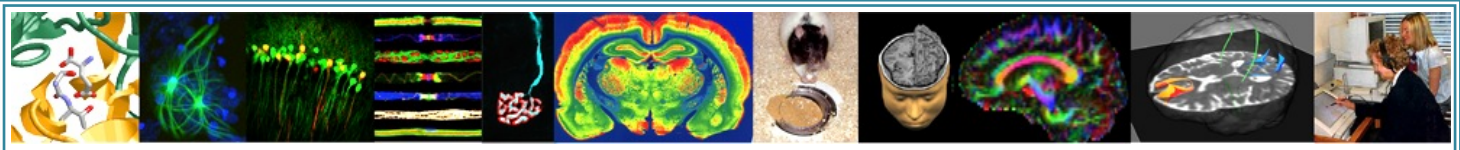

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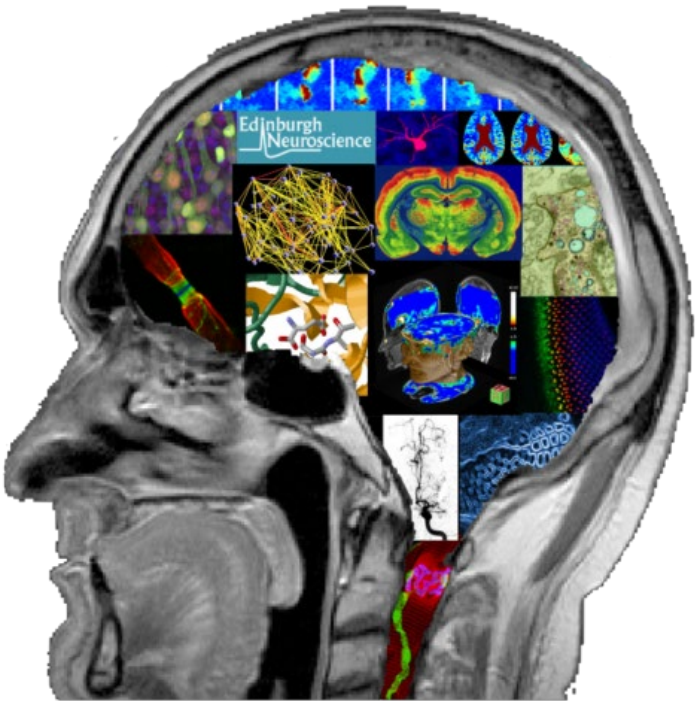

Wednesday 13 March 2019

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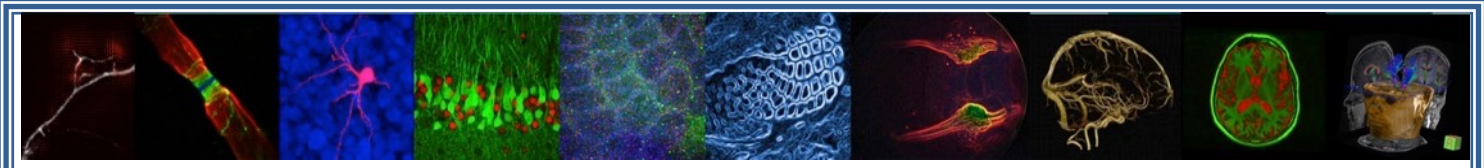
MENTAL HEALTH

The Patrick Wild Centre
for Research into Autism, Fragile X Syndrome & Intellectual Disabilities

SIDB Simons Initiative for the Developing Brain

Muir Maxwell Epilepsy Centre

BNA British Neuroscience Association



Programme

08.30 Arrival and Registration

Session 1

Chaired by: Prof Siddharthan Chandran, Director, Edinburgh Neuroscience

09.00 Welcome
Prof Siddharthan Chandran, Director, Edinburgh Neuroscience

09.05 The genetics of depression
Professor Andrew McIntosh, Centre for Clinical Brain Sciences

09.30 Vision in action: contextual signals in visual cortex
Dr Nathalie Rochefort, Centre for Discovery Brain Sciences

09.55 Using zebrafish to study myelinated axons in vivo
Professor David Lyons, Centre for Discovery Brain Sciences

10.20 Coffee & Posters

Session 2

Chaired by: Professor Tara Spires-Jones, Centre for Discovery Brain Sciences

10.50 Fellows Session

Neural circuits for long-term memory storage
Dr Gülşen Sürmeli, Wellcome Trust Sir Henry-Dale Fellow, Centre for Discovery Brain Sciences

Facilitating memory persistence in young, ageing and dementia
Dr Szu-Han Wang, Alzheimer's Research UK Senior Research Fellow, Centre for Clinical Brain Sciences

Developing new clinical decision support tools for frequent longitudinal monitoring of chronic disorders: applications in Parkinson's disease and mental disorders
Dr Thanasis Tsanas, Chancellor's Fellow, Usher Institute

Seeking to increase the experimental validity and utility of preclinical stroke research
Dr Emily Sena, Stroke Association Kirby Laing Foundation Senior Lecturer, Centre for Clinical Brain Sciences

11.50 Functional Neurological Disorders: merging brain and mind
Professor Jon Stone, Centre for Clinical Brain Sciences

12.15 An overview of neuroscience research at McGill University, Canada
Professor Edward Fon, Professor Derek Bowie and Professor Stefano Stifan, McGill University

12.40 Lunch & Posters

Session 3

Chaired by: Dr Heather Whalley, Centre for Clinical Brain Sciences

14.00 Student Data Blitz

What mediates the transmission of prenatal stress signals from mother to foetus?
Ms Sze Ying, Centre for Discovery Brain Sciences

Astrocytes regulate cortical neuronal Kir expression during development to increase cell excitability
Ms Alison Todd, Centre for Discovery Brain Sciences

GABAA Receptor mediated inhibition… without GABA (?!)
Mr Nathanael O'Neill, Centre for Clinical Brain Sciences

Exploring the effects of CNS hypomyelination on circuit function and behaviour
Ms Megan Madden, Centre for Discovery Brain Sciences

Bilingualism and Cognitive Functions
Ms Lihua (Helen) Xia, Psychology

14.30 Cognitive offloading: Why digital memory is bad for your brain
Professor Robert Logie, Psychology

14.55 The UK Dementia Research Institute in Edinburgh
Professor Giles Hardingham, Centre for Discovery Brain Sciences and Associate Director, UK Dementia Research Institute

15.20 Tea & Posters

Session 4

Chaired by: Professor David Wyllie, Director, Centre for Discovery Brain Sciences

16.00 Annual Distinguished Lecture in Neuroscience 2019

Neuronal calcium ion channels in the pain pathway from gene to function
Professor Diane Lipscombe, Thomas J. Watson Sr. Professor of Science, Director, Carney Institute for Brain Science, Brown University, USA, and President of Society for Neuroscience 2018/19

Our Annual Distinguished Lecture 2019 is supported by the British Neuroscience Association

17.00 Drinks Reception in the Great Hall

18.00 Close of Meeting

Edinburgh Neuroscience

Edinburgh Neuroscience Activities 2019

The Edinburgh Neuroscience community has had a busy and successful year. There hasn't been much in the way of major change this year, more maintaining the events and opportunities that already exist. Here is a round-up of activities by Edinburgh Neuroscience and our Research Centres and groups since our last Neuroscience Day.

• Opportunities for our researchers

Edinburgh Neuroscience has been running 3 funding opportunities designed to support and develop research careers, two will continue for 2019 while one is taking a short break.

WR Henderson Scholarship Established in 2012, this fund enables an early experience of research by providing stipends and a contribution to laboratory costs for undergraduate students wanting to undertake summer placement work in the Centre for Discovery Brain Sciences. Administered by Edinburgh Neuroscience but made possible by an endowment held by the Deanery of Biomedical Sciences, last year there were four recipients (44 % success rate), costing £10,400). *Next deadline:* 31 May 2019):

- Emma Fowler: (2nd year Psychology with Neuroscience BSc, University of Glasgow) to work in Prof Tom Pratt's laboratory on 'What is the role of 16p11.2 CNV genes in human neurogenesis''.
- Anna Kuriwska (2nd year Biotechnology BSc,) to work in Dr Leah Herrgen's laboratory on 'Establishing KillerRed-mediated photoablation to study the effect of neuronal injury on tectal neural circuits'.
- Katarzyna Mazur (2nd year Medical Science BSc) to work in Dr Carole Torsney's laboratory on 'Is hyperinnervation with Meissner's corpuscles associated with incisional dynamic allodynia?'
- Lisl Tudor (3rd year Neuroscience BSc, University of Edinburgh) to work in Prof Richard Ribchester's laboratory on 'Evaluation of vital stains for neuromuscular junctions and their potential utility in confocal endomicroscopy'

Neuroresearchers Fund: Established in 2010, this fund supports non-tenured, early years, researchers by providing funds of up to £1,500 to enable them to visit laboratories elsewhere to learn new techniques or start new collaborations. There were 4 recipients last year (57 % success rate) totalling £3,950. *Next deadline*: 30 April 2019:

- Elizabeth Davenport (Postdoc, Centre for Discovery Brain Sciences): Visit to the Institute of Interdisciplinary Neurosciences, Bordeaux to learn a new technique: Fluorescence Activated Synaptosome Sorting (FASS).
- Cristina Martinez Gonzalez (Postdoc, Centre for Discovery Brain Sciences): Visit to the laboratory of Prof. Karl Deisseroth, Stanford University to learn the Clarity, brain tissue clearing, technique.
- Mark Rodrigues (ECAT PhD student, Centre for Clinical Brain Sciences): Visit to the Cerebral Amyloid Angiopathy (CAA) Research Lab at Massachusetts General Hospital, Boston to establish a multicentre external validation study of the Edinburgh and Boston criteria for cerebral amyloid angiopathy.
- HongYan Zhang (Chancellor's Fellow, Centre for Discovery Brain Sciences): Visit to TongJi University, Shanghai, China to learn a new technique: patch clamping spinal neurons in adult zebrafish.

The Neuroresearchers Fund has also received a boost this year with the generous donation of just over £1,000 from two former Neuroscience Honours students. Hanna Nowers and Patrick Hillan met studying neuroscience here and started dating in their Honours year. Last year they got married and, as part of their wedding registry, they asked guests to donate to the Neuroresearchers Fund which not only supports early career researchers but was established in the year they started dating! Congratulations and a huge thank you to Hanna and Patrick Hillan!

RS MacDonald Seedcorn Fund: Established in 2017, this fund supports early years and established researchers, from postdocs (or equivalent) upwards providing awards if up to £5,000. It funds activities that further research and particularly encourages new collaborations, particularly between life-course areas. There were 21 awards made last year (40 % success rate) totalling £75,369. We intend to apply for a further round of seedcorn funding to enable this successful scheme to continue.

• External networking

Edinburgh Neuroscience members Professor David Wyllie (Director, Centre for Discovery Brain Sciences) and Professor Siddharthan Chandran (Director, Centre for Clinical Brain Sciences) are working with partners in McGill

University, Canada to establish a new partnership covering a variety of areas of neuroscience, including (i) autism/neurodevelopmental disorders, neurodegenerative disorders and (iii) intellectual disabilities. Professors Edward Fon, Derek Bowie and Stefano Stifa from McGill University will be joining us for Neuroscience Day and will be giving a talk outlining area's of overlap and mutual interest. If you have existing links with McGill University, please get in touch with Prof David Wyllie and let him know.

In other activities, Dr Jane Haley is on the Host Society Committee for the Federation of European Neuroscience Societies (FENS) Forum meeting coming to Glasgow in 2020, which will bring between 6,000 – 7,000 delegates from across Europe to Scotland's largest city. Professor Tara Spires-Jones and Dr Jane Haley were also both elected Term Members for the European Dana Association for the Brain (EDAB), recognising their public outreach work.

• Training students across the life-course

We continue to support and nurture PhD student training – in September another 7 students started the Wellcome Trust PhD programme in Translational Neuroscience (bringing the total number of students to 19). The CSO funded cross-university SPRINT MND/MS PhD programme also continues to recruit quality students. The Autumn School for PhD students in October, established in 2012, once again brought together 50 first and final year PhD students for a day of networking across all research areas, providing advice and guidance for those embarking on their PhD and those looking to the future.

• Engaging the public

Once again, in 2018, we were busy delivering outreach activities, via our getBRAINY workshops for schools (getCONNECTED, getPROTECTED), Science Festivals, and our Christmas lecture. In 2018 we worked with St Cecilia's Hall to put together a series of events for a 'Mad Hatter Grey Matter Festival' linking creative arts and neuroscience for Brain Awareness Week in March. This partnership continues for 2019 where 10 separate events are being staged, including the incredibly popular Neurotheatre (www.edinburghneuroscience.ed.ac.uk/events/mad-hatter-grey-matter-festival)! Once again, we contributed a programme of events for the Midlothian Science Festival in October, including a new event 'Happiness in Everyday Life' with Stella Chan, Stephen Lawrie and Catharine Ward Thomson for World Mental Health Day in April. In addition to our face-to-face activities 2,000 people watched our online talks in 2018 and we reached 484,000 people via social media.

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Round up of Centre Activities

Centre for Clinical Brain Sciences (Clinical Neurosciences, Neuroimaging Sciences & Psychiatry)

www.ed.ac.uk/clinical-brain-sciences, @EdinUniBrainSci

The Centre's multiple sites have begun to consolidate at Little France (now called Edinburgh BioQuarter). The clinical arm of the National CJD Research and Surveillance Unit has relocated from the Western General Hospital, and the Division of Clinical Neurosciences (DCN) at the Western and the SMC Research Centre at Sick Kids will be moving to BioQuarter when the long-delayed new hospitals open in 2019. A symposium was organised by Jon Stone and colleagues to mark the illustrious tenure of DCN at the Western since 1960.

Stalwarts of the National CJD Research and Surveillance Unit James Ironside and Mark Head have now retired; James was profiled in an article in *Lancet Neurology* titled "modest manner, mighty impact". Colin Smith has now taken up Directorship of the Unit.

CCBS researchers embarked on 55 new research awards last year. Major new clinical trials included LACI-2, R4VaD, STAY ENCHANTED, SoSTART and NICHE (stroke), MS-STAT2 (progressive multiple sclerosis), Physio4FMD (functional motor disorders) and AIMS-2 (autism). The 3000-patient FOCUS trial reported findings: unfortunately fluoxetine (often known as Prozac) was found not to improve recovery after stroke.

Many Centre members have won prizes and accolades; there are unfortunately too many to mention all by name here. Congratulations to Szu-Han Wang who was awarded an ARUK Senior Fellowship. Postdoctoral / intermediate fellowships were awarded to Stewart Wiseman, Ally Rooney, David Breen and David Howard; while Una Clancy, Liz Elliott and James Loan received clinical PhD fellowships. Suvankar Pal was awarded a UoE Senior Lectureship, while Jon Stone and Alan Carson were both promoted to Honorary Personal Chair.

Joanna Wardlaw was awarded the Karolinska Stroke Award for Lifetime Contribution to Excellence in Advancing Knowledge in Stroke, and the William M. Feinberg Award for Excellence in Clinical Stroke from The American Stroke Association. She also gave the Edinburgh Neuroscience Christmas Public Lecture. Martin Dennis was awarded the inaugural British Association of Stroke Physician's President's Award for excellence in stroke practice, research and training.

CCBS researchers produced a remarkable 'clean sweep' of awards at The Stroke Association Research Awards, with Priority Programme awards to Rustam Al-Shahi Salman, Colin Smith and colleagues, and Lectureships for Emily Sena and Grant Mair. Rustam also won the Scientific Excellence Award from the European Stroke Organisation. With ECAT Fellow Mark Rodrigues, Rustam received media coverage of their *Lancet Neurology* publication about a simple four-step checklist to improve outcomes for people who experience a stroke due to brain haemorrhage.

Gillian Mead and colleagues launched the multidisciplinary Edinburgh Life After Stroke (ENLITES) Research Group, which seeks ways to improve post-stroke problems & promote enhanced recovery after stroke. A chapter on life after stroke was included in the European Stroke Organisation "Action plan for stroke in Europe 2018-2030", co-authored by Joanna Wardlaw.

Seth Grant's *Neuron* publication in August generated much interest in the press ("Map of a billion synapses reveals clues about how we think") and an interview on BBC Radio 4's Today programme; it was described as one of the "5 coolest things on earth this week" by GE Reports.

David Hunt won the Medical Research Foundation Emerging Leaders Prize, and his post-doc Sarah McGlasson won the Elsevier/US-UK Fulbright Commission UK Early Career Researcher Award in Medicine.

Our neuro-oncology researchers Adam Waldman, Gerry Thompson and Paul Brennan are part of the Tessa Jowell BRAIN-MATRIX adaptive clinical trial for brain tumours; Edinburgh will host all the imaging data. Other research from Paul Brennan was in the media in April: having added a pupil response score to the Glasgow Coma Scale to improve the rapid assessment of the 350,000 p.a. UK hospital admissions involving damage to the brain.

Andrew McIntosh and team had a particularly good year, with no less than 7 publications in Nature-family journals and one in Science, including all three of the Centre publications that received the most attention according to Altmetric.com. Andrew also had success with a £2.2M MRC Mental Health Data Pathfinder award. For news from this group, follow Andrew's new Twitter feed @EdinUniMentalH.

Also in Psychiatry, Sue Fletcher-Watson achieved a tenured position and will shortly take up the Directorship of the SMC Research Centre (see later). Andrew McKechanie became a member of the Royal Society of Edinburgh Young Academy. Stephen Lawrie was recently elected a Fellow of the Royal Society of Edinburgh, and last Summer rocked the Edinburgh Fringe once again, with "Why Is Mental Illness So Goddamn Controversial?" which was reviewed in *Lancet*.

In student successes, Owen James won the UK final of the Three Minute Thesis competition with his illustrative analogy linking impaired neuronal conduction in MS with a slow broadband connection. Bérengère Digard obtained a Fellowship in the Parliamentary Office of Science and Technology. At our 4th Annual Centre Away Day in January, Gordon Blair and Gashirai Mbizvo were jointly awarded the John D Matthews Postgraduate Award, and Nathanael O'Neill, Kaitlyn Hair and Beth York won the CCBS Three Minute Thesis competition.

We continue to jointly host, with CDBS, monthly socials in Chancellor's Building (2nd Friday of each month from 4pm). All are welcome – researchers and support staff and students alike from the whole of the Edinburgh Neuroscience community – please join us!

• Edinburgh Imaging

www.ed.ac.uk/clinical-sciences/edinburgh-imaging; @EdinUniImaging; @EdinUniNeuroImg

Edinburgh Imaging Facilities have continued to expand in 2018, with the Edinburgh Imaging Facility RIE installing a Heidelberg Spectralisc retinal imaging camera in addition to their Siemens Magnetom Prisma 3T scanner. Our radiography team has also increased, and we welcome Maddie Murphy and Isla Mitchell.

By the end of 2018 our hospital embedded scanner at the Royal Infirmary had completed over 180 scans for Theirworld Edinburgh Birth Cohort; had done 50% of the scans for the Sleep Apnea study; had finished all recruitment and scanned over 200 participants for our dementia study, Chariot-Pro, and continued with recruitment and scanning for the Horizon 2020 funded SVDs@Target study. By Autumn 2018, we had successfully started recruitment for the Mild Stroke Study 3 (MSS3), the Rates, Risks and Routes to Reduce Vascular Dementia (R4VaD) study and the Edinburgh Transient and Neurological attack (ETNA) study.

At Edinburgh Imaging Facility QMRI, the Siemens Biograph mMR scanner, combining MRI with PET scanning completed over 200 scans by the end of 2018, for 12 different funded research studies with a focus on neurology, cardiology, vasculature and endocrinology. At the Edinburgh Imaging Facility WGH, we continue to support high-profile longitudinal research studies like the Lothian Birth Cohort 1936 and BHF Lacunar Intervention Trial 2 (LACI-2).

The Edinburgh Imaging Academy developed and expanded their portfolio of online courses relating to medical imaging. This includes the online Certificate in Applied Medical Image Analysis, the online Certificate in PET_MR Principles & Applications Certificate and a variety of unsupervised online short courses.

The Edinburgh Imaging PhD Expo event in October 2018, was well attended by over 70 PhD students. The inaugural Edinburgh Imaging Alliance event in December was a great success, with members such as Canon Medical Research Europe, Blackford Analysis, Optos and EPCC giving presentations to over 180 young researchers, talking about the exciting products and services developed in Edinburgh and explaining what career opportunities were available within Edinburgh.

• Anne Rowling Regenerative Neurology Clinic

annerowlingclinic.com; #annerowlingclinic

The Anne Rowling Clinic has continued to develop its portfolio of clinical research studies in neurodegenerative conditions, particularly multiple sclerosis (MS) and motor neurone disease (MND), but also Parkinson's (a major Dundee-Edinburgh Parkinson's initiative has been launched), Huntington's disease, neuroinflammatory conditions and early-onset dementias. We launched a new public-facing website in 2018 which makes it easier for people living with these conditions to find and sign-up to studies, and have a very active Facebook community for patients and fundraisers.

Eight hundred people have now signed up to Rowling CARE (Clinical, Audit, Research & Evaluation), an electronic register for people with neurological disorders across Scotland. Rowling CARE gives researchers permission to analyse anonymised health data, and contact individuals if there is research they might be interested in.

The national MS-SMART clinical trial was completed and patients invited to an unblinding event; unfortunately none of the drugs showed efficacy but the trial contributed to our understanding of secondary progressive MS, and another trial, MS-STAT2, is now underway.

Welcome to our new Rowling Scholars Maria Stavrou and Patrick Kearns, and congratulations to Arpan Mehta on his MRC/MND Association Clinical Training Fellowship. Congratulations too to Rowling Fellows David Breen, Liz Elliott and Rickie Patani who have also each been awarded a personal Fellowship (from Wellcome, CSO/MND Scotland, and MRC, respectively).

If you'd like to find out more about the Clinic, do pop in to our next Open Evening on Weds 10th April (no booking required) – all are welcome.

• Euan MacDonald Centre for Motor Neurone Disease Research

www.euanmacdonaldcentre.com, @EuansCentre

The Euan MacDonald Centre is a network of 200+ researchers across Scotland who are interested in any aspect of motor neurone disease (including spinal muscular atrophy) or motor neuron biology – if this is you, and you're not already a member, please get in touch! The Centre has twice-yearly academic meetings, funds PhD students and provides bursaries for conference attendance to postgraduates.

Centre researchers published >60 MND-related papers in 2018, mostly in basic science but with a strong psychology component. It is encouraging that many publications and new grants awarded are cross-disciplinary and collaborative among Centre members. Many congratulations to the first graduates of our PhD scheme, Chris Crockford and Hannah Shorrock, who both completed their degrees and published first-author papers.

We work closely with MND Scotland and the key stakeholders in Scotland, including the MacDonald family and former rugby star Doddie Weir, who was diagnosed with MND in 2016. The My Name'5 Doddie Foundation recently donated funds to the Centre to establish a drug-screening programme. Our incredible fundraisers, many of whom are Centre researchers, achieved the amazing total of £130K last year.

The Centre launched a new website in 2018, and we also have an active social media presence on Facebook and Twitter. Please take a look!

• Muir Maxwell Epilepsy Centre

www.muirmaxwellcentre.com, @MMECEdinburgh

The Muir Maxwell Epilepsy Centre welcomed 3 new PhD students this year. Personal successes include for Richard Chin who was promoted to Clinical Reader in Paediatric Neurosciences, Rebecca Black and Kari Aaberg who both completed their PhD, Katherine Bonnycastle who was awarded runner up in the Alison Douglas Prize for best PhD

dissertation in the Centre for Discovery Brain Sciences and finally, Clinical Research Fellow Dr Gashirai Mbizvo who won the prestigious John D Matthews Postgraduate Award and "best presentation" at the UK Chapter of the International League Against Epilepsy meeting.

Susan Duncan has been invited to present her work on Epilepsy-Related Deaths to the Cross Parliament Epilepsy Group in Scottish Parliament. We will be hosting an Epilepsy Research UK Supporter's Reception in April 2019. Also, we launched an educational animation about epilepsy designed with children and for children using their words - called "Me and my epilepsy".

The Juliet Bergqvist Memorial Fund was established this year to support pioneering research into mental health and early death in people with epilepsy. The investment was made possible by a generous gift from a family affected by suicide.

• Edinburgh Dementia Prevention

centrefordementiaprevention.com, @CenDemPrevent

The Centre for Dementia Prevention is now called Edinburgh Dementia Prevention! Our new website will be launched soon.

The European Prevention of Alzheimer's Dementia (EPAD) Consortium, led from our group, had an exciting year of expansion and now features a cohort of over 1400 participants across 21 European sites with the first wave of study data being released soon. The team is now busy preparing to run the first proof of concept clinical trials starting next spring.

The PREVENT Dementia Research Programme will close to recruitment this year having welcomed 700 participants at 5 sites across the UK and Ireland. This year the study has extended its global reach, visiting Chongqing, China and Bangalore, India to set up collaborative projects collecting aligned core data sets.

A highlight of our engagement and education activity was our week-long tour of the west coast of Scotland. Researchers teamed up with dementia charity Playlist for Life to deliver discussions in seldom-served small community venues. Closer to home we held our first Dementia Prevention Open Lecture Series; recordings are available on the PREVENT Dementia website. Our popular Summer School also returns for its third year this June and registration is open now.

We were thrilled to be chosen as the UoE Estates Department Charity Group charitable cause of the year. The amazing team put on a fantastic range of imaginative fundraising events smashing their projected annual target to raise over £5,500 for our brain health research!

• Sackler Centre for Developmental Psychobiology

www.ed.ac.uk/psychiatry/research/sackler-centre

The Sackler Centre in Edinburgh welcomed three new PhD students this year, along with several others in Glasgow. Two have joined the mental health data science pilot scheme and the third student studies cell biology of SORCS3 in collaboration with IGMM; this gene has been implicated in several recent genetic studies of depression. Edinburgh also hosted the Sackler PhD meeting this year, at the Kennedy Tower, with presentations from both Edinburgh and Glasgow PhD students and post-doctoral scientists

• MS Society Edinburgh Centre for MS Research

www.ed.ac.uk/clinical-brain-sciences/research/ms-research-centre

The Centre received a favourable review of its mid-term impact report to the MS Society, which cited 275 research publications, 500 press articles and approximately 50 workshops or activities for the public. Congratulations to Anna Williams and colleagues including Joanna Wardlaw and Colin Smith, whose publication on oligodendrocyte heterogeneity was published in *Nature* in January 2019.

Centre members have generously participated in many tours and promotional films for the MS Society, including Meet the Researchers featuring Dave Lyons and others.

• The Jennifer Brown Research Laboratory & Theirworld Edinburgh Birth Cohort

www.ed.ac.uk/centre-reproductive-health/research/jennifer-brown; www.tebc.ed.ac.uk; #TheirworldEBC

We have welcomed Victoria Ledsham (Research Psychologist) to the team, plus Bavanthi Navarathne (Parent Representative) and Dr Chiara Nosarti to the Scientific Advisory Board. Congratulations to Manuel Blesa and Vix Monnelly were awarded their PhD and MD respectively.

Recruitment and follow up are progressing well with over 250 families signed up and the first recruits already 2 years old and coming back for their follow up assessments. This is thanks to the dedication and hard work of the whole research team at every stage of the study. The effort is now resulting in high-profile publications including on prenatal methadone exposure and its association with altered neonatal brain development (Monnelly et al, NeuroImage:Clinical) and early breast milk exposure and brain connectivity in preterm infants (Blesa et al, NeuroImage).

We keep in touch with our study families throughout the year including newsletters, a Facebook Group for parents, our website and our annual party to say a huge 'thank you' to all our families for their time and commitment helping us with this research.

• The SMC Research Centre for Learning Difficulties

Welcome to Dr Sue Fletcher-Watson who has recently been appointed as the new Director of the SMC Research Centre. Sue will take over from founding Director Professor Anne O'Hare who is retiring from the University at the end of March. Also welcome to Dr Tracy Stewart and Dr Louise Marryat who joined the Centre in the last year as Research Fellows.

The results of the Centre's flagship project 'Research Priorities for Learning Difficulties' launched in September. This was a collaboration with the James Lind Alliance and key funders The Salvesen Mindroom Centre. The project worked with families and health and education professionals to identify and prioritise the top 10 research priorities for learning difficulties. These priorities will now shape and direct the research focus of the Centre.

Other highlights from the past year include the publication of the CAIDS-Q research results with the screening questionnaire proving effective as a tool to identify children with a mild-moderate intellectual disability. Discussions are underway about use of the tool within practice in Lothian.

Also within the Centre, Dr Sinead Rhodes is successfully recruiting to a study in partnership with CAMHS that examines numeracy and literacy in children with neurodevelopmental disorders. Her team are now developing tailored interventions to resolve the educational difficulties faced by these children. Dr Rachael Wood is working with City of Edinburgh Council pupil testing data and national health data to explore the early literacy of children with autism spectrum disorder.

• Row Fogo Centre for Research into Aging and the Brain

This newly established philanthropic hub focuses on understanding small vessel disease and its impact through brain ageing, vascular disease and dementia, through use of advanced brain imaging and related complementary methods. The Centre forms a bridge between the UoE UK Dementia Research Institute and the British Heart Foundation Centre of Research Excellence, and acts as a source of information on SVDs, expertise in image analysis, and networking point to engage researchers working on cerebral small vessel diseases from any perspective across the University.

Centre for Cognitive Ageing and Cognitive Epidemiology

www.ccace.ed.ac.uk, @ccace, @ccaceEdinburgh, @ccaceVideo

The MRC Centre for Cognitive Ageing and Cognitive Epidemiology came to the end of its allotted 10 years, following a successful renewal, on 31st August 2018. It is currently in a year's extension for a few specific projects. During its decade its researchers published excellent science in more than 1000 peer reviewed articles. It greatly enhanced the productivity of the Lothian Birth Cohorts and Generation Scotland, and it was crucial in helping Edinburgh researchers' successes in analysing UK Biobank's data, especially after the release of its half a million genotypes. CCACE's Director Ian Deary and Co-Director Jonathan Seckl were awarded OBEs in the 2019 New Year's Honours.

The cognitive ageing and cognitive epidemiology conducted by CCACE continues to flourish. New grants from Age UK, MRC, and NIH, and support from the School of Philosophy, Psychology and Language Studies, have secured the large team working on cognitive ageing in the Lothian Birth Cohorts and other cohorts until around 2022. In the last year, Gail Davies, David Hill and Ian Deary led the largest genome-wide association studies of intelligence, finding almost 200 related genetic variants. Stuart Ritchie, a CCACE Fellow, obtained a lectureship at King's College London. Among a busy programme of knowledge exchange, over 20 of the Lothian Birth Cohorts' participants and researchers were the subjects of an exhibition of portraits by renowned painter Fionna Carlisle.

The psychiatry research is highly successful and expanding (see more on page 8). Andrew McIntosh and David Howard published a paper in Nature Neuroscience reporting over 100 genetic variants for depression, which received media attention on BBC News and radio. David won a competitive Henry Wellcome Fellowship and Heather Whalley successfully progressed from her College Fellowship to a permanent position. New projects in psychiatry included an MRC Global Challenge Research Fund pump-priming to study depression and resilience in Malawi, Nepal and Costa Rica, and an MRC Mental Health Data Pathfinder Award to leverage research and routinely collected data to study common mental health disorders, particularly depression.

Professor John Starr

Professor John Starr, CCACE Co-Director, passed away suddenly on December 8th 2018. He is greatly missed. A thanksgiving service was held on 4th January at St Mary's Cathedral, Palmerston Place, Edinburgh.

NRS Mental Health Network

The NRS Mental Health Network has been supporting high quality clinical research across Scotland since 2009.

We are funded by the Chief Scientist Office (CSO) and our primary aim is to increase the quality and quantity of mental health research throughout Scotland.

We currently support a large number of academic and commercial studies in a range of clinical areas.

Led by a Scotland-wide Management Group, we have a dedicated team of experienced Research Assistants and Research Nurses across the four NRS Nodes (North, East, South East and West).

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info@smhrn.org.uk

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Centre for Discovery Brain Sciences

https://www.ed.ac.uk/discovery-brain-sciences

Members of the Centre for Discovery Brain Sciences (CDBS) conduct research at molecular, cellular, systems and behavioural levels to understand fundamental mechanisms and pathways relevant to brain and body function in health and disease and are based in three locations the Hugh Robson Building, 1 George Square (Central Area) and Chancellor's Building (BioQuarter).

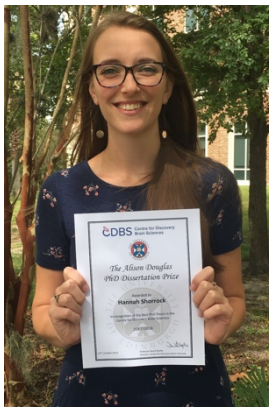
The past 12 months have seen CDBS colleagues maintain strong funding support of £13M; many congratulations to all those who have had funding success in what continues to be a very competitive funding climate. Of particular note, Prof David Lyons renewed his Wellcome Senior Research Fellowship where a £2M funded programme of work will determine, primarily using zebrafish, how the regulation of myelination by neuronal activity in the CNS affects neural circuit function. Dr Gülşen Sürmeli was awarded a prestigious Wellcome Trust/Royal Society Sir Henry Dale Fellowship, which will provide her with £1.3M for her research programme entitled "An investigation of distributed cortical neural circuit mechanisms for memory storage". Gülşen's award now means that CDBS hosts four Sir Henry Wellcome Fellows.

Dr Stuart Cobb's lab received significant funding from Neurogene Inc, a US based gene therapy company 'to develop innovative gene therapies in genetic brain disorders'. Prof Jamie Davies received funding worth £900,000 from the European Commission for 'applying optogenetics and machine vision to tissue engineering'. The BBSRC awarded Prof Mike Ludwig £662,000 for his project entitled "Oxytocin a sweat hormone?" while Prof Andrew Jarman received £535,000 for 'Building a molecular machine: analysis of co-chaperones for assembly of ciliary dynein motor complexes'. Dr Leah Herrgen secured £518,000, which will fund her project "Elucidating the role of surviving neurons in morphological and functional recovery after brain injury in zebrafish". Dr Jill Fowler was awarded £210,000 from ARUK as an extension to her Senior Fellowship for her project "the therapeutic potential of boosting astrocytic Nrf2 signalling to protect the neurogliovascular unit following cerebral hypoperfusion".

Dr Emily Osterweil and Prof Peter Kind are part of a consortium, Syn2Psy, funded by European Commission Horizon 2020 Marie Skłodowska-Curie Innovative Training Networks, which will provide Ph.D. training that will investigate synaptic dysfunction in neuropsychiatric disorders and its potential for therapeutic targeting. In addition, Emily also received an ONO Rising Star Initiative award to study the role of the Ubiquitin Proteasome System in neurodevelopment disorders. Dr Nathalie Rochefort has been selected as one of 26 life science researchers within their first four years as group leaders to become an EMBO Young Investigator.

We offer our many congratulations to Prof David Price who has recently been elected a Fellow of the Royal Society of Edinburgh for his research concerning the development of the cerebral neocortex.

Recognition of successes of CDBS-based post-docs and PhD students is also wonderful to report. Daisy Arkell (PhD student with Dr Emma Wood and Dr Olli Hardt) won the prize for the best talk "The black box effect: Reducing sensory stimulation after spatial learning promotes memory consolidation" at the Annual Learning and Memory conference organised by the Centre for Learning and Memory Processes (LAMP) at Durham University. Dr Chris Henstridge won a place on Scottish Crucible an award-winning leadership and development programme and also profiled on BBC News (https://www.bbc.co.uk/news/uk-scotland-edinburgh-east-fife-46589662) for his role in the "Dementia Buddies" outreach scheme which was awarded an NHS Lothian ACCORD Bursary. Dr Cristina Martinez-Gonzalez (Prof Matt Nolan lab) received Edinburgh Neuroscience Neuroresearchers' Fund support that allowed her to visit the laboratory of Prof. Karl Deisseroth (Stanford University) to attend his 3-day imaging and data analysis workshop. Dr Hannah Shorrock (PhD student with Prof Tom Gillingwater) won this year's Alison Douglas PhD Dissertation Prize for the Best Thesis. Many post-docs and and PhD students have been successful with Guarantors of Brain travel grants enabling them to attend conferences (FENS, SfN and BNA) to present posters of their research. Attending these events have provided them with tremendous networking opportunities in terms of both forging new collaborations and learning new technologies that will equip him for the next steps in their scientific careers – just remember to request you Letter of Support well in advance of application deadlines

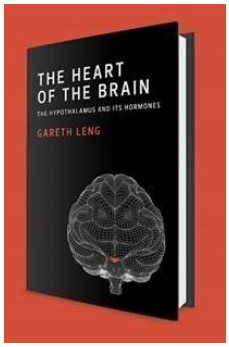


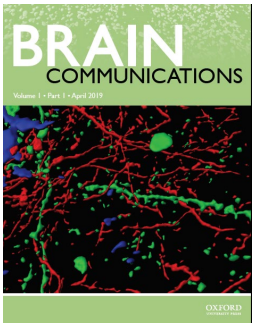
CDBS-authored papers continue to appear in internationally leading journals and the top specialized discipline-based journals. As REF2021 looms on the horizon, CDBS researchers continue to generate strong outputs for the UoA4 submission. The following are a small selection of the many excellent publications from the past year. In a wonderful

example of how basic research paves the way for translational research, the Brophy lab, with Polish colleagues, discovered the first human neurodevelopmental disease caused by a mutation in the Neurofascin gene. This mutation specifically deletes the glial isoform, Neurofascin155, which the Brophy lab discovered 21 years ago. The affected baby was originally diagnosed with spinal muscular atrophy (SMA) and other cases are now appearing in which patients who had been tentatively diagnosed with SMA may instead carry mutations in the Neurofascin gene. Their study was published in Human Molecular Genetics.

In their Nature Communications paper the Becker Lab propose that macrophages produce key molecules that dampen inflammation at the spinal injury site enabling motorneurons to bridge the gap and repair lost connections. The Cousin Lab in their PNAS paper using biochemical enrichment protocols and state of the art mass spectrometry revealed the molecular inventory of activity-dependent bulk endocytosis for the first time. The Hardingham Lab published a paper in Nature Protocols that describes a method of mixed species RNA-seq read sorting that is based on the evolutionary divergence of mRNA sequences present in different species. The Rochefort Lab in their Cell Reports paper show how neurons in the primary visual cortex can encode behaviorally relevant spatial locations, based on either visual cues or on self-motion feedback when visual cues are absent. Dr HongYang Zhang's study published in Current Biology reveals the role of Ih in excitatory interneurons in the regulation of Xenopus laevis tadpole locomotion, while last month a study led by Dr Tom Pratt received the accolade of having one of the images from the paper on the cover of Journal of Neuroscience.

Prof Gareth Leng has his book entitled "The Heart of the Brain: The Hypothalamus and Its Hormones" published in September 2018 with a review by Donald Pfaff, Professor of Neurobiology and Behavior, The Rockefeller University stating "As neuroendocrinology blossomed from a boutique field of neuroscience into the prime opportunity to relate molecular biology to hormones and behavior, Leng led by virtue of his productivity and his quantitative thinking. His book makes neuroscience accessible, as his writing blends charm and expertise. He presents complex ideas in a clear and interesting manner." Prof Tara Spires-Jones has been selected as the inaugural Editor-in-Chief of a new Open Access journal "Brain Communications" (https://academic.oup.com/braincomms). Indeed this journal launches Neuroscience Day (13/03/2019) and is an international, editorially independent, peer-reviewed journal that welcomes both direct submissions and manuscripts transferred from its sister journal Brain. Tara has already been busy recruiting Editoral Board Members from Edinburgh Neuroscience including Profs Richard Morris, Richard Ribchester, Siddharthan Chandran, and Karen Ritchie. Also contributing to editorial board remits, Dr Emily Osterweil has been selected to serve as Associate Scientific Advisor for Science Translational Medicine for 2019-2020.





In the past 12 months the CDBS Seminar Series has hosted 45 visiting speakers from across the globe. The breadth and diversity of the talks has encompassing all five research themes of interest associated with CDBS, Genes and Development, Synapse Circuits and Behaviour, Injury and Repair, Signalling, Homeostasis and Energy Balance and Ageing and Degeneration. Live streaming has become an important resource for accessing seminars across campuses and bringing our campuses closer. Many thanks to Dr Karen Smillie, Dr Chris Henstridge, Dr HongYan Zhang and Dr Leah Herrgen for their tremendous efforts in coordinating the seminars and to The Physiological Society for their funding that supports this activity.

In 2018/19 CDBS bid farewell to three colleagues, Dr Peter Flatman, Prof Mayank Dutia and Derek Thomson, who between them have contributed over 100 years of dedicated service; later this month Deb Allen will also retire. We wish each of them, with grateful appreciation of their immense contribution to CDBS and the former Centres, Divisions and Departments from which it has evolved, a long, happy and healthy retirement. Finally we express our thanks to all members of staff at CDBS for the commitment they show be it in research, teaching, technical support or administration

• The Patrick Wild Centre and Simons Initiative for the Developing Brain (SIDB)

http://patrickwildcentre.com; www.sidb.org.uk

The Simons Initiative for the Developing Brain (SIDB) is based in The Patrick Wild Centre for Research into Autism, Fragile X Syndrome and Intellectual Disabilities (PWC). The PWC was established in 2010 and SIDB in 2017. Together, the two Centres provide a unique opportunity to bring together a range of scientific and clinical expertise. SIDB has a strong basic science research portfolio, while the PWC focusses on clinical research and public engagement. Jointly, their aim is to understand how the brain develops by examining it on multiple levels, including molecular biology, neuronal circuitry, genetics, behaviour and cognition, and then to use this information to deliver rational therapeutic interventions.

SIDB grew from the successes of the Patrick Wild Centre and a fruitful second year (April 2018-March 2019) has boosted further growth for our Centre. Our membership has increased to include an additional six Associate Members (Gulsen Surmeli, Alfredo Gonzalez, Tom Pratt, John Mason, Rob Illingworth, Noboru Komiyama). In September 2019 we will also add six additional students to our PhD cohort. Each of our students will receive a fully funded 3.5 year studentship and these additional students will bring our cohort number to 13. We are proud to support such a strong community of PhD students and we have now set up a weekly PhD meeting (led by Peter Kind and Cathy Abbott as our PhD Director) where our students can come together to discuss relevant topics of interest. The last few months of 2018 were also a busy time for recruitment for SIDB. We have recently gone through the recruitment process for a SIDB Research Fellow and we hope to make an announcement on this soon. In June 2018 we completed our third annual grant call for SIDB members and awarded just under £615,000 across 6 awards. We are very happy to be able to support our SIDB researchers in this way and this third call brings our overall SIDB grant award total to £4.23M. We will launch our fourth grant call in May 2019.

After nearly a decade of highly productive research, the PWC shows no sign of slowing down. On the horizon there are a variety of exciting new projects. Most noteworthy these include a pilot study on the genetic cause of adult intellectual disability and an online data capture project for the genetic causes of autism and intellectual disability. Both projects are in their preliminary stages and updates will be available on our PWC website as they progress.

SIDB held its second annual scientific research retreat on the 4th and 5th September 2018 at the Royal Society of Edinburgh. The meeting was attended by approximately 250 individuals from the University of Edinburgh, our wider collaborators and special invited guests (including our External Advisory Board). We changed our programme slightly for 2018 and opened the floor to some of our SIDB postdoctoral researchers as well as our senior PIs. The first day concluded with a very enjoyable social evening at The Caves. Our 2019 meeting is scheduled for the 12th and 13th September 2019 and will again be held at The Royal Society of Edinburgh. For the PWC, in June 2019 we are hosting a conference in partnership with "Bridge the Gap – SYNGAP – Education and Research Foundation". This is an American charity whose goal is to bring SYNGAP-1 families from the US and UK together for meet-up events. Edinburgh has been chosen as the host city for the 2019 conference. During the 1-day meeting, SYNGAP-1 families will attend sessions where they will receive support, education and resources from academics and clinicians through talks, activities and Q&A sessions. The goal of the meeting is to empower the families and stress the importance of their involvement in driving research forward.

Watching the early development of SIDB and the continued growth of the PWC has been rewarding and we are proud of what we have achieved. Furthering our growth both scientifically and physically is an exciting prospect, especially as we begin planning our exciting move to the Edinburgh Bioquarter.

You can find out more about SIDB and PWC by visiting www.sidb.org.uk and www.patrickwildcentre.com..

• UK Dementia Research Institute at Edinburgh

https://ukdri.ac.uk

Neuroscience Day 2019 marks 18 months since the establishment of the UK DRI at the University of Edinburgh. The Centre's core aim is to elucidate the interactions within and between the brain vasculature, neurons, macroglia and microglia which control the trajectory of neurodegenerative disorders leading to dementia, and exploit this knowledge for therapeutic gain. Our five Programme Leads (Giles Hardingham, Joanna Wardlaw, Siddharthan Chandran, Tara Spires-Jones and Barry McColl) plus our Momentum Award holder, Josef Priller, have shown promising progress in their research through the publication of papers in well-regarded journals such as Nature

Neuroscience, Nature Reviews Neuroscience, Nature Protocols, Nature Communications. They, and their laboratories, receive strong support from DRI Scientific Administrator Dr Beverly Roberts, and DRI Laboratory Manager Ms Alexa Jury.

An important aim of the UK DRI at Edinburgh is to provide added value and create a strong environment of collaboration. Programme Leaders have also contributed to strengthening links between Edinburgh Neuroscience and the Centre for Cardiovascular Science, as well as with cross—College researchers in the innate immunity field, with several pan-Centre symposia already organised. Collaborative funding initiatives have been primed by these interactions: DRI PLs were co-applicants in Professor Andy Baker's (CVS) BHF Research Excellence Award (2019-23), with Joanna Wardlaw leading the Vascular Theme. Hardingham and McColl, with Dr Andrea Caporali (CVS) have secured Dementia Discovery Fund Investment for their work on the blood-brain-barrier, and Chandran and Hardingham, with Professor Neil Carragher (Edinburgh Drug Discovery) obtained funds from the Scottish Chief Scientists Office to develop a MND drug screening platform. Spires-Jones has attracted investment to work with several pharma companies, including Autifony, to develop novel therapeutics. She was also recently elected (along with Dr Jane Haley) to the European Dana Alliance for the Brain. Other recognition has come this year with DRI PLs elected Fellows of the Royal Society of Edinburgh (Chandran, Hardingham) and the Academy of Medical Sciences (Hardingham).

The Edinburgh DRI Centre held its launch symposium last April, attended by 250 people at the Royal Society of Edinburgh, including its international Scientific Advisory Board, chaired by Professor Richard Morris. These externally-facing meetings will be held every two years, with a local meeting (open to all Edinburgh researchers regardless of DRI links) in the alternate years. Our DRI Centre also benefits from being part of the wider UK DRI community, attending the annual UK DRI 'Connectome', as well as other focussed theme meetings. In addition to our scientific progress, our Centre has also grown in stature with the recruitment of three new Associate Members (we are the first UK DRI Centre to recruit these): Professor Chris Ponting (IGMM), Professor Seth Grant (CCBS) and Professor Dario Alessi (University of Dundee). The remit of the Associate Members is to enrich the scientific community within the UK DRI by bringing added value through their experience and complementary expertise. In addition, at least two further DRI Programme Leaders are scheduled to join us in the autumn, and these will be confirmed later in the year.

UK DRI at Edinburgh Launch Symposium April 2018

Institute for Genetics & Molecular Medicine

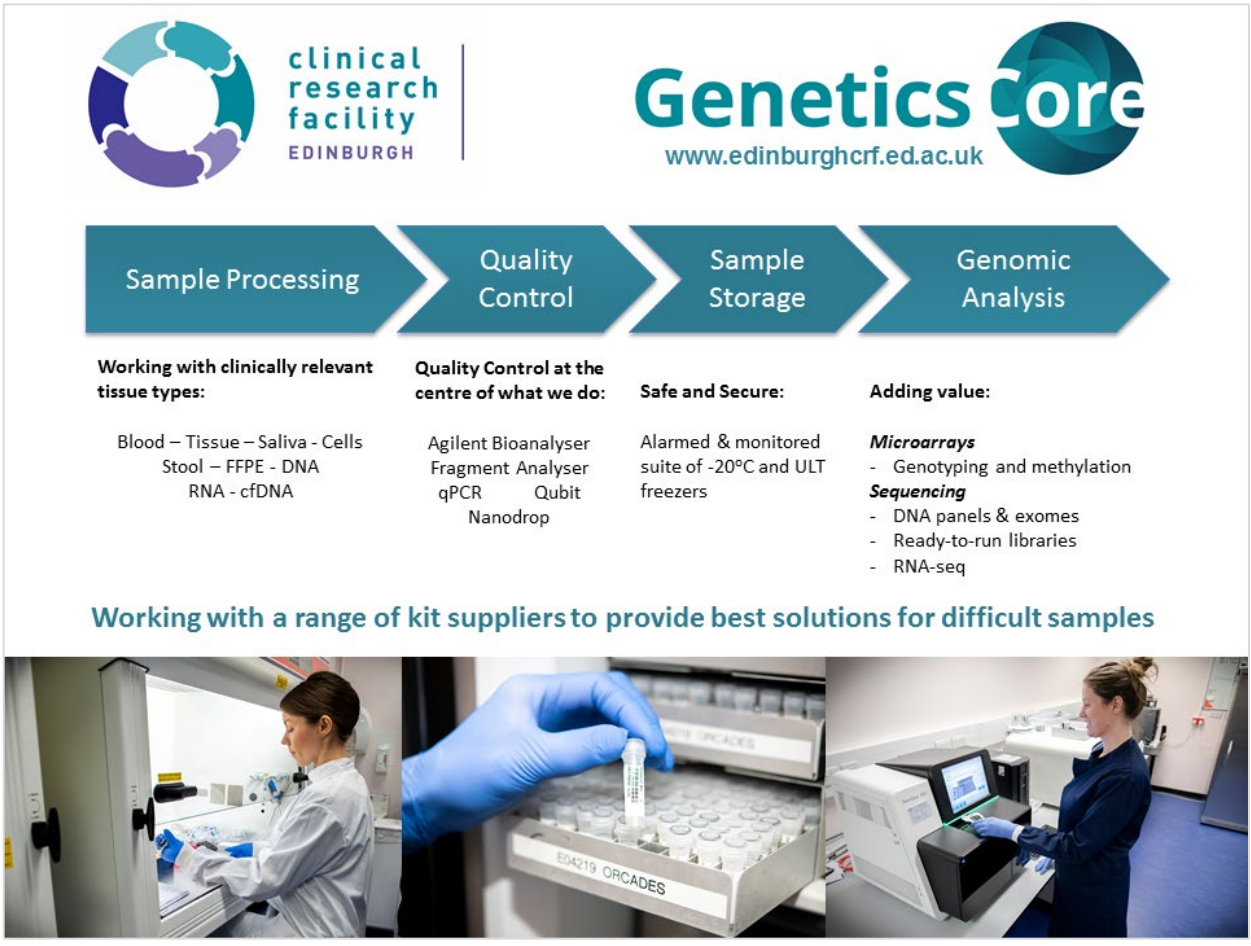
www.ed.ac.uk/igmm

Yanick Crow has led a clinical trial for Aicardi-Goutières syndrome (AGS), a severe childhood encephalopathy associated with enhanced type I interferon signalling. Hypothesising that endogenous retroelements might drive such interferon production, Yanick and colleagues decided to treat AGS patients with reverse transcriptase inhibitors (as used against the exogenous retrovirus HIV-1 that causes AIDS). In a letter published in the New England Journal of Medicine (Rice et al. 2018;379:2275-7) a reduction in interferon levels was observed in affected patients over a one year period of treatment, with levels of interferon increasing when the drugs were stopped.

Three papers recently published, and led by Pippa Thomson, have used data from the UK Biobank, Generation Scotland and the Major Depressive Disorder working group of the Psychiatric Genomics Consortium to study the genetic effects of response to stress and depression. It has been well recognized that stressful life events are a determinant of depressive symptoms. Stress is associated with poorer physical and mental health in those affected, with a person's response to stress predicting the onset of depression. Understanding individual variability in stress-sensitivity may lead to an identification of the molecular pathways involved. This research showed that there is both a genetic component to stress response that increases the liability to depression and that stress moderates the effects of genetic variants predisposing to depression. Pippa says: "These studies highlight the need to combine the study of environmental and genetic risk factors to better understand their effects on health."

Kathy Evans led a study involving several members of IGMM showing that inheritance of a translocation linked to major mental illness is associated with differential DNA methylation at loci implicated in neuronal development/function and in other studies of psychiatric illness. As genomic rearrangements are over-represented in individuals with psychiatric illness, it may be the case that such epigenetic analyses will be valuable more widely in the study of these conditions. (McCartney et al. Altered DNA methylation associated with a translocation linked to major mental illness. NPJ Schizophr. 2018 Mar 19;4(1):5)

Cathy Abbott has been invited to serve on the Psychology, Psychiatry and Neuroscience sub-panel for REF2021. She has also been appointed to the BoT of MND Scotland and chair of their Research Committee



Psychology

www.ed.ac.uk/ppls/psychology

Hildigunnur Anna Hall has started an internship at the Scottish Parliament

Psychology members at all levels have had a successful year: In November, Ms Hildigunnur Anna Hall (PhD student with Dr Bonnie Auyeung and Dr Tom booth) was selected for a 3 month full-time placement (starting January 2019) with the Scottish Parliament working in the health policy team of the Scottish Parliament Information Centre (SPICe) to assist in gathering and synthesising existing research and policy. Her PhD focuses on using existing data to assess links between women's health during pregnancy and children's developmental outcomes. Internships are open to all UKRI-funded PhD students in 2nd or 3rd year and allow students to understand how policymaking in general, and health policy in particular, is developed and scrutinised in the Scottish Parliament. Dr Sarah Stanton was awarded a 3 year £300K ESRC New Investigator grant (starting March 19. Sarah's research uses a social psychological approach to understand the cognitive and affective aspects of close relationships and their effects on behaviour, physiology, and health and well-being and her grant is titled 'Variety is the spice of love: promoting partner responsiveness within the relationship ecosystem'. Professor Ian Deary was awarded an OBS in the New Year honours 2019.

Professor Sharon Abrahams published a study in 'Neurology" which gained a lot of press interest. She found that, in addition to experiencing severely impaired movement, four out of five motor neurone disease (MND) sufferers also experienced a decline in their thinking skills. This is the first study to show that changes in thinking and language and behaviour are present in the earliest stages of MND and that patients are increasingly impaired in the later stages of the disease. Professor Robert Logie published a study in the 'Journal of Applied Research in Memory and Cognition' which sheds light on how people form memories and may offer ways of helping people maintain memory abilities as they age.

In December 2018, Psychology lost a valued colleague when Professor John Starr (Director, Alzheimer's Scotland Dementia research Centre and Co-Director, Centre for Cognitive Ageing & Cognitive Epidemiology) unexpectedly passed away.

Muir Maxwell
Epilepsy Centre
Part of the University of Edinburgh

MMEC is a "centre without walls" and a hub for multidisciplinary collaboration across the University of Edinburgh.

Our motto is:
"No epilepsy, better epilepsy"

Centre members include experts and researchers in brain cell development, synaptic function, genetics, protein biochemistry, cell biology, brain imaging, clinical trials, psychology, epidemiology, public health, informatics, and medical sociology.

MMEC focuses on translating our pre-clinical and clinical epilepsy research into clinical care.

We provide Training opportunities for the next generation of researchers.

Collaboration within and outwith Edinburgh welcome.

Seed-corn grants of up to £5,000 to obtain pilot data/ build collaborations for larger grants available.

MMEC supports Patient and Public Involvement in a number of ways.

If you would like to **find out more**, or **For Information on Giving** why not visit us on our stand today or contact us at: **mmec@ed.ac.uk**

www.muirmaxwellcentre.com

Neuroscience Day 2018 Speakers

2019 Annual Distinguished Lecturer

Professor Diane Lipscombe

Thomas J. Watson Sr. Professor of Science Director, Carney Institute for Brain Science, Brown University, USA

diane_lipscombe@brown.edu

Prof Lipscombe's website

Neuronal calcium ion channels in the pain pathway from gene to function

I was born in Edinburgh but spent most of my childhood in Orpington, Kent. My scientific career started at Burroughs Wellcome where, by a stroke of sheer luck, I was hired as a technician in Sir James Black's lab after leaving school. Jim Black encouraged me to join University College London where I graduated with a BSc and PhD from University College London in Pharmacology and where I studied with Humphrey Rang. I joined Yale University School of Medicine as a postdoctoral associate to work with Richard Tsien and moved with him to Stanford Medical School before joining Brown University in 1990. For close to 30 years, my lab has studied voltage-gated ion channels their functions, importance as drug targets, and roles in disease in neurons. At Brown University I Direct the Carney Institute for Brain Science and will serve as the President of the Society for Neuroscience from November 2018 for one year. I am honored to be giving this seminar thanks to all the amazing students and post docs who have collaborated with me over the years.

2019 Speakers (in programme order)

Professor Andrew McIntosh

Professor of Biological Psychiatry

Centre for Clinical Brain Sciences

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The genetics of depression

Andrew McIntosh is Professor of Biological Psychiatry and he Chairs the Psychiatric Genomics Consortium Major Depressive Disorder Group. Andrew works on identifying the causes and consequences of major depression using population-based and cohort studies of patients, individuals at high-genetic risk and the general population. His research combines genomics, imaging and data sciences – including the use of routinely collected datasets and record linkage.

Dr Nathalie Rochefort

Wellcome Trust Sir Henry Dale Fellow

Centre for Discovery Brain Sciences

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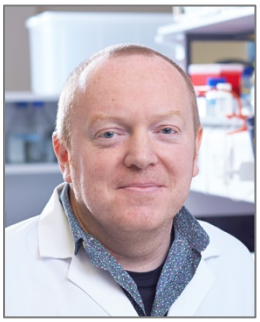
Vision in action: contextual signals in visual cortex.

Nathalie Rochefort is a Sir Henry Dale fellow at the University of Edinburgh. She is a sensory neuroscientist whose goal is to understand how neural activity in the visual cortex underlies our perception of a visual scene. As an undergraduate, she studied biology and epistemology in Paris. She then obtained a European PhD in Neuroscience from the University Paris-VI and the Ruhr-Universität-Bochum and did her post-doctoral training at the Technical University in Munich. Her work during her PhD and post-doctoral training has contributed to a new understanding of how neurons acquire their functional properties in the visual cortex and to the development of a powerful technique, in vivo two-photon calcium imaging, to investigate neuronal functions in the living brain. Current projects of her lab investigate how behavioural context modulates neuronal activity in the visual cortex and how experience durably modifies the activity of such networks.



Professor David Lyons

Professor of Neurobiology

Centre for Discovery Brain Sciences

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Using zebrafish to study myelinated axons in vivo

We use zebrafish to study myelinated axons, which comprise about half the volume of our nervous system and are essential to its formation and function. Disruption of myelinated axons is associated with numerous human diseases, including Multiple Sclerosis (MS). Therefore, we are also interested in understanding the mechanisms of myelinated axon pathology and in identifying methods to treat disease.

Our lab uses zebrafish for two principle reasons: first, their amenability for live imaging at high-resolution, which allows detailed cellular and functional analyses in vivo, and secondly, their suitability for large-scale genetic and chemical screens.

Zebrafish embryos are transparent and develop rapidly (myelin is formed from just two days after egg fertilization). These facts coupled with the relative simplicity of the early nervous system and the availability of transgenic lines that drive fluorescent reporters in a variety of cell types, make the zebrafish ideal for live in vivo imaging of entire developmental processes in real time. In addition, it is now possible to use zebrafish to study the functional activity of neurons and glia of the brain in real time, as the animal executes behaviours. We are currently using these approaches to study how the mechanisms by which myelination of neuronal circuits occurs, and how myelination and its dysregulation in turn affect circuit function.

Our gene discovery and chemical biology screens allow us identify novel regulators of central nervous system (CNS) myelination, demyelination and remyelination in vivo, and to find strategies with the potential to treat diseases of myelinated axons.

Dr Gülşen Sürmeli

Wellcome Trust Sir Henry-Dale Fellow

Centre for Discovery Brain Sciences

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Neural circuits for long-term memory storage

Gülşen Sürmeli's research focus is dissecting neural circuits underlying cognitive behaviour. Her lab employs a variety of cutting edge molecular biology, electrophysiology and in-vivo imaging tools to understand the circuit architecture and function that sustains the mechanism of long-term episodic memory. She did her PhD at Columbia University, USA followed by a brief post-doc at Janelia Research Campus, USA. She then moved to the University of Edinburgh as a Wellcome Trust Sir Henry Wellcome Fellow. She continues to be supported by the Royal Society and the Wellcome Trust as a Sir Henry Dale Fellow as of January 2019.

Dr Szu-Han Wang

BBSRC new investigator and Alzheimer's Research UK Senior Research Fellow

Centre for Clinical Brain Sciences

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Facilitating memory persistence in young, ageing and dementia

My research focuses on understanding the behavioural and brain mechanisms in memory persistence. Particularly, we investigate the receptor mechanism in the brain that underpins experience-dependent learning and memory stabilization. The key findings involve the discovery of training-dependent receptor regulation and training-led changes in receptor and circuit mechanisms in the brain (Wang et al, 2009ab, Nature Neurosci; Wang et al, 2012, Hippocampus; Finnie et al, 2018, Curr Biol). We showed that peri-learning events play a critical role in modulating memory persistence (Wang et al, 2010, PNAS; Salvetti et al, 2014, Learn Mem; Wang et al, 2018 Neuropharm). We developed a sensitive model to detect memory decline in early ageing and identify methods to reverse it (Gros and Wang, 2018, Neurobio Aging). We are applying this knowledge in delineating memory impairment in animal models of Alzheimer's disease. Our research ultimately aims to develop effective methods of reversing memory decline in health and in disease. BBSRC (NIG, IPA) and ARUK (SRF) fund our current research.

Dr Thanasis Tsanas

Chancellor's Fellow in Data Science

Usher Institute of Population Health and Informatics

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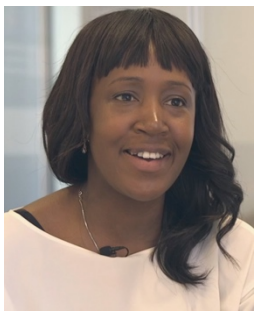
Developing new clinical decision support tools for frequent longitudinal monitoring of chronic disorders: applications in Parkinson's disease and mental disorders

I studied Engineering for my undergraduate and masters degrees and completed a PhD in Applied Mathematics (University of Oxford, 2012). I stayed at the University of Oxford to work as a research fellow in Biomedical Engineering and Applied Mathematics (2012-2016), Stipendiary Lecturer in Engineering Science (2014-2016); since 1/2017 I am a Chancellor's Fellow in Data Science at the Usher Institute of Population Health and Informatics, University of Edinburgh, and Lecturer in Statistical Research Methods at the University of Oxford.

I received the Andrew Goudie award (top PhD student across all disciplines, St. Cross College, University of Oxford, 2011), the EPSRC Doctoral Prize award (2012), the young scientist award (MAVEBA, 2013), and the EPSRC Statistics and Machine Learning award (2015). I was shortlisted in the final six candidates for the Papanikolaou prize (2011), and was key member of the Oxford biomedical engineering team that won the annual Physionet/Computing in Cardiology Competition (2012) for "Predicting mortality of ICU patients". One of my first-authored papers was highlighted as 'key scientific article' by Renewable Energy and Global Innovations. I was an 'Outstanding Reviewer' for the journal Computers in Biology and Medicine (2015), and won a 'Best reviewer award' from the IEEE Journal of Biomedical Health Informatics (2015).

I sit on the Editorial Board of JMIR Mental Health, and serve as Associate Editor in JMIR mHealth and uHealth. The research findings of my work have been commercialized by industrial partners such as Intel Corporation and LSVT Global, and have found application in the NHS.



Dr Emily Sena

Stroke Association Kirby Laing Foundation Senior Lecturer

Centre for Clinical Brain Sciences

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Seeking to increase the experimental validity and utility of preclinical stroke research

Preclinical stroke research has not been as effective as it may be in delivering therapies for patients. Meta-research, research on research, suggests that most in vivo ischaemic stroke studies are at risk of bias and this is associated with overstatements in treatment effects. This has focused on threats to internal validity, for which recent analyses suggest substantial improvements, and publication bias. My research seeks to understand threats to other aspects of experimental validity that may be impeding successful translation.

I use meta-research approaches facilitated by machine learning and text mining to understand the validity of preclinical stroke research. My approaches include developing a living systematic review to comprehensively describe in vivo studies, to support ongoing improvements and assessments of reporting risk of bias items. They also include understanding the limits to experimental validity more broadly, including the outcome measures used and how to implement multicentre studies to test hypotheses. Further, there is no a priori reason to suppose that scientists conducting in vitro research are better at avoiding bias, or that these experiments are any less susceptible to threats to experimental validity. Applying meta-research approaches to in vitro models of stroke is novel and I am developing the infrastructure to do this.

Trialling research improvement activities in collaboration with journals and our Animal Welfare Ethical Review Board (AWERB), I am assessing how to best effect positive change in preclinical research based on meta-research evidence. My research approaches and findings are applicable to the modelling of human diseases beyond ischaemic stroke.

Professor Jon Stone

Honorary Professor of Neurology

Centre for Clinical Brain Sciences

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Functional Neurological Disorders: merging brain and mind

Professor Jon Stone is an NHS Consultant Neurologist and Honorary Professor in Neurology in Edinburgh. He is an international leader in functional neurological disorder, also called psychogenic/dissociative/conversion disorder, and in the past, hysteria. Since 1999 he has published over 250 articles in the area including systematic reviews, large cohort and treatment studies. He led on new diagnostic criteria for functional neurological disorders in DSM-5 and ICD-11 and the development of professional organisations in the area. In 2016 he co-edited the volume 'Functional Neurologic Disorder' (ed Hallett, Stone, Carson) Elsevier 2016 setting a new standard for a teaching and research curriculum. He co-chaired the 3rd International Congress on this area in Edinburgh in 2017 (www.fnd2017.org) and is due to become secretary of the new international FND society – FNDS.

Jon graduated from the University of Edinburgh in 1992 and did his house officer jobs there. He worked in various SHO jobs in Newcastle, Leeds, Oxford and New Zealand before returning to Newcastle and Edinburgh to do two years of locum registrar neurology posts. He met Charles Warlow and Michael Sharpe in 1999 who supervised his PhD, a case control study of functional limb weakness. He became an NHS Consultant Neurologist in 2005. In 2009 he made the first website for patients with FND at www.neurosymptoms.org promoting a new transparent approach to diagnosis and treatment for what has been a highly stigmatised condition. The site has been translated by other neurologists in to 12 other languages and receives 60,000 visits a month. He runs a weekly clinic for patients with functional movement disorders and dissociative (non-epileptic) seizures and as of August 2012 is a National Research Strategy Clinician (NHS Scotland). He has been awarded the Biemond Lectureship (2014), Royal College of Physicians (London) Jean Hunter Prize for Nervous Disorders (2014), Royal College of Physicians (Edinburgh) Clouston Medal (2017) and Royal College of Psychiatrist Presidents Medal (2017). He has given invited plenary sessions at the World Congress of Neurology, American Academy of Neurology and Movement Disorders Society World Congresses as well as lectures to 18 neurology department in the UK and grand rounds at Harvard and Stanford. He was promoted to Professor in 2018 but remains a full time NHS clinician

Professor Edward Fon, Professor Derek Bowie and Professor Stefano Stifan

McGill University, Canada

An overview of neuroscience research at McGill University, Canada

Professor Edward Fon is Scientific Director of the Montreal Neurological Institute. His research interests are on the molecular events underlying Parkinson's Disease. Professor Derek Bowie is Director of GEPROM, Department of Pharmacology & Therapeutics. His research focusses on glutamate and GABA-A receptors and their involvement in conditions/disease states such as autism and Alzheimer's disease. Professor Stefano Stifan is based in the Montreal Neurological Institute where his research centres on the regulation of neural stem cells in the developing brain, as well as neural circuit integration with particular focus on cell vulnerability in MND.

They are working with Professor David Wyllie (Director, Centre for Discovery Brain Sciences) and Professor Siddharthan Chandran (Director, Centre for Clinical Brain Sciences and Director, Edinburgh Neuroscience) to create a new partnership between McGill University and Edinburgh in the area of neuroscience. This initiative will focus on three main areas of neuroscience research in which both Edinburgh and McGill have considerable strengths and where building on synergistic collaborations between the two institutions is hoped to lead to major funding bids in the future: (i) autism/neurodevelopmental disorders, (ii) neurodegenerative disorders and (iii) intellectual disabilities (this area will require studies using human induced pluripotent stem cells).

Professor Robert Logie

Professor of Human Cognitive Neuroscience

Psychology

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Cognitive offloading: Why digital memory is bad for your brain

Robert H Logie is Professor of Human Cognitive Neuroscience at the University of Edinburgh. His research and teaching interests cover both theoretical and applied approaches to the cognition of human memory, focused on experimental behavioural studies. Projects range from developing cognitive theories of working memory across the adult lifespan, through cognitive deficits associated with focal and degenerative brain damage, to the interaction of human cognition with digital technology. His current research 'Working Memory Across the Lifespan: An Adversarial Collaboration' is funded by ESRC, and involves an international collaboration among cognitive researchers who hold contrasting views about the understanding of human cognition.

Professor Giles Hardingham

City of Edinburgh Professor of Pharmacology

Centre for Discovery Brain Sciences and Associate Director, UK Dementia Research Institute

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The UK Dementia Research Institute in Edinburgh

Hardingham has identified neurodegenerative and neuroprotective pathways and how gene regulation underlies them. He showed that Ca2+ signals with different spatial properties (acting in nucleus, cytoplasm, and submembranous regions) trigger distinct transcriptional responses and that nuclear Ca2+-driven gene expression mediates activity-dependent neuroprotection, with others showing it mediates long-term memory and inflammatory pain. More recently he showed the central role of mitochondrial Ca2+ in excitotoxicity. Much of Hardingham's research involves the NMDA receptor (NMDAR), which can promote Ca2+-dependent neuroprotection or degeneration depending on circumstances. He established the basis for this, discovering that pro-survival vs pro-death NMDAR signalling depends on receptor location (synaptic vs. extrasynaptic) and subunit. Others subsequently showed that synaptic vs. extrasynaptic NMDAR imbalance may contribute to Huntington's, Alzheimer's and stroke pathogenesis. Hardingham has also uncovered pathways promoting neuronal homeostasis, including activity-dependent gene networks that boost resistance to excitotoxicity and apoptosis, and recently defined the activity-dependent transcriptome in human neurons. He uncovered the reason why neurons have weak antioxidant defences and how synaptic activity regulates these defences to meet demand. He also identified signals between neurons and glia that control gene expression non-cell-autonomously and regulate neuro-glial metabolic coupling. This work on mechanisms underlying the maintenance or loss of brain homeostasis has revealed regulatory nodes and potential therapeutic targets for neurological disorders.

PhD Student Data Blitz Talk Abstracts

What mediates the transmission of prenatal stress signals from mother to foetus?

Ms Sze Ying*, with J Fernandes*, TJ Phillips^, H Scott^, CP Case^, PJ Brunton*, *Centre of Discovery Brain Sciences and The Roslin Institute; ^School of Clinical Sciences, University of Bristol

Excessive stress during pregnancy can strongly impact the developing offspring, leading to permanent and long-term changes that extend into adulthood, in a process known as “prenatal programming”. In our rat model, where pregnant dams were exposed to chronic social stress, prenatally stressed (PNS) offspring exhibit anxious behaviour, cognitive deficits and exaggerated stress responses [1,2]. However, it is unclear how the stress signals are being transmitted from mother to foetus during the gestation period to result in the “programming”.

Stress increases the secretion of glucocorticoids in the maternal circulation, and foetal glucocorticoid overexposure has been proposed as one of the possible mechanisms of programming [3]. However, it was found that the placenta was in fact playing an active role in limiting the direct crossover of corticosterone to the foetus, and the corticosterone concentrations were not different in the brains of PNS and control offspring.

The possible role of oxidative stress in prenatal programming was then investigated, using an antioxidant drug [4] administered to the pregnant dam before chronic social stress. Notably, this rescued the anxiety phenotype and several other anxiety-related physiological markers in the brains of the PNS offspring. The placenta was also found to be actively secreting factors that are transmitted to the foetal circulation, and may be directly involved in programming of these physiological and behavioural changes in the offspring. This suggests that oxidative stress, especially in the placenta, is involved in the transmission of stress signals, and targeting it could be a therapeutic option in preventing the adverse outcomes of stress during pregnancy.

Funding: BBSRC, British Society of Neuroendocrinology, University of Edinburgh Principal’s Career Development Scholarship

References: 1) Brunton and Russell, 2010. Prenatal social stress in the rat programmes neuroendocrine and behavioural responses to stress in the adult offspring: sex-specific effects. J Neuroendocrinol. 2) Brunton et al., 2015. 5alpha-reduced neurosteroids sex-dependently reverse central prenatal programming of neuroendocrine stress responses in rats. J Neurosci. 3) Cottrell and Seckl, 2009. Prenatal stress, glucocorticoids and the programming of adult disease. Front Behav Neurosci. 4) Phillips et al., 2017. Treating the placenta to prevent adverse effects of gestational hypoxia on fetal brain development. Sci Rep.

Astrocytes regulate cortical neuronal Kir expression during development to increase cell excitability

Ms Alison Todd, with Philip Hasel, Owen Dando, David J A Wyllie, Jing Qiu & Giles E Hardingham, Centre for Discovery Brain Sciences

Introduction: Astrocytes play important roles in neuronal development and function throughout life, with strong indications they are important for synaptogenesis. Despite their suspected roles, the precise influence of astrocytes over neurons has yet to be revealed. To address this we investigated the effect of astrocytes on the neuronal transcriptome during development by using a mixed-species co-culture system, conducting RNA sequencing on cortical rat neurons grown with (co-culture) and without (mono-culture) mouse astrocytes. We used these results to guide further investigation into the functional consequences of astrocyte-controlled gene expression.

Results: Nearly 2,000 genes were either significantly up or down-regulated by a factor of >1.5 in neurons grown with astrocytes. Of these, the Kir family was strongly down-regulated in co-culture neurons compared to mono-culture neurons at DIV 8, with the greatest effect being on Kir3.1 (KCNJ3) and Kir2.3 (KCNJ4). Consistent with this we observed both an increase in the membrane resistance and a more depolarised resting membrane potential in co-cultured neurons. Furthermore, co-cultured neurons showed greater intrinsic excitability with a leftward shift of the FI curve, and a significant reduction in the rheobase current compared to mono-cultured neurons. Application of the Kir3.1 and Kir2.3 antagonists tertiapin-Q and ML 133 to mono-cultured neurons resulted in a similar shift in excitability that was observed when neurons were co-cultured with astrocytes. However, we did not observe astrocytes to influence the gene expression of AMPA or NMDA receptor subunits, and functionally there was no significant difference in the frequency or amplitude of mEPSC events.

In summary, we do not see that astrocytes are required for excitatory synapse formation in cortical neurons. Instead, we have shown that astrocytes reduce the expression of Kir channels in cortical neurons, which functionally alters neuronal properties resulting in increased excitability.

Funding: Euan MacDonald Centre for Motor Neurone Disease Research, UK Dementia Research Institute at Edinburgh

GABAA Receptor mediated inhibition… without GABA (?!)

Mr Nathanael O'Neill, with Molly Hickey, Sergiy Sylantyev, Centre for Clinical Brain Sciences

Background: Neurons express a wide variety of neurotransmitter receptors which allow them to communicate with each other. Activation of these receptors causes either excitation or inhibition in the neuron. The main inhibitory receptor – and the topic of my PhD – is the GABAA receptor. The classical view of GABAA receptors signalling in the brain is simple: they are active in the presence of GABA, and – just as importantly – they fall silent in its absence. However, two studies (McCartney, 2007 and Wlodarczyk AI, 2013) demonstrated that this was a gross oversimplification. They showed that in the hippocampus GABAA receptors exhibit constitutive activity, meaning that they are spontaneously active even in the absence of GABA.

Rationale: When I started my PhD, although the presence of spontaneously active GABAA receptors had been confirmed, their function remained elusive. During my PhD I was able to address this ambiguity by performing electrophysiological recordings from the rat dentate gyrus.

Results and Conclusions:
1. Spontaneously opening GABAA receptors produce tonic inhibitory currents in the dentate gyrus. The inhibitory charge delivered by spontaneous receptors is 20-fold greater than that produced in the presence of GABA. Thus, they cannot be discounted as a mere artefact.
2. These spontaneous receptors are outwardly rectifying, meaning that they deliver more inhibition at depolarised membrane potentials. When these receptors are blocked the passive and active membrane properties of the neurons change so that they become hyper-excitable.
3. The entire function of the dentate gyrus network is altered as a result: neurons are no longer able to filter incoming synaptic signals as effectively - neurons fire action potentials when previously they had been silent. However, LTP amplitude was not altered.
4. Finally, I uncovered previously unknown mechanism of actions of Midazolam (potent anti-convulsant) and Zolpidem (anxiolytic) which both increase the amount spontaneous receptor activity.

Exploring the effects of CNS hypomyelination on circuit function and behaviour

Ms Megan Madden[1], with Jason Early[1], Elelbin Ortiz[3], Michael Granato[3], Isaac Bianco[2] & David Lyons[1], [1]Centre for Discovery Brain Sciences, [2]Department of Neuroscience, Pharmacology and Physiology, University College London, [3]Department of Cell and Developmental Biology, University of Pennsylvania

Activity regulated myelination (the adjustment of myelin morphology according to activity of the underlying neurons) is proposed as a novel mechanism of central nervous system (CNS) plasticity. As a key regulator of conduction velocity, adjustments in myelination could fine tune the temporal precision of action potentials during circuit development and adaptation. Despite building evidence, the contribution of myelin to nervous system plasticity will be debated until we can directly link changes in myelin at a cellular level to behavioural correlates and altered circuit activity in vivo. We set out to address this problem using larval zebrafish as a model organism.

Larval zebrafish display stereotypical innate behaviours – for example the escape response - at an early age, which are essential for their survival. Interestingly, the onset and progression of CNS myelination coincides with the development and refinement of these behaviours over time. Using a larval zebrafish mutant with CNS specific hypomyelination, we set out to investigate whether disrupting myelination during development would perturb circuit function and behaviour. We monitored free swimming behaviour of mutants and their wild type siblings, and compared their locomotor responses to different sensory stimuli as well as during routine hunting and swimming behaviour.

We found that the latency of acoustic startle responses is increased in mutants compared to their siblings, likely representing a simple conduction delay along the axon of the main neuron which mediates this response. Unexpectedly, we also found that during spontaneous swimming mutants exhibit increased swim bout frequency and a shift towards high velocity swim bouts, representing more complex underlying physiology. In the final year of my project, we will use a combination of electrophysiology and functional imaging techniques to measure the functional effects of hypomyelination on the circuits underlying these behaviours. In doing so we hope to identify specific contributions of myelin to circuit function, and thus behaviour, in vivo.

This project has been funded by Wellcome Trust.

Bilingualism and Cognitive Functions

Ms Lihua Xia, with Thomas Bak, Antonella Sorace, Mariana Vege-Mendoza, Psychology

There is a debate on the “bilingual advantages”, which refers to that bilinguals outperform monolinguals on a variety of tasks involving executive functioning. This study aims at examining the “bilingual advantage” in young adults through three well-established cognitive tasks: Attention of Network (ANT), Number Stroop task, and The Test of Everyday Attention (TEA). The results suggested the “bilingual advantages” on different attentional control components. Specifically, comparing to the monolinguals, bilinguals displayed a smaller switching cost and faster disengagement attention on the ANT; a smaller conflict effect on the Stroop task; better performance on the attentional switching on the TEA. The current study supports the “bilingual advantages”, which demonstrates that bilinguals experience less influence from relevant information and have greater ability to disengage attention from previous trials. Additionally, their continual and extensive management in the conflict arising from the simultaneous of their two languages, leading to an enhanced executive control. Furthermore, the experience of frequently switching their languages in the bilinguals resulted in a more flexible attentional switching. Due to cognitive development, this processing effect mostly reported in the children and the elderly population. This finding provides supporting evidence for the “bilingual advantages” in young adults. Importantly, this study has implications for interpreting the “bilingual advantages” from the new perspective of disengagement attention.

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Posters

Posters can be found in two areas: Conference Centre foyer (posters numbered 1 – 30) and The Great Hall (which is upstairs) (posters numbered 31 – 56)

Cellular & Molecular

1. **Spontaneously Opening GABAA Receptors Decrease Excitability and Tune Coincidence Detection in Hippocampal Granule Cells** , Nathanael O'Neill, Molly Hickey, Sergiy Sylantyev , Centre for Clinical Brain Sciences, University of Edinburgh

2. **Using HaloTag technology to measure protein turnover in the living brain**, Edita Bulovaite, Ricky Qiu, Seth Grant, Centre for Clinical Brain Sciences, University of Edinburgh

3. **Neuroprotective effects of astrocyte-specific overexpression of Nrf2 in a mouse model of stroke,** [1]Lizi Hegarty, [1]Margaux Aimable, [1]Katharina Nagassima Rodrigues Dos Reis, [2]Jeffrey A. Johnson, [1,3]Giles E Hardingham, [1]Karen Horsburgh, [1]Jill Fowler, [1]Centre for Discovery Brain Sciences, University of Edinbrugh [2]School of Pharmacy, University of Wisconsin-Madison, [3]UK Dementia Research Institute at Edinburgh

4. **Identification of a novel gene regulating myelinated axon caliber and synapse maintenance in the CNS**, Jenea M Bin, Daumante Suminaite, Megan Madden, Silvia Benito, Linde Kegel, Matthew Livesey, David A Lyons, Centre for Discovery Brain Sciences, University of Edinburgh

5. **Disruption of the solute transporter NKCC1 in myelinating Schwann cells leads to severe peripheral nerve pathology** Linde Kegel[1,], Katy LH Cole[1,], Marion Baraban[1], Rafael Almeida[1], Matthew R Livesey[2], Maria Rubio[1], Anna Klingseisen[1], Silvia Benito[1], Jason J Early[1], Richard J Poole[3] and David A Lyons[1], [1]Centre for Discovery Brain Sciences, [2]Centre for Clinical Brain Sciences, both University of Edinburgh, [3]Department of Cell & Developmental Biology, University College London

6. **Do HCN channels link axonal activity and adaptive myelination?,** Matthew Swire, Charles ffrench-Constant, Matthew Livesey MRC Centre for Regenerative Medicine, Centre for Discovery Brain Sciences, University of Edinburgh

7. **New insights into the assembly and maintenance of the juxtaparanodal Kv1 complex,** Nina Kozar, Dies Meijer, Centre for Discovery Brain Sciences & Edinburgh Centre for MS Research, University of Edinburgh

8. **Characterisation of intrinsic and synaptic properties of hippocampal neurons in Grin2a+/- and Grin2a-/- rats**, Farhana Yasmin, Sam A. Booker, Neela K. Codadu, Sarfaraz Nawaz, Katie F. M. Marwick, Emma R. Wood, Peter C. Kind, Giles E. Hardingham and David J. A. Wyllie, Centre for Discovery Brain Sciences, Simons Initiative for the Developing Brain, University of Edinburgh

9. **Computational > investigation of Neurogranin's influence on CaMKII activation using > KappaNEURON** Domas Linkevicius, David C. Sterratt Institute for Adaptive and Neural Computations, School of Informatics, University of Edinburgh

10. **An interactive website to investigate the developmental expression of genes associated with autism** Owen Dando[1,2,3], Zrinko Kozic[1,2] and Peter Kind[1,2,3], [1]Simons Initiative for the Developing Brain, [2]Centre for Discovery Brain Sciences, [3]Patrick Wild Centre, all University of Edinburgh

11. **Laboratory Automated Interrogation of Data (LAB-AID): Ephys — An interactive website for the visualisation and analysis of electrophysiological properties in rodent models of autism**, Zrinko Kozic[1,2], Owen Dando[1,2,3], Peter Kind[1,2,3], [1]Simons Initiative for the Developing Brain, [2]Centre for Discovery Brain Sciences, [3]Patrick Wild Centre, all University of Edinburgh

Neural Systems & Circuits

12. **Organisation of the medial entorhinal cortex output pathways**, Sau Yee Tsoi, Zuzanna Bogdanowicz, Matthew Nolan, Gülşen Sürmeli, Centre for Discovery Brain Sciences, University of Edinburgh

13. **Comparative anatomy of the neuromuscular junction: Implications for larger animal models of neurodegenerative diseases**, Ines Boehm, Ross A. Jones, Thomas H. Gillingwater, Edinburgh Medical School: Biomedical Sciences; Centre for Discovery Brain Sciences; Euan MacDonald Centre for Motor Neurone Disease Research, all University of Edinburgh

14. **Two stages of synaptic potentiation in the hippocampus during acquisition and consolidation of a contextual fear memory**, Francesco Gobbo[1,2], Bruno Pinto[2,3], Ajesh Jacob[2], Laura Cancedda[3], Antonino Cattaneo[2], [1]Centre for Discovery Brain Sciences, University of Edinburgh [2]Bio@SNS, Scuola Normale Superiore, Pisa, Italy, [3]Department of Neuroscience & Brain Technologies, Istituto Italiano di Tecnologia, Genova, Italy

15. **Methylglyoxal, a glycolytic metabolite associated with painful diabetic neuropathy, alters C-fibre activity-dependent slowing in a sex-dependent manner**, Atanaska Velichkova, Amy L. Hall, Carole Torsney, Centre for Discovery Brain Sciences, University of Edinburgh

16. **Zebrafish as an in vivo electrophysiology model for investigating myelinated axon function in neuronal circuit**, Daumantė Šuminaitė, Jenea Bin, Matthew Livesey and David Lyons, Centre for Discovery Brain Sciences

17. **The Heading Encoding Circuit in the Insect Brain**, John Pisokas School of Informatics, University of Edinburgh

18. **Imbalance if flight-freeze responses and their cellular correlates in the Nlgn3-/y rat model of autism**, NJ Anstey[1,2,3,4], V Kapgal[2,3,4], AKH Toft[1,2,3,4], S Tiwari[2,3,4], T Spano[2,3,4], S Nawaz[1,2,3,4], S Chattarji[2,3,4], DJA Wyllie[1,2,3,4], ER Wood[1,2,3,4], O Hardt[2,3,4,5], PC Kind[1,2,3,4], [1]Centre for Discovery Brain Sciences, University of Edinburgh [2]Centre for Brain Development and Repair, Instem, Bangalore, [3]Simon's Initiative for the Developing Brain, [4]Patrick Wild Centre, both University of Edinburgh [5]McGill University, Canada

19. **Experience-dependent changes in CA1 place cell spatial information and CA1 network activity are disrupted in Fmr1 KO rats**, Antonis Asiminas[1,2,3,4], Peter C Kind[1,2,3,4], Emma R Wood[1,2,3,4], [1]Centre for Discovery Brain Sciences, [2]Simons Initiative for Developing Brain, [3]Patrick Wild Centre for Research into Autism, Fragile X Syndrome & Intellectual Disabilities, all University of Edinburgh [4]Centre for Brain Development & Repair, Bangalore, India

20. **Impaired Functional Connectivity in a Rat model and Humans with Fragile X Syndrome**, Joanna A.B. Smith[1,2,3] , Andrew G. McKechanie[1,2,4] , Milou Straathof[5] , Rick M. Dijkhuizen[5] , Sumantra Chattarji[1,2,6] , Andrew C. Stanfield[1,2,4] , Sally M. Till[1,2,3] , Peter C. Kind[1,2,3,6], [1]Patrick Wild Centre, [2]Simons Initiative for the Developing Brain, [3]Centre for Discovery Brain Sciences, [4]Centre for Clinical Brain Sciences, all University of Edinburgh [5]Center for Image Sciences, University Medical Center Utrecht, The Netherlands, [6]Centre for Brain Development and Repair, Instem, Bangalore, India

21. **Multifaceted homeostatic regulation of cellular excitability in Fmr1-/y mice**, Laura Simoes de Oliveira, Sam A. Booker, Natasha J. Anstey, Paul S. Baxter, Owen R. Dando, Diane Sherman, Giles E. Hardingham, Peter J. Brophy, David J.A. Wyllie, Peter C. Kind, Centre for Discovery Brain Sciences; Simons Initiative for the Developing Brain; Patrick Wild Centre, both University of Edinburgh

Cognition

22. **Phenome-wide association study of epigenetic age in the Lothian Birth Cohort 1936**, Anna J Stevenson, Daniel L McCartney, Tara L Spires-Jones, Andrew M McIntosh, Ian J Deary, Riccardo E Marioni, [1]Centre for Genomic & Experimental Medicine, [2]Centre for Cognitive Ageing & Cognitive Epidemiology, [3]Department for Psychology, [4]UK Dementia Research Institute at Edinburgh, [5]Centre for Discovery Brain Sciences, [6]Division of Psychiatry, Centre for Clinical Brain Sciences, all University of Edinburgh

23. **Genetic factors associated with recontact and mental health survey participation in a large population cohort**, Mark J. Adams, David M. Howard, W. David Hill, Ian J. Deary, Andrew M. McIntosh, Division of Psychiatry, Centre for Clinical Brain Sciences, and Department of Psychology, both University of Edinburgh

24. **Longitudinal trajectories of DNA methylation outliers and their associations with cognitive decline**, Anne Seeboth[1], Daniel L. McCartney[1], Kathryn L. Evans[1], Andrew M. McIntosh[123], Sara Hägg[4], Ian J. Deary[125], Riccardo E. Marioni[12], [1]Centre for Genomic & Experimental Medicine, [2]Centre for Cognitive Ageing & Cognitive Epidemiology, [3]Division of Psychiatry, Centre for Clinical Brain Sciences, both University of Edinburgh [4]Department of Medical Epidemiology and Biostatistics, Karolinska Institutet, Stockholm, Sweden, [5]Department of Psychology

25. **Validity of the English Version of the COMEGAM**, Kym Craig, Daniel Hale, Pierre Mongeau, Catherine Grainger, Mary E. Stewart, Heriot-Watt University, University of Stirling; University of Quebec in Montreal

26. **Development, Delivery and Assessment of the First Motorsport-Specific Concussion Education Programme**, Dr Stephanie A. Adams, Anthony P. Turner, Hugh Richards, Peter J Hutchinson, Institute for Sport, PE & Health Sciences, Moray House School of Education, University of Edinburgh; Academic Division of Neurosurgery, Addenbrooke's Hospital, University of Cambridge.

27. **Concurrent validation of the UK Biobank cognitive assessment**, Chloe Fawns-Ritchie and Ian J Deary. The Centre for Cognitive Ageing & Cognitive Epidemiology, Department of Psychology, University of Edinburgh

28. Generation Scotland - Using Electronic Health Records for Research, Archie Campbell, David Porteous, Rachel Edwards, Centre for Genomic & Experimental Medicine, Institute of Genetics & Molecular Medicine, University of Edinburgh

29. Does the test order and the subject of study affect the performance of students on attentional tasks? Lihua Xia, Thomas Bak, Antonella Sorace, Mariana Vega-Mendoza, Psychology, University of Edinburgh

30. Lesions of the head direction cell system impair directional discriminations, Anna E. Smith[1,2], Olivia A. Cheek[1], Emily L.C. Sweet[1], Paul A. Dudchenko [1,2], Emma R. Wood[1], [1]Centre for Discovery Brain Sciences, University of Edinburgh [2]Psychology, School of Natural Sciences, University of Stirling

Development & Regeneration

31. Investigating the Effects of 16p11.2 Deletion on Cerebral Development and Interneuron Production, Rana Fetit, Sarah Morson, Yifei Yang, Mandy Johnstone, Stephen Lawrie, Thomas Theil, Thomas Pratt, David Price, Simons Initiative for the Developing Brain, Centre for Discovery Brain Sciences, both University of Edinburgh

32. Understanding the role of 16p11.2 CNV genes in human cerebral corticogenesis, S. Morson, Y. Yang, D. J. Price, T. Pratt, Centre for Discovery Brain Sciences, University of Edinburgh

33. Characterising INPP5E's role in forebrain development using human brain organoids, Bhuvaneish Selvaraj, James Cooper, Ariane Willems, Karen Burr, Mandy Johnstone, Siddharthan Chandran, Thomas Theil, Centre for Discovery Brain Sciences, University of Edinburgh

34. Dissecting the contribution of innate immune cells to regeneration following demyelination, Sarah Neely, David Lyons, Centre for Discovery Brain Sciences, University of Edinburgh

35. Imaging activity-dependent myelination in the developing zebrafish spinal cord, Helena Cornu, Rafael Almeida, David Lyons Centre for Discovery Brain Sciences, University of Edinburgh

36. Neuronal activity accelerates myelin sheath growth within a critical period in vivo, Jill M Williamson, David A Lyons Centre for Discovery Brain Sciences, University of Edinburgh

37. Independent regulation of targeting and growth orchestrates myelination by oligodendrocytes in vivo, Anna Klingseisen, Ana-Maria Ristoiu, Peter J. Brophy and David A. Lyons, Centre for Discovery Brain Sciences, University of Edinburgh

38. Using zebrafish to study how neuronal activity regulates multiple aspects of myelination, Rafael Almeida, Sarah Lewis, David Lyons Centre for Discovery Brain Sciences, University of Edinburgh

39. Chemical Screening with VAST, Jason Early, Katy Cole, David Lyons Centre For Discovery Brain Sciences, University of Edinburgh

40. An automated Chemical Screen for Modulators of Brain Repair in Zebrafish, David Greenald
Bella Spencer, Nimra Rasheed, Leah Herrgen, Centre for Discovery Brain Sciences, University of Edinburgh

41. How are brain structure and function restored after a mechanical injury? Francois Waharte, Leah Herrgen, Centre for Discovery Brain Sciences, University of Edinburgh

42. Rapid clearance of cellular debris by microglia limits secondary neuronal cell death after brain injury in vivo, Chiara Herzog[1], Laura Pons Garcia[1], Marcus Keatinge[1], David Greenald[1], Christian Moritz[2], Francesca Peri[2,3] and Leah Herrgen[1], [1]Centre for Discovery Brain Sciences, University of Edinburgh [2]EMBL Heidelberg, Germany, [3]Institute of Molecular Life Sciences, University of Zürich

43. Development of a high-throughput screening platform for oligodendrocyte myelination (for progressive multiple sclerosis), (Jee Soo) Monica Kim[1], Marie Bechler[1], Anthony Buchoux[2], Maaria Ginai[3], Adam Stokes[2], Anthony Callanan[3], Mark Bradley[4], Neil Carragher[5], Charles ffrench-Constant[1], [1]MRC Centre for Regenerative Medicine, University of Edinburgh; [2]Scottish Microelectronics Centre; [3]School of Engineering; [4]School of Chemistry; 5 Cancer Research UK Edinburgh Centre

44. Central nervous system regeneration is driven by microglia necroptosis and repopulation, Amy F. Lloyd[1], Claire L. Davies[1], Rebecca K. Holloway[1], Yasmine Labrak[2], Graeme Ireland[1], Dario Carradori[2], Alessandra Dillenburg[1], Eva Borger[3], Daniel Soong[1], Jill C. Richardson[4], Tanja Kuhlmann[5], Anna Williams[3], Jeffrey W. Pollard[1], Anne des Rieux[2], Josef Priller[6,7], Veronique E. Miron[1], [1]MRC Centre for Reproductive Health, University of Edinburgh; [2]Louvain Drug Research Institute, Université Catholique de Louvain, Belgium; [3]MRC Centre for Regenerative Medicine; [4]Neurosciences Therapeutic Area Unit, GlaxoSmithKline R&D Ltd, Stevenage; [5]Institute of Neuropathology, University

Hospital Muenster, Germany; [6]Department of Neuropsychiatry and Laboratory of Molecular Psychiatry, Charité Universitätsmedizin Berlin, Germany; [7]UK Dementia Research Institute at Edinburgh

45. **Enhancing remyelination with CRISPR/Cas9 edited human oligodendrocyte precursor cells**, L.J. Wagstaff, A. Fidanza R.J.M. Franklin, A.C. Williams, MRC Centre for Regenerative Medicine; MS Society Edinburgh MS Centre, University of Edinburgh; Wellcome Trust-MRC Cambridge Stem Cell Institute, Cambridge

Degeneration and Neuropathology

46. **Investigating the role of astrocytes in central nervous system remyelination,** Irene Molina-González[1,5], Z. Jiwaji[2,3,4], O. Dando[2,3], G. Hardingham[2,3,5], S. Chandran[2,4,5], V. E. Miron[1,5], [1]MRC Centre for Reproductive Health, [2]Edinburgh Dementia Research Institute, [3]Centre for Discovery Brain Sciences, [4]Centre for Clinical Brain Sciences, [5]Edinburgh Centre for Multiple Sclerosis Research, all University of Edinburgh

47. **Brain hypoxia in remyelination**, Ana-Maria Rondelli[1], Kamil R Kranc[2], Sarah R Walmsley[3], Anna Williams[1], [1]MRC Centre for Regenerative Medicine, University of Edinburgh [2]Queen Mary University of London, Centre for Haemato-Oncology Barts Cancer Institute, [3]MRC Centre for Inflammation Research

48. **NRF2 in Stroke due to Intracerebral Haemorrhage: a Histopathological Study**, Edward Christopher[1, 2], Jeremy Hughes[3], Rustam Al-Shahi Salman[2], Colin Smith[2], [1]College of Medicine & Veterinary Medicine, [2]Centre for Clinical Brain Sciences, [3]MRC Centre for Inflammation Research, all University of Edinburgh

49. **Investigating the role of TREM2 in an experimental model of chronic cerebral hypoperfusion**, Stefan Szymkowiak[1], Karen Horsburgh[2], Barry McColl[1], [1]UK Dementia Research Institute at Edinburgh, [2]Centre for Discovery Brain Sciences, University of Edinburgh

50. **ATP11BKO Rat: a potential new model for Small Vessel Disease**, Sophie Quick, Rikesh Rajani, Anna Williams, MRC Centre for Regenerative Medicine, University of Edinburgh

51. **Effects of APOE genotype on microglial phagocytosis of synapses in human post-mortem tissue in Alzheimer's disease,** Makis Tzioras, Karla Popovic, Colin Smith, Christopher Henstridge, Barry McColl, Tara Spires-Jones, Centre for Discovery Brain Sciences; UK Dementia Research Institute at Edinburgh; Centre for Clinical Brain Sciences, all University of Edinburgh

52. **A "Living" Systematic Review of Alzheimer's Disease Studies**, Kaitlyn Hair, Emily Sena, Malcolm Macleod CAMARADES, Centre for Clinical Brain Sciences, University of Edinburgh

53. **Meta-Analysis of Preclinical Neurological Data in Drug Discovery Research** Ezgi Tanriver-Ayder[1], Christel Faes[2], Tom Van De Casteele[3], Sarah McCann[4], Malcolm Macleod[1], [1]Centre for Clinical Brain Sciences, University of Edinburgh, [2]Hasselt University, [3]Janssen Pharmaceutica NV, [4]Charité Universitätsmedizin Berlin

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54. **Characterising the genetic and epigenetic architecture of neurological protein biomarkers in the Lothian Birth Cohort 1936**, Robert F. Hillary[1], Daniel L. McCartney[1], Sarah E. Harris[2,3], Anna J. Stevenson[1], Anne Seeboth[1], Qian Zhang[4], David C. Liewald[2], Kathryn L. Evans[1], Craig W. Ritchie[5], Elliot M. Tucker-Drob[6,7], Naomi R. Wray[4], Allan McRae[4], Peter M. Visscher[4], Ian J. Deary[2,3] and Riccardo E. Marioni[1,2], [1]Centre for Genomic & Experimental Medicine, [2]Centre for Cognitive Ageing & Cognitive Epidemiology, University of Edinburgh [3]Department of Psychology, [4]Institute for Molecular Bioscience, University of Queensland, Australia, [5]Centre for Dementia Prevention, Centre for Clinical Brain Sciences, [6]Department of Psychology, University of Texas at Austin, USA, [7]Population Research Center, University of Texas at Austin, USA

55. **An investigation of factors influencing prescribing practice of Riluzole in Scotland**, Kiran Jayaprakash, Judith Newton, Bernard Pang, Emily Beswick, Richard Davenport, George Gorrie, Ian Morrison, Shuna Colville, Siddharthan Chandran, Suvankar Pal, on behalf of the CARE-MND Consortium Centre for Clinical Brain Sciences; Euan MacDonald Centre for Motor Neurone Disease Research, University of Edinburgh; Anne Rowling Regenerative Neurology Clinic, Royal Infirmary of Edinburgh; Department of Clinical Neurosciences, NHS Lothian; Department of Neurology, NHS Tayside; Institute of Neurosciences, NHS Greater Glasgow & Clyde, Glasgow

56. **What is the Role of mHealth in Traumatic Brain Injury? A Systematic Review of the App Markets and the Literature**, Edward Christopher[1], Kareem Alsaffarini[2], Aimun Jamjoom[3] 1College of Medicine & Veterinary Medicine, University of Edinburgh; [2]College of Life Sciences and Medicine, University of Aberdeen; [3]Centre for Clinical Brain Sciences

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