



# NUFFIELD DEPARTMENT OF CLINICAL NEUROSCIENCES

We host world-leading programmes in basic, translational and clinical neuroscience teaching and 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 2018



## From the Head of Department



It gives me great pride to share just some of our successes of 2018 in this document. On all fronts – research, clinical practice, public engagement, teaching, innovation and impact – we have excellent news stories to celebrate.

When painstaking research leads to changes in treatments available for patients, we can feel a well-deserved sense of pride in our achievements. Highlights in this area in the past year have included new digital cognitive behavioural therapy for insomnia, and a possible diagnostic biomarker of amyotrophic lateral sclerosis (ALS, also known as motor neurone disease). We are also pioneering new medical techniques, such as robotic eye surgery, and ways to prevent recurrent stroke.

Our researchers have contributed additionally to ground-breaking discovery science building the body of scientific knowledge across a range of disciplines, including the genetic analysis of brain structure and function, and the factors that influence outcomes for patients admitted to intensive care.

For yet another year, our teaching has gone from strength to strength thanks to a dedicated group of skilled educators ably supported by the academic administration team.

We have an exciting year ahead with the new Wolfson building coming to fruition for the Centre for the Prevention of Stroke and Dementia and the Wellcome Centre for Integrative Neuroimaging, and of course a new Head of Department. Let me take this opportunity to express what a joy and privilege it has been these past few years as NDCN's Head of Department. It's an incredible department with amazing people, and during my time in post I have been impressed with the high quality not only of the research work, but also the teaching programme, public engagement activity, staff development initiatives and administrative support. When all these elements work together, we can truly see the difference we are making in the world. I would like to thank each and every one of our staff and students for their part in making our department truly outstanding and I wish NDCN every success as it moves onwards and upwards!

**Professor Irene Tracey**

# The Year in



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## Our work leads to digital treatment for insomnia

Millions of people have been given access to digital treatment for insomnia as an alternative to sleeping pills, as a result of our study which showed that the Sleepio app improves overall wellbeing, mental health and quality of life in nearly three-quarters of participants. The cognitive behavioural therapy-based Sleepio app is the first NHS rollout of direct-access digital medicine. It works by helping people to resolve their persistent sleep problems by discovering their ideal personal sleep pattern, and by overcoming the 'racing mind' that so often prevents people from sleeping.

[www.ndcn.ox.ac.uk/news/digital-insomnia-medicine-rolled-out-as-major-study-links-sleep-to-better-health](http://www.ndcn.ox.ac.uk/news/digital-insomnia-medicine-rolled-out-as-major-study-links-sleep-to-better-health)

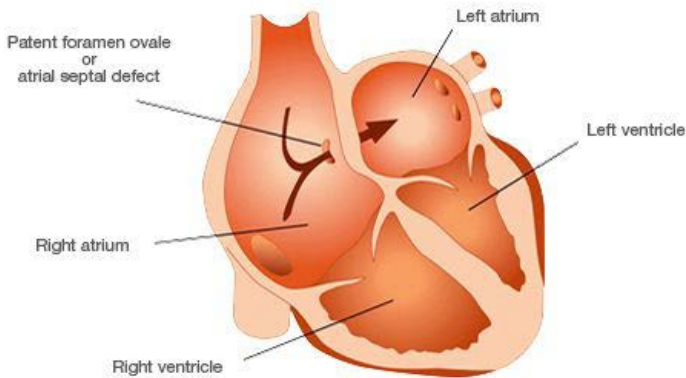


## The culture of our department inspires innovation

Our research has led to a number of spinouts and novel clinical interventions. Oxford University Innovation has set up a new programme of innovation champions, one of whom is Phi Anh Phan, in our Nuffield Division of Anaesthetics. He is developing a medical device to non-invasively monitor lung function and pulmonary blood flow.

[innovation.ox.ac.uk/innovation-champions/](http://innovation.ox.ac.uk/innovation-champions/)

# Highlights



## We work on new ways to prevent recurrent stroke

A patent foramen ovale (PFO – an asymptomatic hole between the right and left sides of the heart) is a cause of stroke in young people and trials have shown that closing the hole prevents recurrent strokes. However, it was uncertain whether PFO was also responsible for a significant proportion of strokes at older ages, when most strokes occur. In the first population-based study investigating the association between PFO and stroke in a large number of patients, irrespective of age, our researchers showed that older patients with otherwise unexplained TIA and stroke also have a much higher than expected prevalence of PFO, which can be reliably detected using a simple ultrasound screening technique. Results suggest that as many as 10,000 people per year in the UK have strokes due to PFO. Clinical trials are now planned of PFO-closure in older patients in order to prevent recurrent stroke.

[www.thelancet.com/journals/laneur/article/PIIS1474-4422\(18\)30167-4/fulltext](http://www.thelancet.com/journals/laneur/article/PIIS1474-4422(18)30167-4/fulltext)

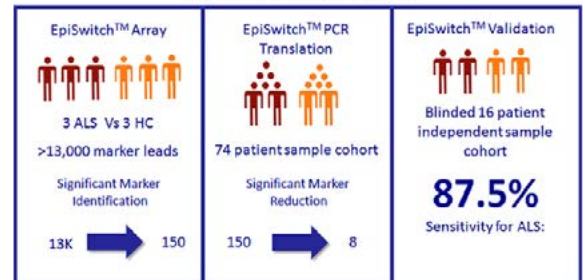
## Researchers take their work out and about

Members of our department took to the local shopping centre to explain their science as part of Oxford's Science and Ideas Festival. Shoppers learnt how we feel sensations like temperature, touch, vibration or pain, and found out what your brain has got to do with your breathing. We also had scientists showcasing astrocytes and neuroimaging at Oxford's Town Hall. Another initiative saw researchers from our Wellcome Centre for Integrative Neuroimaging visiting local schools to share their research into the brain with Key Stage 3 pupils. The Big Brain Roadshow combines drama, movement and hands-on activities to give young people an introduction to the history of brain imaging from the 1800s to the present day and an outline of the ways in which current research is building our understanding of the brain.

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



## EpiSwitch™ Platform Development



## We identify biomarkers for neurodegenerative disorders

Researchers from our Oxford Motor Neuron Disease Centre have been working with Oxford BioDynamics on a study looking at the diagnosis of Amyotrophic Lateral Sclerosis (ALS). ALS is a progressive, neurodegenerative disorder characterised by muscle weakness and eventual paralysis. There is currently no definitive, clinically validated measure to identify ALS. The research team used Oxford BioDynamics' EpiSwitch™ platform to compare the genomic architecture of healthy and ALS patient samples to discover an epigenetic biomarker, called a chromosomal conformation signature (CCS), with diagnostic potential in ALS. The study successfully yielded a distinct CCS biomarker that was diagnostic for ALS, demonstrating a highly promising, potential new approach to the diagnosis of this disease.

[www.ndcn.ox.ac.uk/news/study-identifies-biomarker-for-the-diagnosis-of-amyotrophic-lateral-sclerosis-als](http://www.ndcn.ox.ac.uk/news/study-identifies-biomarker-for-the-diagnosis-of-amyotrophic-lateral-sclerosis-als)





## We are at the cutting edge of robotic eye surgery

In 2018 our researchers completed the first successful trial of robot-assisted retinal surgery. The trial involved 12 patients, half of whom were randomly allocated robot-assisted surgery and the other half to standard manual surgery to remove a membrane from the back of the eye. Using the robot, the surgeon was able to perform the procedure with equal or better efficacy than in the traditional manual approach. In the second phase of the trial, the team used the robot to insert a fine needle under the retina to dissolve blood in three patients who had age-related macular degeneration - all experienced an improvement in their vision as a result.

[www.ndcn.ox.ac.uk/news/first-human-test-of-robotic-eye-surgery-a-success](http://www.ndcn.ox.ac.uk/news/first-human-test-of-robotic-eye-surgery-a-success)

## We discover more about low dose aspirin

About one billion people worldwide take regular aspirin, usually to prevent heart attacks or strokes. Our new study suggests a more tailored strategy is required. The team studied detailed data from their own previous trials (with over 130,000 participants) and showed that standard low-dose aspirin (75-100mg daily) was indeed only effective in preventing heart attacks and strokes in people weighing less than 70kg. In contrast, higher doses were only effective at weight above 70kg, and were potentially harmful at lower weight. Effects on other outcomes, including cancer, were also dependent on body size.

[www.ndcn.ox.ac.uk/news/effectiveness-of-low-dose-aspirin-dependent-on-body-size](http://www.ndcn.ox.ac.uk/news/effectiveness-of-low-dose-aspirin-dependent-on-body-size)



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## We contribute to genetic analysis of brain structure and function

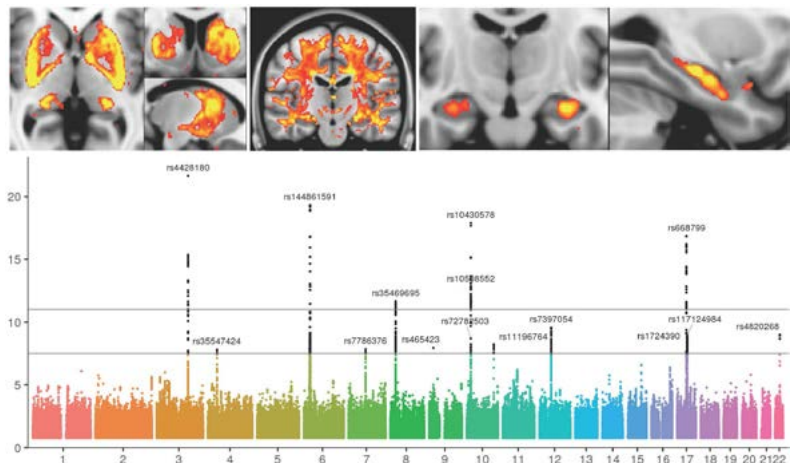
Our scientists have gained new insights into the structure and function of the brain using genetic information and detailed brain images from 10,000 UK Biobank participants. They found a genetic fingerprint on some of the most fundamental processes that allow us to think, act and function. It is hoped their results will provide a huge impetus to new research for a wide range of degenerative and psychiatric disorders. With a further 20,000 participants already imaged, and 70,000 more to be scanned in the next three years, the resource is set to transform research into brain development and aging, and understanding how it functions, becomes damaged by disease and heals itself.

[www.ndcn.ox.ac.uk/news/first-genetic-analysis-of-brain-function-and-structure-using-uk-biobank-imaging-data-yields-exciting-results](http://www.ndcn.ox.ac.uk/news/first-genetic-analysis-of-brain-function-and-structure-using-uk-biobank-imaging-data-yields-exciting-results)

## Our research shows link between intensive care and psychological disorders

Researchers investigated psychological disorders in former ICU patients in the UK, and found that patients frequently report symptoms of anxiety, PTSD and/or depression. Those reporting symptoms of depression after critical illness appear to be at a greater risk of death. The study found that patients who reported symptoms of depression were 47% more likely to die from any cause (all-cause mortality) during the first two years after discharge from the ICU than those who did not report these symptoms. The findings suggest that depression following care of a critical illness in the ICU may be a marker of declining health.

[www.ndcn.ox.ac.uk/news/over-half-of-former-intensive-care-patients-in-the-uk-report-symptoms-of-psychological-disorders](http://www.ndcn.ox.ac.uk/news/over-half-of-former-intensive-care-patients-in-the-uk-report-symptoms-of-psychological-disorders)



## STATISTICS FOR 2018



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### We work to improve outcomes for patients after a stay in intensive care

Our Critical Care Research Group has discovered a strong link between being discharged from ICU at night and dying unexpectedly on general wards, or readmission to intensive care. These effects remained across all definitions of out-of-hours and across healthcare systems in different geographical locations. This study adds to ongoing research investigating what happens to patients once they leave intensive care. The research programme will provide an in-depth picture of post-ICU ward management in three NHS trusts. The findings will help researchers and practitioners work together to improve post-ICU patient outcome. This could include reducing out-of-hours discharge, or at least putting in place measures that would support patients on the ward.

[www.ndcn.ox.ac.uk/news/new-research-on-recovery-following-intensive-care-treatment](http://www.ndcn.ox.ac.uk/news/new-research-on-recovery-following-intensive-care-treatment)

  
**314**  
GRANTS

  
**104**  
FUNDING BODIES

**£107.2m** **TOTAL**   
GRANT VALUE

 **RESEARCH**  
**TURNOVER** **£18.4m**

**£13.2m** **NON-RESEARCH**  
TURNOVER

**12**  
INTERNATIONAL  
MEDIA  
FEATURES

**19**  
PUBLIC  
ENGAGEMENT  
ACTIVITIES

**202k**  
WEBSITE  
USERS 

 **560** PUBLICATIONS

**65**  
Support staff

**244**  
Research Staff

**129**  
DPhil students

**34**  
Associate  
Professors

**25**  
Professors

**322**  
Honorary  
Agreement Holders

# The Year in Highlights



## Our academics learn about policy-making

Gwenaëlle Douaud from our Wellcome Centre for Integrative Neuroimaging took part in the Royal Society's pairing scheme which gives policymakers and research scientists an opportunity to experience each other's worlds. She spent a week in Westminster in December, which included two days shadowing her local East Oxford MP, Annaliese Dodds. The experience gave her insight into the amount of 'noise' in politics, and an understanding of how difficult it is to get key messages across to parliamentarians. Ms Dodds made a reciprocal visit to NDCN to find out more about our research, where basic neuroscience, imaging methods development and clinical application meet.

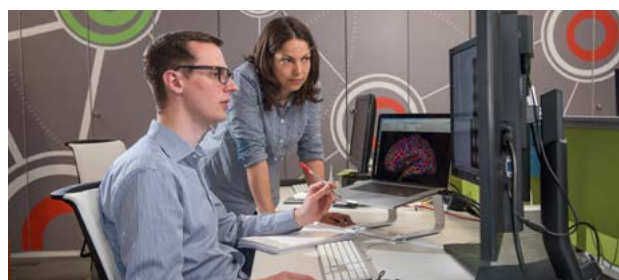
[www.ndcn.ox.ac.uk/news/from-neuroscience-to-politics-and-back-again](http://www.ndcn.ox.ac.uk/news/from-neuroscience-to-politics-and-back-again)



© Oxford Medical Illustration

## Expert Patient Tutors enhance our teaching programme

The neurology teaching and the clinical learning experience of the Year 5 medical students has been significantly enhanced by the introduction of the Expert Patient Tutor (EPT) programme. Every 8 weeks the students interact with people who have a range of neurologic diseases, hear about the patient's disease experience and demonstrate the key neurologic findings. Our EPTs are an integral part of our teaching team and are hugely appreciated by both staff and students for their enthusiasm and generosity in helping students to develop a better understanding of the complexities of their illness. In response to positive student feedback, funding was secured from the Nuffield Oxford Hospital Fund to expand these sessions.



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## We are committed to developing our staff

Two recent initiatives demonstrate our commitment to the people who make up our department. In August 2018, we launched an innovative mixed methods study of the careers of our female clinical academics. The knowledge gained will help us develop initiatives to promote female clinical academics into senior roles. In 2019, we will publish a Remote Working Guide, offering advice on IT security, remote access to documents and data, collaborating and ways of keeping in touch. This ensures that staff can succeed at NDCN whatever their personal working pattern.

[www.ndcn.ox.ac.uk/about/staff-development](http://www.ndcn.ox.ac.uk/about/staff-development)



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