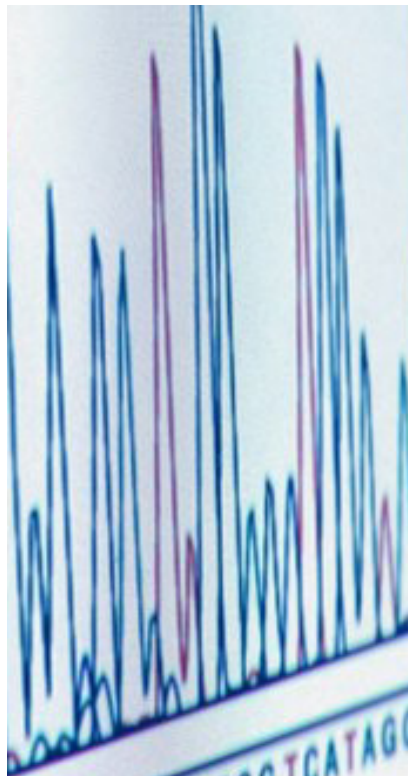
## Developing gene therapies for inherited blindness

Nightstar, a new spin-out company from the University of Oxford, will commercialise a new gene therapy developed by Professor Robert MacLaren and colleagues. The therapy targets an inherited form of progressive blindness, called choroideremia. Nightstar has 11 employees based at the Wellcome Trust and is funded by Syncona Partners, a subsidiary of the Wellcome Trust.

<http://bit.ly/1Q9Z4Bw>



# Highlights



## Diagnosing Parkinson's disease earlier

Our researchers, led by Associate Professor Michele Hu, have developed a quick and simple 'resting state' MRI technique for the early diagnosis of Parkinson's disease. If treatments are to be developed that can slow or halt the progression of the disease before it affects people significantly, we need to be able to identify people at risk before symptoms take hold.

[www.ndcn.ox.ac.uk/news/mri-early-parkinsons](http://www.ndcn.ox.ac.uk/news/mri-early-parkinsons)

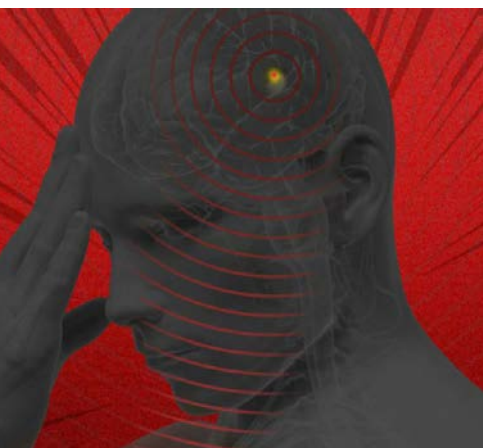


Image courtesy of the PAIN group and Rebecca Rumble

## Locating a pain area in the brain

Using a new brain imaging technique, our researchers, led by Professor Irene Tracey, discovered that activity in a brain area known as the dorsal posterior insula is directly related to the intensity of pain. As this area connects to many other important brain regions involved in pain experiences, the team hopes that attempting to modulate activity in this area might help to treat pain.

[www.ndcn.ox.ac.uk/news/ouch-zone-in-the-brain-identified](http://www.ndcn.ox.ac.uk/news/ouch-zone-in-the-brain-identified)

## Treating congenital myasthenic syndrome

Congenital myasthenic syndromes (CMS) are inherited diseases resulting in fatiguable muscle weakness. As a result of Professor David Beeson and his team's pioneering research into these disorders, the Department of Health set up a National Diagnostic and Advisory Service for CMS based at the John Radcliffe and Churchill Hospitals. Most notably, in 2006 the team established the genetic cause and effective treatment for a relatively common group with weakness in the muscles around the shoulder girdle and hips. More recently they found that the weakness in many similarly affected patients is caused by variants in a series of genes responsible for adding sugar residues onto proteins.

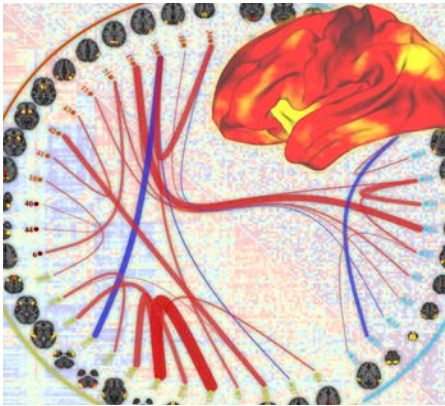
<http://bit.ly/1MgE2ly>



## Obtaining the latest equipment

In April, a new 3 Tesla MRI scanner arrived at the Oxford Centre for Functional MRI of the Brain (FMRIB). Features include a significantly better gradient coil and improved stability, as well as many times the computer processing power of the previous scanner. It joins the 7 Tesla machine, one of only two in the UK.

[www.ndcn.ox.ac.uk/news/new-scanner-for-functional-MRI-research](http://www.ndcn.ox.ac.uk/news/new-scanner-for-functional-MRI-research)



### Mapping connections in the brain

The Human Connectome Project is a multi-national cross-disciplinary project that aims to produce a comprehensive map of anatomical and functional connections in the human brain at the highest achievable accuracy and resolution given current technology. The University of Oxford is one of four major partners, and our researchers, led by Professor Stephen Smith, are designing new schemes for data acquisition and new technologies and algorithms for data analysis and mining.

<http://humanconnectome.org/>



Andrey Popov/Shutterstock.com

### Providing innovative teaching

The University of Oxford is offering a new online course in sleep medicine for health-care professionals. The course covers the physiological basis of sleep and sleep disorders, right through to modules on sleep and society. The programme is hosted by our Department's Sleep and Circadian Neuroscience Institute (SCNi) and led by Professor Colin Espie.

[www.ndcn.ox.ac.uk/sleep-medicine-online](http://www.ndcn.ox.ac.uk/sleep-medicine-online)



### Building a community of researchers

Our staff and student clubs have enjoyed a packed programme of educational, developmental and social events. We raised £2500 for our chosen annual charity, Headway Oxfordshire, which supports people with acquired brain injury across the county.

[www.ndcn.ox.ac.uk/about/working-in-our-department](http://www.ndcn.ox.ac.uk/about/working-in-our-department)



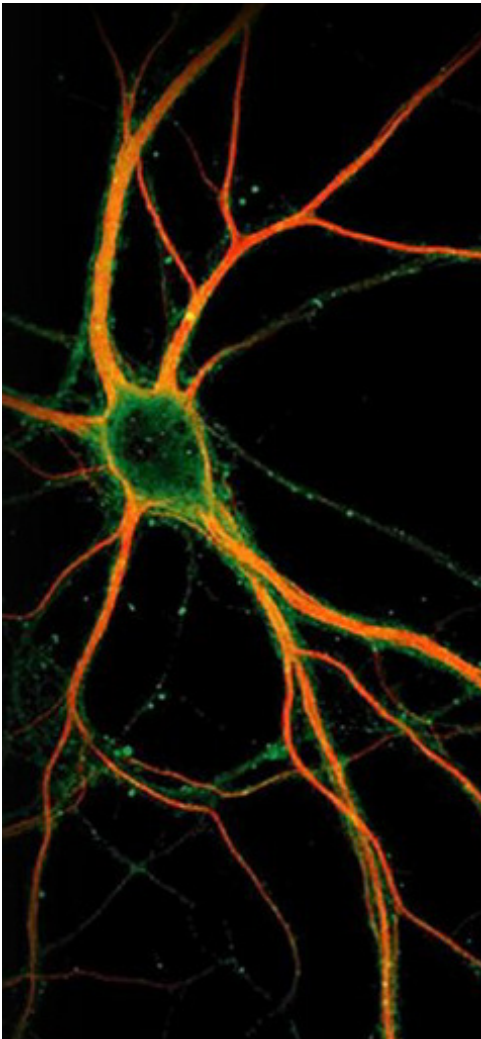
Image courtesy of Oxford Medical Illustration

### Engaging the public

As part of our extensive public engagement programme we held a free public event during Brain Awareness Week to showcase some of the brain research going on at the University and the Oxford University Hospitals NHS Foundation Trust. Over 250 people came along to browse interactive stands and listen to talks about what is being done to tackle dementia, stroke, Parkinson's disease and epilepsy.

[www.ndcn.ox.ac.uk/about/impact/public-engagement](http://www.ndcn.ox.ac.uk/about/impact/public-engagement)

## STATISTICS FOR 2014–15



### Identifying autoimmune disease

Research by Professor Angela Vincent FRS and her colleagues has created a step change in the diagnosis and understanding of diseases caused by antibodies to proteins of the nervous system. These disorders include different forms of myasthenia gravis (causing muscle weakness) and newly identified forms of encephalitis (inflammation of the brain that can lead to epilepsy, psychosis, sleep or movement disorders). These disorders improve markedly following immunological treatments.

<http://bit.ly/1FUo5kd>

SCORED   
**100%**

for quality of our research & training environment in the UK's Research Excellence Framework exercise



**108**  
FUNDING BODIES

**£72.2m** TOTAL   
GRANT VALUE



RESEARCH  
TURNOVER

**£14.5m**

**191**   
GRANTS

**£11.5m**  
Non-research turnover

  
**985**  
PUBLICATIONS

**250**  
HONORARY  
CONTRACT  
HOLDERS

**345**  
Staff

**100**  
DPhil students

**25**  
Associate professors

**24**  
Professors



Treating congenital myasthenic syndrome:  
Searching for mutations in a DNA sequence

Diagnosing Parkinson's disease earlier:  
The basal ganglia network is in green, and the significant difference between  
Parkinson's patients and the control group in red

Identifying autoimmune disease:  
Patient antibodies (stained green) bind to a protein on the surface of a nerve  
cell (stained red). Antibodies like this one can interfere with the function of  
the nervous system.

Mapping connections in the brain:  
A new study led by Professors Stephen Smith and Karla Miller has used  
data from the Human Connectome Project to identify a pattern of brain-  
behaviour variation across the population; individuals were predominantly  
spread along a single 'positive-negative' axis linking lifestyle, demographic  
and psychometric measures to each other and to a specific pattern of  
functional brain connectivity.



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