HEALTH SCIENCES
DOCTORAL TRAINING CENTRE
(HSDTC)

KING'S College LONDON

HSDTC Annual Research Symposium

Friday 3 April 2020 | Safra Lecture Theatre

Programme

09.15	**Registration, coffee, and poster installation** Great Hall
09.45	**Mini-masterclasses** K0.16, K0.50, S0.13
11.00	**Keynote Address** Safra Lecture Theatre
12.00	**Speed networking** K0.16, K0.50, S0.13
12.45	**Lunch** Great Hall
13.00	**Science Posters (odd numbers)** Great Hall
13.45	**Introduction to Resources at King's** Safra Lecture Theatre
14.15	**Science Posters (even numbers)** Great Hall
15.00	**Awards Ceremony** Safra Lecture Theatre
15.15	**Careers Panel** Safra Lecture Theatre
16.15	**Drinks Reception** Great Hall

Introduction

The HSDTC Annual Research Symposium is open to all PhD students in the Health Faculties at King's College London, and is an opportunity to meet and network with fellow doctoral researchers, to showcase doctoral research through a science poster, and to gain valuable new skills and insights through mini-masterclasses.

The 2020 Symposium was cancelled with just a few weeks to go due to the COVID-19 coronavirus pandemic. This programme has been published as a record of the 'proceedings'.

We would like to thank all of the participants who had offered to help make this year's event a success, and a big thank you to our PGR Student Organising Committee who worked so hard on planning and organising the Symposium: Shaikha Almazrouei, Nadia Chaher, Vita Dikariyanto, Valeria Manuelli, and Marie-Therese Salcher-Konrad.

We look forward to welcoming you all to the 2021 HSDTC Annual Research Symposium.

HSDTC Team
hs-dtc@kcl.ac.uk

Mini-masterclasses

09.45–11.00

K0.16, K0.50, S0.13

Using Data Science in your Research K0.16

Dr Haya Al-Khatib, Nutrition Manager at Zoe, and Dr Mohsen Mazidi, Research Associate

This session will give you an overview of the application of data science principles to the field of life sciences. It will be led by researchers affiliated with King's College London who are also working for Zoe, a nutritional science company (**joinzoe.com**) which is using data science principles in the management of large-scale studies.

How to Sell your Project in a Grant Proposal S0.13

Dr Chris Bird, FoLSM Research Development Manager, and Professor Andrea Streit, Developmental Neurobiologist in the Centre for Craniofacial & Regenerative Biology

Find out where to get information about funding opportunities, how to identify when the best time to apply is, and how to make yourself competitive for fellowships; and learn top tips on writing a successful grant application, how to start drafting a project outline, and the importance of getting your sponsors to peer review it.

Tailoring your CV for Different Sectors K0.50

Donald Lush, Careers Consultant, King's Careers & Employability

How can you make your CV stand out to an employer, whether in academia or another sector, and how can you best describe your research experience and skills? How do you structure and edit a CV for maximum impact, and what should be included or left out? This masterclass will address all of these questions through a presentation from one of our specialist researcher careers consultants and a session where you will work together on each other's CVs.

Keynote address Dr Juliet Foster

11.00–12.00

Safra Lecture Theatre

Postgraduate Student Mental Health and Wellbeing: some thoughts on the Knowns, the Unknowns and the Future

Student mental health has made the headlines on many occasions over the past few years: rising demand for support services and long counselling service waiting lists, high levels of reported anxiety and depression in particular, and the impact of sector-wide issues such as workload and debt have all rightly caused concern, leading some commentators to suggest that we are experiencing a crisis in student mental health. However, the focus in much of this debate has been on undergraduate students, and it is only relatively recently within these discussions that questions have been raised about postgraduate student mental health and wellbeing.

Drawing on her own research as a social psychologist studying understandings about mental health problems, and her role as Academic Lead for Student Mental Health and Wellbeing for King's College London, Dr Juliet Foster will discuss the evidence on the state of postgraduate student mental health as well as the questions that remain in developing our understanding of interventions that can encourage postgraduate students to thrive. She will argue that approaches that take an individual approach to the issues (and especially those based on a deficit model) are problematic, and that instead a whole institution approach is as important to postgraduate mental health and wellbeing as it is at undergraduate level.

Dr Juliet Foster is Interim Dean of Education at the Institute of Psychiatry, Psychology and Neuroscience and Academic Lead for Student Mental Health and Wellbeing for King's College London. She is a social psychologist whose research focuses in particular on understandings of mental health and ill health, and she specialises in qualitative research. She is also Chair of the Education and Training Board of the British Psychological Society.

Speed networking

12.00–12.45

K0.16, K0.50, S0.13

ROUND ONE 12.00–12.20

Pick a theme that best aligns with your PhD or that you want to know more about and go to that room.

Molecular Basis of Disease K0.16

This theme concentrates on increasing our understanding of the basis of human disease, and brings together aspects of research into cell biology, genetics, and infection and immunity.

Mental Health and Wellbeing K0.50

The focus of this theme is improving the prevention and treatment of mental ill-health while increasing patient wellbeing, through better understandings of how the brain works, investigating the interaction of psychological, social, genetic and developmental factors, and linking population data to risk factors for adverse mental health.

Health Services, Patient Engagement and Clinical Care/Health Research Application and Evaluation S0.13

Health Services, Patient Engagement and Clinical Care examines practical applications of health sciences research, including the care of and engagement with specific patient groups, and research focused around the professional development of health practitioners. Health Research Application and Evaluation explores the impact of health sciences research on patient health, including how research into public health, health economics, policy and global health research are implemented and assessed.

Speed networking

12.00–12.45

K0.16, K0.50, S0.13

ROUND TWO 12.25–12.45

Pick another theme that aligns with your PhD or that you want to know more about and go to that room.

Health Across the Life Course and Evolutionary Time K0.16

This theme encapsulates research areas spanning developmental biology to age-related disorders; the theme focuses on how health changes with time, both across the human life span and with the progress of evolution.

Imaging, Computational and Technological Approaches to Health K0.50

This theme combines biomedical science research with the mathematical, computational and physical sciences, this theme explores research areas including clinical and molecular imaging, computational modelling, 'big data' research, and high throughput technologies.

Advanced Therapies and Translational Medicine S0.13

The focus of this theme is on moving fundamental science and experimental medicine to the bedside and population, this theme encompasses regenerative medicine and cell therapies, the drug discovery pipeline line, biomedical engineering, and research into medical device development.

Introduction to resources at King's 13.45–14.15

Safra Lecture Theatre

Find out about some of the top-class research facilities and techniques that are available across King's for PhD students in the Health Faculties. The different facilities that you can use will be presented, including short talks from Dr Roland Fleck from the Centre for Ultrastructural Imaging, Dr Steven Lynham from the Proteomics Facility, and Dr George Chennell from the Wohl Cellular Imaging Centre.

Awards ceremony

15.00–15.15

Safra Lecture Theatre

The winners (and runners-up) of the *HSDTC Science Communication Competition 2020*, *HSDTC Science Image Competition 2020*, and *HSDTC Annual Research Symposium Science Poster Prize 2020* will be announced.

Careers panel

15.15–16.15

Safra Lecture Theatre

A panel of PhDs from a range of science careers will introduce themselves and then answer your career questions.

Dr Alastair Kirby, Founder of Vivisco, a neuroscience-based start-up. Alastair received his PhD in Neuroscience from King's in 2020 on Harnessing plasticity for the treatment of brain tumours.
linkedin.com/in/alastair-kirby-1810a4b1
vivisco.co.uk

Dr Dawn Lau, Research Fellow at the Alzheimer's Research UK UCL Drug Discovery Unit. Dawn received her PhD from King's in 2015.
uk.linkedin.com/in/dawnhwlau
ucl-ddi.alzheimersresearchuk.org

Dr Carly Schott, Market Manager (Cardiac) at Roche. Carly received her PhD from King's in 2018 on Using in vitro systems to identify new therapeutic bio markers in Autistic Spectrum Disorder.
uk.linkedin.com/in/carly-schott-ph-d-017916a7
roche.com

Dr Nadine Taylor, Manager at Vynamic, a healthcare industry management consulting firm, and formerly a life sciences consultant at Deloitte. Nadine received her PhD from King's in 2015.
linkedin.com/in/nadine-taylor-phd-48a26539
vynamic.com

Science posters

Great Hall

Simone Capp

Associations between autistic and ADHD traits and quality of life in a UK young adult population-based twin sample

Research has demonstrated that autism/autistic traits as well as Attention Deficit Hyperactivity Disorder (ADHD) are associated with lower Quality of Life (QoL). Despite high levels of co-occurrence of autism and ADHD, little research has attempted to understand how the combination of these traits might influence outcomes. Young adult twins (N=473; 45 per cent Male; Mean Age=22.45) from a UK population-based study completed online self-report questionnaires on their QoL (WHOQOL-BREF), autistic traits (Social Responsiveness Scale-2) and ADHD traits (Barkley Adult ADHD Rating Scale-IV). Twenty-four participants reported an autism diagnosis and a further 76 participants self-reported high autistic traits. WHOQOL-BREF domains (physical, psychological, social and environmental) were entered as dependent variables in multilevel random intercept models and covariates included autism traits, ADHD traits and their interaction (aut*ADHD) as well as biological sex, age and cognitive ability. Physical and psychological QoL there were significantly negatively associated with autistic and ADHD traits. Sex and the interaction, aut*ADHD, were also significant. WHOQOL social domain scores were significantly negatively associated with autistic traits and lower in males. In the environmental domain, WHOQOL scores were significantly negatively associated with autistic traits and were higher for males. Across all domains, QoL was significantly lower in young adults with higher levels of autistic traits. Trait ADHD levels and their interaction with autistic traits were important to physical and psychological QoL, but not for social or environmental QoL. It is hoped this understanding will lead to better, individually tailored support for young autistic adults in the future.

Aycan Celik

The impact of type 2 diabetes on women's health and well-being during their reproductive years

Background: As one of today's dominant health issues, the incidence of type

2 diabetes (T2DM) among younger women is increasing, with two out of five women living with diabetes during their reproductive years. To provide effective care, healthcare professionals need to understand the impact of T2DM on women's health and wellbeing. **Objectives:** (1) identifying the health issues encountered by women aged 16-45 years living with T2DM; (2) determining the modifiable risk factors associated with living with diabetes; (3) specifying ideas for effective intervention for promoting age and gender-specific diabetes-related health. **Method:** A systematic search was performed in the following databases: MEDLINE, PsycINFO, EMBASE, CINAHL, Web of Science, and Maternity and Infant Care. Databases were searched without time or study design limits. The Mixed Methods Appraisal Tool was used to assess the methodological quality of included studies. Data were narratively synthesised due to the mixed methods evidence included. **Results:** A total of 35 papers are included in the review. The following seven domains were identified from the synthesis: (1) diabetes related modifiable risk factors: blood glucose, cardiovascular risk, neuropathy/ nephropathy/retinopathy, diabetes self-care barriers (2) reproductive health: women's knowledge about pregnancy, pre-pregnancy care, contraceptive use, maternal and neonatal risk (3) psychosocial wellbeing; (4) sexual function; (5) polycystic ovary syndrome; (6) age at menopause; (7) sociocultural status. **Conclusion:** This review highlighted wide ranging health issues affecting women of reproductive age with T2DM which due to the rising prevalence in this age group, represent an important focus for health services research and health care delivery.

Shilei Chen

Do you like me? Women's self-objectification and need for approval

Fredrickson and Roberts (1997) offered objectification theory as an integrative framework for researching women's experience as sexualized objects in a sociocultural context. Existing research on self-objectification (SO) has mostly uncovered its negative impacts on women in intrapersonal contexts, such as their mental health, affective change, cognitive ability, etc. However, little research so far has examined how SO shapes women's behaviors and self-presentation in interpersonal contexts. The present research aims to address this gap by examining the impact of SO on approval motivation in terms of possible self-presentation online. Study 1 (N=103) found that trait SO of women was positively correlated with the need for approval. Study 2 (N=94) replicated the effect of study 1 by adding a behavioural measure of approval motivation (examining to what extent were participants willing to modify their social media profile pictures with a filter). Results showed

that women high in trait SO tended to modify their profile picture more than women with lower levels of SO. In study 3 (N=100), participants were randomly assigned to groups where two ideal levels of modification (low modification vs. high modification) were indicated to lead to the optimal level of approval by others. Results indicated that women with higher trait SO chose to modify their profile picture to a greater extent, regardless of the level of optimal approval.

Colette Christiansen

DNA methylation signatures in monozygous twins discordant for visceral fat

Obesity is a global health issue. The number of obese adults worldwide has tripled since 1975 to 13 per cent in 2016, with higher percentages in US (nearly 40 per cent) and UK (nearly 30 per cent) (WHO, 2018). Obese individuals are more likely to suffer from heart disease, diabetes and cancer (Pi-Sunyer, 2009). Previous work has shown a strong association between BMI and DNA methylation levels in blood (Wahl et al, 2017). DNA methylation is the addition of methyl groups to cytosine bases in the DNA which can alter gene expression. However, visceral fat is a stronger risk factor for metabolic disease than BMI (Shuster, 2012). We analysed genome-wide DNA methylation profiles in genetically-identical monozygotic (MZ) twin pairs who were discordant for visceral fat levels. MZ twin pairs are exactly matched for genetics, age, and sex, enabling the study of environmental effects. Methylome profiling was carried out at 450,000 CpG-sites genome-wide in whole blood and adipose samples from 48 and 7 MZ twin-pairs, respectively. In blood we found no statistically significant results after multiple testing adjustment. In adipose tissue there is a stronger methylation signal with adiposity, despite the small sample size, where 10 CpG sites in 9 genes were differentially methylated at FDR <0.05. The genes fell into three categories, relating to mental health – that may potentially contribute towards adiposity development, relating to cell proliferation – potentially arising because of adiposity, and relating to cancer. The findings help to understand the drivers of obesity and may help to understand the mechanisms of obesity related illness.

Katrina Davis

Prescribing statins and aspirin for people with dementia: is there any evidence?

We reviewed the evidence for long-term benefit of statins and aspirin on physical health and cognition in people with dementia, as well and potential harms. Pathology that may contribute to dementia include inflammatory and vascular mechanisms, which might be treated by statins and aspirin. In addition, many people with dementia

are also at risk of major cardiovascular events, which is also an indication for statins and aspirin. On the other hand, people with dementia appear to be at greater risk of medication side-effects and harm from polypharmacy. To date, no guidance has been issued that specifically addresses prescribing or deprescribing these preventative medications in people with dementia. Systematic review on randomised-controlled trials (RCT) and robust observational studies on long-term efficacy (at two years) or harms (at any time) of statins and aspirin in people with dementia in modern practice (2007–19 developed countries), interpreted by the 'Grading of Recommendations Assessment, Development and Evaluation' (GRADE) approach. Supplemented by review of evidence behind current clinical guidelines. **Statins:** Five studies were found. No studies that looked at physical health outcomes for people with dementia. Three cohort-style studies of prevalent statin use found a small protective effect of statins on cognition, but confidence in the finding was rated 'very low'. Two RCTs found no significant difference in the risk of any adverse event (odds ratio (OR) statin vs placebo 1.21, 95 per centCI 0.83–1.77), but lacked power to detect uncommon outcomes. **Aspirin:** Two studies were found. One RCT into aspirin showed no significant difference in mortality (OR aspirin vs control 1.07, 0.58–1.97, 'very low' confidence). One cohort-style study on prevalent aspirin showed a protective effect of aspirin on cognition, but the RCT did not ('very low' confidence). The randomised controlled trial showed that people on aspirin were at greater risk of any adverse event (OR aspirin vs control 1.89, 1.20–2.97, 'moderate' confidence), with bleeding events being a concern. **Overall:** There was a general lack of evidence. All studies had been conducted in people with probable Alzheimer's dementia only, and many excluded people with any vascular disease, which limits their generalisability to the general dementia population. More evidence is needed to enable clinicians and patients to make informed decisions about prescribing and deprescribing of medication in people with dementia.

Ewald Doornebal

Development of personalised human immunocompetent ex vivo models for primary and secondary liver cancers

Experimental models of liver cancers lack the complex 3D tissue architecture, cellular heterogeneity, tumour immunity and inter-individual variability. This has hindered the understanding of the pathogenesis of disease and development of personalised treatment approaches. We aimed to develop ex-vivo human immunocompetent models of primary (hepatocellular carcinoma; HCC) and secondary (neuroendocrine liver metastasis; LM-NEN) liver cancers using precision cut tissue slice (PCTS)

technology from surgical waste tissue. 6 HCC and LM-NEN tissue samples have been collected and sliced using previously established protocols. PCTS were cultured ex-vivo for 8–15 days in 95 per cent O2 (LM-NEN) or atmospheric O2 (HCC). Viability was assessed by measuring apoptotic vs non-apoptotic cell death (cytokeratin 18), lactate dehydrogenase release, ATP content and histological analysis. Immunofluorescence was used to quantify proliferative capacity (Ki67) and neuroendocrine differentiation (chromogranin A (LM-NEN)). Metabolic capacity was examined by measuring adenylate energy charge using HPLC. Immune components were interrogated using PCR microarray. Histological characteristic tissue architecture including tumour morphology, stroma and immune infiltration is maintained over the culture period and tissue viability markers remained stable. HCC slices remained viable for up to 8 days whereas LM-NEN could be maintained for 15 days. Levels of apoptotic cell death were <5 per cent over duration of culture. Proliferative capacity remained constant and distinctive immunological features associated with an immune infiltrated ('hot') or immune deserted ('cold') tumour micro-environment were preserved in the slices. We have successfully developed a human personalised ex-vivo model of primary and secondary liver cancers that retain the structural, metabolic and immunological signatures observed in vivo.

Diede Fennema

Who benefits from standard antidepressants? Preliminary findings supporting a moral sentiment-task based functional MRI measure for personalising treatment

Background: Currently, half of patients with major depressive disorder (MDD) will not respond to the first course of selective serotonin reuptake inhibitors (SSRIs). The objective of this study is to provide the proof-of-concept for using functional magnetic resonance imaging (fMRI) to prospectively predict which MDD patients will not benefit from SSRI treatment.
Material and methods: Eligible patients have at least moderately severe major depressive syndrome on the PHQ-9 (score>14) and are non-responders to at least two serotonergic antidepressants in the current or previous episodes. The fMRI is based on the so-called moral sentiment task. Patients are shown short written statements describing actions counter to social and moral values described by social concepts in which the agent is either the participant (self-agency) or their best friend (other-agency). This study pilots a shortened and optimised version.
Results: Initial exploratory single subject-level analysis in SPM12 in a case series of n=8 patients with MDD provides support that the optimised, shortened, moral sentiment task can

detect differences in blood-oxygen-level-dependent (BOLD) signal between the self- and other-agency conditions in our regions of interest, such as the subgenual cingulate cortex (threshold p-value=0.05, uncorrected). **Conclusion:** These preliminary findings confirm that the optimised, shortened, moral sentiment task can detect differences between self- and other-agency conditions. It shows selective activation in regions implicated in overgeneralised feelings of self-blame. The next step is to investigate whether anterior temporal-subgenual cingulate and anterior temporal-ventral striatal connectivity prospectively predicts who will fail to respond to another course of SSRI treatment based on these differences.

Piyada Gaewkhiew

Remaining teeth and body measurements among Thai older adults

Objective: To explore the association between number of teeth and body measurements among Thai older adults. **Methods:** Cross-sectional study was assessed among 788 adults, aged 60 years and above, living in Phetchaburi, Thailand. Assessments of cognitive ability and functional independence were performed before consent was obtained. Interviews with questionnaire collected demographic data, socioeconomic status, chronic conditions and health behaviours. Weight, height and triceps skinfold (TSF) were calculated as the average of two consecutive measurements taken using a digital scale, stadiometer and body fat calliper, respectively. Participants were also dentally examined for number of teeth and denture assessment. **Results:** Sample included more female (69.8 per cent), adults aged between 60–69 years (53.5 per cent) and those who educated (97.8 per cent). Besides, the mean number of teeth in the sample was 12.9 (SD: 10.2, range: 0 to 32). Significant linear trends were found for weight and TSF, but not for BMI. More teeth participants had greater weight and TSF. The association of number of remaining teeth with weight was fully attenuated after adjustments for confounders. However, TSF remained significant after adjustments. Participants with 1–19 and 20+ teeth had 3.09 (95 per cent CI: 0.80 to 5.38) and 3.63 mm (95 per cent CI: 1.07 to 6.20) more TSF than edentate, after adjustments. **Conclusion:** The number of teeth was positively associated with greater body fat. Weight and BMI were not associated with the number of teeth. In-progress analysis will explore the role of dietary intake on the above association.

Rabab Hashem

Lipohypertrophy (LH) and glucose variability (GV)

Background: Lipohypertrophy (LH) is a common insulin injection site problem that occurs with repeated insulin injection exposure in the

subcutaneous tissue. Subcutaneous insulin exposure can increase tissue density with hypertrophy and hyperplasia of adipocytes. The effect of insulin when injected into an LH area can be attenuated, potentially leading to glucose variability (GV). The aim of this study was to examine impact of LH on GV in adults with Type 1 diabetes (T1DM). **Methods:** Participants were adults with T1DM recruited from out-patient diabetes clinics. GV was assessed in two conditions using continuous glucose monitoring (CGM): Condition 1, usual insulin injection behaviour; and Condition 2, injecting in areas assessed to be unaffected by LH. GV in both conditions was assessed using blind CGM (for six days). The LH areas were assessed using both palpation and ultrasound examination. **Findings:** A total of 27 participants were recruited, of which 15 completed the study. The median age was 32 (IQR, 25–60) years, with a median duration of T1DM of 14 (IQR,10–23) years. One third of the participants demonstrated improvement in variability with an increase in time in range (TIR) (4–10mmol/l) >10 per cent, while the remainder showed limited improvement, with one case showed a reduction in TIR (10 per cent). The findings also showed reductions in total daily insulin dose (mean±SD -4±8.5) and increases in the number of effective bolus injections by 16.1 per cent in Condition 2. **Conclusions:** The current data shows that changing injection sites in a small sample of participants with T1DM led to improvements in the time participants spent in the target glucose range and reduction in insulin doses.

Rachel Irlam

Overcoming matrix effects in the detection of organic explosives using a Lego®-inspired approach to solid phase extraction

Detecting trace concentrations of organic explosives from operationally relevant matrices, such as soils and items contaminated with blood, is a vital capability for forensic providers and law enforcement agencies worldwide. Typical routine analysis involves solid phase extraction (SPE), for sample clean-up and preconcentration, followed by liquid chromatography – mass spectrometry (LC-MS). Matrix effects, such as ion suppression or enhancement, caused by interfering components from the sample, can challenge this analysis, for example by affecting analyte recoveries, mass accuracy and/or quantitation. Whilst effective sample pre-treatment has been shown to reduce unpredictable matrix effects, they remain problematic. Successful development and application of dual-sorbent SPE approaches, to simultaneously remove unwanted matrix interferents and selectively extract target analytes, is presented herein. Specific sorbent combinations were optimised for six complex sample types and the procedure

then miniaturised through design and optimisation of components that could be 3D-printed and 'clicked' together to form flexible arrays. The Lego®-inspired arrays enabled sample and solvent to be delivered with no leaking or sorbent bleed and a block-to-world interface allowed connection with existing lab equipment, such as pumps. Sample delivery could also be performed manually using a handheld syringe, creating the novel potential for at-scene extraction. Overall, dual sorbent SPE reduced average matrix effects and interference and the 3D-printed approach provided additional advantages, such as rapid, on-demand printing, using a benchtop 3D printer and commercially available resin, and on-site use without additional equipment/connective tubing. This could provide a future-proofed solution to matrix effects and increased assurance for forensic trace explosives analysis.

Ayesha Javed

Exploring white matter connectivity in the corpus callosum in autism spectrum disorder using DTI

Existing research has suggested that Autism Spectrum Conditions (ASC) is caused by abnormalities in the Corpus Callosum (CC), the largest White Matter (WM) structure in the brain that connects both hemispheres together. Previous research has suggested that the CC in individuals with ASC follows a different developmental trajectory across age. However, little is known about how the CC impacts core symptoms of ASC. The present investigation examined the CC in 40 male children with ASC and healthy controls matched for age and IQ using Diffusion Tensor Imaging (DTI). The investigation examined individual segments of the CC (genu, rostral body, anterior midbody, posterior midbody, isthmus and splenium) using Tractography which allowed virtual dissections of the CC. Differences between diffusion characteristics; Fractional Anisotropy (FA), Mean Diffusivity (MD) and Radial Diffusivity (RD) were examined in tract-specific segments of the CC. Diffusion characteristics of each segment were then correlated with the age in both groups, volume of individual segments and the total volume of the CC. Symptom severity of ASC were also correlated with diffusion characteristics. The results showed that the anterior midbody and posterior midbody significantly correlated with symptom severity in ASC. The results also indicated that individuals with ASC follow a different developmental trajectory in the CC. Further results revealed abnormalities in the CC in ASC may continue with age, rather than declining as ASC individuals get older; as the majority of literature has previously suggested. These findings suggest that abnormalities in WM connectivity in the CC may underlie core symptoms of ASC.

Bradley Jermy

Using genetics to compare emotional distress and major depression

The distinction between emotional distress and clinical depression is subjective. Clinicians tend to consider episodic recurrence, duration, impairment, and additional symptoms as differentiators; however, objective evidence is limited that this creates a distinct disorder. This study systematically investigated these differentiators to understand how their addition influences the traits genetically. Participants were selected from the UK Biobank cohort who answered a Mental Health Questionnaire. Responses to a participant's worst episode of depression were used to define 32 traits (Ncases range: 69589–9671) which considered the differentiating factors of clinical depression in a systematic fashion. Heritabilities, a measure of the degree to which genetics contributes to a trait in the population, and genetic correlations with major depression defined in previous studies were computed for each trait. Genetics explained more of the variance in the trait as more differentiating components were added (Emotional distress heritability: 0.1289 (SE=0.0137), Emotional distress + all differentiators heritability: 0.211 (SE=0.02307)). The most important differentiator was episode recurrence followed by the presence of additional symptoms. No trend was found with genetic correlations of major depression and no key differentiator could be identified. This study shows genetics has a more prominent role for traits that incorporate the differentiators to emotional distress, however, the lack of trend in genetic correlations suggests much of the same variants contribute to both emotional distress and clinical depression. Both findings suggest there is an interaction between genetics and depression severity, but these subjective differentiators do not induce any biologically meaningful differences to emotional distress.

Adam Jones

Mitochondrial fission inhibitor peptide P110 does not provide neuroprotection following neonatal hypoxic-ischaemic brain injury

Hypoxic-ischaemic (HI) encephalopathy affects 2-3 in every 1000 term infants and can bring about life-changing neurological consequences. Perturbation of mitochondrial function is a key hallmark of HI. Following oxygen-glucose deprivation (OGD), an in vitro mimic of HI, mitochondria undergo rapid fission which is mediated by the GTPase DRP1. DRP1 translocates to the outer mitochondrial membrane to interact with surface proteins such as Fis1. Using the Rice-Vannucci model to induce HI in vivo in term-equivalent pups, we tested a novel DRP1-Fis1 inhibitor, P110, conjugated to a cell-penetrating peptide TAT

(TAT-P110). We conducted a semi-randomised, alternating for sex, blinded pilot study to determine the effects of p110 treatment (1mg/kg, oh and 2h after injury). Drp1 and Fis1 mRNA and protein expression were determined by qRT-PCR and western blot respectively. DRP1 activity was determined ex vivo by GTPase assay of isolated immune complexes. We found that DRP1 and Fis1 mRNA are expressed in neonatal brain and remained unaltered following HI. However, protein analyses identified changes in both DRP1 phosphorylation and DRP1 GTPase activity following HI. In vitro, application of TAT-P110 (10μM) reduces cell death and prevents mitochondrial fission following OGD. However, we observed no reduction in infarct volume following HI in TAT-P110-treated mice compared with TAT alone-treated or no treatment controls. DRP1 is known to interact with other adaptor proteins like MFF, MiD49/51 in addition to Fis1. Our data suggest that, unlike adult brain following injury, the interaction between Drp1 and Fis1 may not be a critical factor in the neonatal brain.

Jimin Kim

Trauma-related appraisals and psychological health among survivors of Jeju April 3rd

After the liberation from Japanese colonisation, the Jeju island had experienced state violence, 'Jeju April 3rd' (also known as Jeju Sasam). The current study aims to explore the trauma-related appraisals and adjustment of the survivors from this state violence with a mixed-method approach. Elderly survivors (n=50) over 82 years old conducted not only the semi-structured interviews but also the measurement of posttraumatic stress disorder and depression. Thematic analysis will identify the possible factors that impact to their adjustment and recovery of survivor's psychological distress. Themes from the findings will be discussed in the future. Keywords: Appraisal, Posttrauma life experience, Psychological distress, Culture, Qualitative research.

Deniz Konac

Comorbidity between depression and anxiety: bridging symptoms and relevance of adolescent adversity

Objective: The mechanisms behind the co-occurrence of the mental health problems of depression and anxiety is not well-understood. The present study used network analysis to investigate the bridging symptoms between these two mental health problems, and the role of relevant risk factors (eg bullying, child maltreatment). **Method:** We analysed data from the Avon Longitudinal Study of Children and Parents (N=3431). Depression and anxiety symptoms, peer victimization, bullying, peer problems, prosocial behaviour, and parental monitoring were assessed between ages 12 years 6 months and 13 years 10 months. Stressful life

events were assessed between 9 years and 11 years. Unregularized partial correlation networks were created and centrality indices and bridge centrality indices were examined to identify bridging symptoms and associations with risk factors. Nonparametric and case-dropping subset bootstraps were employed to assess the stability of centrality indices and accuracy of edge weights. Bootstrapped difference tests were employed to detect differences between individual edge-weights and centrality indices. **Results:** The strongest bridge edges that denote 'depression – anxiety' connections were 'hating self – worrying about past', 'feeling lonely – worrying about future', and 'feeling unhappy – worrying about school.' Depression symptoms of 'feeling lonely' and 'feeling unhappy', and other peer relational difficulties were found to bridge depression and anxiety symptoms and other risk factors. Edge weights were found to have moderate accuracy, and most measures were found to be stable. **Conclusion:** Depression and anxiety were interconnected through several symptom-symptom interactions. Peer relational difficulties were the most prominent risk factors and bridged the symptoms and other risk factors.

Xianqi Li

Impact of comorbidities on long-term survival after ischemic stroke by aetiological subtype: the South London Stroke Register

Background and aims: To identify the prevalence of comorbidities at the time of stroke and up to 10 years after first ever ischemic stroke (IS) and examine their impact on long-term survival by aetiological subtype. **Methods:** Data were collected within the South London Stroke Register (SLSR) between 2000 and 2015. Baseline data included sociodemographic factors, ischemic stroke subtype (modified TOAST), case mix, effective intervention. Comorbidities data included hypertension, atrial fibrillation (AF), peripheral vascular disease (PVD), diabetes, hypercholesterolaemia, mental health conditions and cancer. Survival curves were performed with Kaplan-Meier methods and Cox Proportional-hazards models were used for survival analyses. **Results:** Hypertension (65.23 per cent–32.08 per cent), hypercholesterolaemia (27.34 per cent–35.63 per cent), AF (17.78 per cent–14.19 per cent) and mental health conditions (anxiety, depression and cognitive impairment) were prevalent up to 10 years after IS. Baseline comorbidities such as AF (Hazard ratio (HR):1.28 [95 per cent CI:1.10,1.49]), PVD (HR:1.30 [1.05,1.60]), diabetes (HR:1.20 [1.05,1.38]), cognitive impairment (HR:1.21 [1.03,1.41]) and

cancer (HR:1.39 [1,09,1.77]) increased the risk of death after IS. Large artery atherosclerosis (LAA) patients with diabetes (HR:2.21 [1.37,3.58]) had an even higher risk of death whereas hypercholesterolaemia (HR:0.52 [0.31,0.88]) reduced their death risk. AF (HR:2.28 [1.38,3.74]) and cognitive impairment (HR:1.93 [1.37,2.72]) were associated with even worse survival for small vessel occlusion (SVO) patients. **Conclusions:** Cardiovascular related diseases and mental health conditions were prevalent after IS. Ischemic stroke patients with comorbidities, such as PVD, diabetes, cognitive impairment and cancer had a higher death risk. For stroke subtypes, LAA patients with diabetes and SVO patients with cognitive impairment had even worse survival.

Marie Therese Sangy Manjini Anandaraj

Breech birth competencies at the point of qualification: a qualitative exploration of maternity care professionals' views

Introduction: The recent guidelines on breech birth suggest that childbearing women should be informed of available choices for a safe vaginal breech birth. The current evidence shows that upright birth positions ease the birth of a breech baby and should be given as a choice during delivery of a breech presentation. To promote women's' choice, it is essential for the newly qualified midwife to reconsider and learn new clinical skills such as upright birth position for a safe vaginal breech delivery. **Aims:** To explore the views of senior clinical midwives, obstetricians and neonatologists about the breech birth skills required by newly trained midwives. **Methods:** The study used a qualitative descriptive design. The data was collected from five midwives, two obstetricians and one neonatologist from two National Health Services Trust hospitals. All eight participants were interviewed face to face using a semi- structured interview schedule for 20–40 mins. The collected data was transcribed verbatim by the researcher and analysed using thematic analysis. **Findings:** The data analysis identified four themes as: 1. Theoretical knowledge, 2. Care during antenatal period, 3. Breech births on the obstetric unit and 4. Undiagnosed breech without multi-disciplinary support. **Conclusions:** The results identified specific contents that should be covered in midwifery curriculum. Additionally, good communication and simulations were essential to develop required breech skills. Further research is required from maternity care leaders of different Trust hospitals to verify the views on proposed changes to midwifery curriculum.

David Mason

Outcome studies of autistic adults quality, effect size, and meta-regression

Background: Outcomes for autistic people are often reported to be poor/

very poor (with estimates ranging from 50 per cent–60 per cent in these categories). Outcome refers to living independently, being employed, and having relationships/friendships IQ, autism severity, and language acquisition are thought to predict better outcomes, although findings are mixed. This study conducted a meta-analysis and meta-regression of this literature. **Methods:** Medline, PsychINFO, Embase, and CINAHL were all searched on 31st of December 2019. A total of 8,074 records were identified; 4,088 records were screened. A total of 17 studies were included in the quantitative analysis. Two authors (GS and SC) screened records and assisted with data collection respectively. **Results:** Pooled estimate for good, fair, and poor outcomes were 17.8 per cent (95 per centCI: 9.3–27.4), 27.7 per cent (95 per cent CI: 17.9–38.1), and 50.5 per cent (95 per cent CI: 38.4–62.5) respectively. There was high heterogeneity between studies for each outcome category, part of which may be explained by mean age of follow-up and diagnostic 'type' (eg childhood/infantile autism, autistic disorder, or Asperger's syndrome). Meta-regression indicated that IQ in adulthood was a predictor of poor outcome proportion (explaining 51.5 per cent of the variance), however, the other regression models (using childhood and adulthood IQ to predict the proportion of each outcome category) were not significant after controlling for multiple comparisons. **Conclusion:** Outcomes for autistic people are on average poor. Thus, many autistic people do not attain typical markers of independence. This may be attributable to IQ, whereby IQ is protective against having a poor outcome but does not necessarily predict a good outcome.

Claire McQuitty

An immune-perfused bioengineered model to study liver fibrosis

Introduction: Liver fibrosis is driven by progressive accumulation of extracellular matrix (ECM), coupled with chronic inflammation. Traditional cell culture models often lack immune cell and ECM components and thus don't fully recapitulate disease. Bioengineered models using decellularised tissues present an appealing alternative. We generated a bioengineered liver model incorporating dynamic culture of circulating immune cells with decellularised human or rat liver scaffolds, supported in a custom-made bioreactor which allows us to explore interactions between the immune system and liver ECM proteins at different stages of fibrosis. **Methods:** Liver scaffolds were generated by decellularising liver tissue with/without underlying disease from human liver biopsies or whole rat liver. PBMCS from healthy donors were cultured in the bioreactor under semi-continuous perfusion at high or low shear stress, or in static conditions. Longitudinal profiling of PBMC phenotype was

determined by FACs. Decellularised liver was perfused with PBMCs and cultured for up to 5 days then stained for PBMC surface markers. **Results:** Our custom-made bioreactor supports dynamic culture of PBMCs. Shear stress impacts PBMC viability, with low shear stress optimal for culture. Longitudinal profiling of PBMCs shows differences in phenotype in dynamic vs static culture. Liver scaffolds perfused with PBMCs show homing of immune cells of which 50 per cent are T cells. **Discussion:** Our bioengineered liver model allows us to explore the interactions between the ECM and immune cells in liver disease. A better understanding of ECM-immune interactions could highlight new disease progression biomarkers and therapeutic targets to treat disease.

Ishita Mehta

Differential processing of cephalic and extra-cephalic pain in the rodent thalamus

Within the thalamus, Sox14-expressing GABAergic interneurons (INs) represent a novel subset of inhibitory INs providing sensory-driven feedforward inhibition to thalamic relay cells. We have recently shown that these neurons, whilst abundant in the rodent visual thalamus, localise additionally to other first-order thalamic nuclei, primarily the somatosensory thalamus or ventral posterior complex (VP). Their role and connectivity within the VP however, remains largely unknown. Here we exploit a transgenic Sox14cre mouse line to investigate the role of Sox14-expressing INs in nociceptive processing in the VP. We combine cre-dependant ablation of Sox14$^+$ INs with the Von Frey test to measure periorbital and hind paw sensitivity in VP-ablated and control mice (n=6/group). Interestingly, we show that ablation of Sox14$^+$ INs from the VP results in mechanical sensitivity that is restricted to the periorbital region (0.65±0.07g vs 0.17±0.054g; $p<0.001$) with no difference in mechanical sensitivity observed in the hind paw (0.94±0.07g vs 0.86±0.097g; ns). Our data therefore suggests that these neurons may be involved in the specific regulation of cranio-facial circuits. Altogether, our preliminary results indicate that Sox14$^+$ INs in the mouse VP may contribute to differential processing of cephalic and extracephalic pain.

Nicholas Merrild

Investigating conditions for successful articular cartilage integration to inform on future tissue engineering strategies

Tissue engineering strategies aim to repair mature articular cartilage (AC) defects with transplanted tissue, but integration with the surrounding native tissue remains an issue. Successful integration is critical for effective load distribution and AC longevity and so identifying conditions that allow for it are essential. We therefore aim

to investigate the time dependent expression of the major extracellular matrix (ECM) proteins (eg collagen), using an explant juvenile pig model, to assess if the repair process involves neo-protein production. With fluorescent non-canonical amino acid tagging (FUNCAT) supplemented media (a technique allowing fluorescent imaging of neo-protein synthesised during culture), we show neo-proteins throughout the tissue with increased intensity in the integration zone. Immunofluorescent staining and qPCR data showed no new major ECM proteins in the integration zone. These data suggest that the repair process may not be mediated by the formation of neo-collagen alone. To identify the neo-protein in the integration zone indicated by FUNCAT, we will compare Raman spectra of the integration zone with bulk tissue looking for unique chemical signatures, indicating proteins not found in the bulk tissue. Identifying these proteins may identify conditions for successful AC integration and clinical application.

Victoria Milner

Factors associated with academic attainment for autistic individuals within a population-based twin sample

Background: In the non-autistic population, research has shown that factors have a significant impact on academic attainment. There has been limited research into the effect these factors have on autistic individuals' academic attainment in comparison to their non-autistic peers. This study explored factors that might influence academic attainment, comparing autistic twins, their non-autistic co-twins, and a non-autistic control group selected for low autism traits. **Methods:** Participants were from a population-based twin-sample: 55 18-year-old autistic twins (83 per cent male); 22 non-autistic co-twins (31 per cent male); 50 comparison twins (64 per cent male). Participants completed team-designed questions about education and academic attainment. Multiple regression analyses were run to predict total public exam passes at age 18 from autism severity scores, IQ, sex, maternal education, and emotional, conduct, peer, prosocial and hyperactivity for each group. **Results:** For the autistic group, IQ, autism severity scores, maternal education, emotional difficulties and prosocial difficulties significantly contributed to the model (all $p<0.05$). For the co-twin group, the multiple regression model was not statistically significant, however exam passes were significantly correlated with autism severity scores and conduct difficulties ($p<0.05$). For the control group, IQ and gender were the only coefficients that significantly contributed to the model (all $p<0.05$). Conclusion: Academic attainment was found to be influenced by a range of factors, varying by autism diagnostic status. The results highlight areas for possible intervention in educational settings.

Julian Mutz

Exploring health in the UK Biobank: associations with sociodemographic characteristics, psychosocial factors, lifestyle and environmental exposures

Objective: Our aim was to examine sociodemographic characteristics, psychosocial factors, lifestyle and environmental exposures associated with health status, long-standing illness and self-rated health. **Methods:** The UK Biobank is a prospective study of >500,000 UK residents, aged 37–73, who were recruited between 2006-2010. We used data on 81 cancer and 443 non-cancer illnesses to classify participants by insurance health status (non-standard risk/standard risk). Long-standing illness (yes/no) and self-rated health (poor/fair/good/excellent) constituted secondary outcomes. Logistic and ordinal regression models were fit to estimate associations between explanatory variables and health indicators. **Results:** 307,378 participants (mean age=56.1, SD=8.1; 51.9 per cent female) were selected for cross-sectional analyses. We found that low household income, high levels of neighbourhood deprivation, being male, loneliness and social isolation were associated with poor health. Walking frequency and engaging in vigorous-intensity physical activity were associated with positive health, whereas long sleep duration, high body mass index and smoking were associated with poor health. Alcohol intake less frequent than 1–2 times per week was associated with poor health, whereas more frequent drinking pattern was associated with positive health. There was some evidence that high levels of airborne pollutants (PM2.5, PM10 and NO2) and noise (Lden) were associated with poor health, although findings were inconsistent after adjustment for other factors. Neighbourhood greenspace was associated with positive self-rated health. Conclusions: Public health could put greater focus on non-medical factors such as loneliness, further encourage healthy lifestyle behaviours and weight management, and examine efforts to improve health outcomes of individuals in the lowest income groups.

Alicia Peel

Reported interpersonal trauma associated with differences in internalising symptom networks in a population sample but not a clinical sample

Background: Reported trauma is associated with differences in the course of anxiety and depression, symptom severity and treatment response. However, there has been little investigation into whether reported trauma is associated with different patterns of symptoms. **Methods:** The current study used network analysis to investigate associations between reported interpersonal trauma and internalising symptom networks in a severe clinical sample, the GLAD

Study, and population-based cohort, UK Biobank. Participants with current symptoms of depression or anxiety were grouped into those who did and did not self-report interpersonal trauma. In each group, networks of 16 internalising symptoms were estimated. The networks of those who did and did not report interpersonal trauma were compared on symptom centrality, network strength, network structure and specific edge strength, using the Network Comparison Test. **Results:** In the clinical sample, the networks of those who did and did not report interpersonal trauma did not significantly differ on any metric. In the population-based sample, the network of those who reported interpersonal trauma was significantly stronger than the network of participants who reported no trauma, and was comparable to the strength of the two networks estimated in the clinical sample. **Conclusions:** These findings indicate that reported interpersonal trauma is not associated with differences in internalising symptom networks in a severe clinical sample, but is associated with more densely connected symptom networks in a population-based cohort. This suggests that reported interpersonal trauma may be associated with a pattern of internalising symptoms consistent with more severe or complex depression and anxiety.

Caroline Pollard

Evaluation of latent fingerprints for drug-screening in a social care setting

Background: Studies previously employing point-of-care test (POCT) successfully identified illicit drugs in latent fingerprints (LFPs) but these tests have not been used in health and social care settings. This pilot study trialled a POCT using LFPs in a social care setting where a quick and confidential screening test is required. **Methods:** Parents with a history of drug use were tested on either an ad-hoc or routine basis. The LFP cartridge (DOA114, IFP Ltd, UK) tested for benzoylecgonine (BZE), morphine and amphetamines. LFP tests (DOA150 confirmation cartridge, IFP Ltd, UK) were confirmed using UPLC-MS/MS alongside oral fluid (OF). A comparison between screening and confirmation test results was undertaken. **Results:** In total, 131 screening tests were conducted on 36 subjects (53 per cent female). BZE/cocaine (14 per cent), opiates (25 per cent), amphetamine (1 per cent) and cocaine with opiates (10 per cent) were all detected. Out of 32 LFP confirmation samples, 69 per cent were cocaine positive (median: 1400 pg/print). The most common opioid was 6-monoacetylmorphine (15 per cent; median: 194 pg/print). In OF, tetrahydrocannabinol was the dominant analyte (15 per cent; median: 26 ng/mL) followed by cocaine (9 per cent; median: 14.5 ng/mL).

6-Monoacetylmorphine was the main opioid identified (5 per cent; median: 3 ng/mL) with dihydrocodeine also being detected (0.8 per cent, median: 65 ng/mL). **Conclusions:** Overall, the LFP POCT successfully detected illicit cocaine use and opioids in client samples. Cocaine was the most frequently detected analyte in LFP screening and confirmation samples. In OF, tetrahydrocannabinol was also observed. Factors affecting concentration detection may include: drug's physiochemical properties, time of drug administration and the dose consumed.

The Psychological Medicine [PM] Train

Katrina Davis, Alice Wiskersham, Natasha Chilman, Valeria De Angel

It is increasingly recognised that academia can be an isolating and competitive environment. Early career researchers are especially vulnerable to falling between the cracks of mainstream support, but may be highly motivated to support each other. This poster will show the genesis and progress of a peer-support group, and give advice for anyone wishing to replicate. In consultation with others, Katrina Davis suggested PM Train as a group for training and support in two 'lab' teams for anyone who self-identified as an early career researcher, meeting once every two weeks. A survey was circulated to gauge interest, which was answered by 21 ECRs, of whom eight said they were likely to attend every group, and the remainder would attend some, while eleven people were willing to help with sessions or raising awareness. The top two activities that respondents would want from the group were: problem solving and sharing; and opportunity to hear about others' experience and skills. Suggestion for future sessions were approximately equally split into general support/advice and specific topics/skills training. The first session took place in February 2019, and has been running for a year. We generally have between five and ten people from a pool of about 15 people. Usually majority of attendees are PhD students from the 'lab' team where KD is doing a PhD, but also pre-docs and lesser numbers of post-docs. We also have a chat board and a one-note file that is a log book and also has lists resources that have come up. In order to do this, we have required: Microsoft Teams to be set up, rooms to be booked, people to chair sessions. The first two can be difficult for students with no staff contract. Comments from members: **Strengths –** 'It is a supportive, honest and friendly environment', 'It is a good platform to meet new people who you wouldn't otherwise talk to in the department on different projects, but because it's based in PM people have similar interests', 'Learning who's using similar research methods, so we know who to consult on issues we encounter', 'We set the agenda and topics to discuss together'. **Challenges –** 'We have not broadened out to other teams as

was the plan', 'The fear of chairing', 'Thinking of new topics', 'The burden of work isn't always evenly spread'. **Advice to others who wish to replicate –** 'Be open-minded as to what people want', 'Establishing terms of reference [and] defining the chair role has been helpful', 'Make it informal and relaxed (eg with cake/biscuits). Have some core session ideas to get started (eg skills sharing, academic visitors to talk about their career, reading skills/tips/resources)'.

Helena Rapp-Wright

High resolution chemical analysis and machine learning for the identification of pharmaceutical, pesticides and illicit drug compounds in water

Contaminants of emerging concern (CECs) have been shown to occur in surface waters over the past decade at ng/L to µg/L concentrations and their risks in the environment require further knowledge. Their consumption is growing and therefore reliable analytical methods for identification of new compounds and their determination need to be constantly re-developed. Herein, a more flexible methodology combining liquid chromatography-high resolution mass spectrometry (LC-HRMS) and machine learning-based data analysis is presented for the prioritisation of CECs in water samples in the River Thames, UK, and in the River Liffey, Ireland. Daily river water samples were collected over one week from central London and Dublin. They were subjected to analyte enrichment with solid-phase extraction before analysis with LC-HRMS. A previously developed LC-HRMS method for >190 CECs was used to generate an artificial neural network-based retention time prediction tool [1]. Predicted retention time accuracies of <1 min were achieved generally for gradient separations over 27.5 min on a reversed-phase C18 column. A comparison of identified CECs in both rivers is presented. Overall, the use of chemical analysis and machine learning in this way could enable more rapid shortlisting of CEC candidates for prioritised monitoring. Ultimately, such approaches may also inform more efficient ecotoxicity testing strategies for potentially toxic compounds in the aquatic environment.

Lav Rupali

Wnt signalling in the apical papilla is essential for tooth root development

The mammalian tooth roots support and anchor teeth in the jaws enabling them to withstand occlusal forces. Wnt signalling is a key developmental pathway that plays an important role in organ development and homeostasis. Although disturbances in Wnt signalling have been shown to adversely affect early tooth development, little is known about its role during root formation. This study identifies an essential source of Wnts and demonstrates the crucial role of the

Wnt signalling pathway during murine root development. To examine the role of the Wnt pathway, we start by charting the pattern of Wnt activity during different stages of root formation in Axin2LacZ reporter mice. Gli1 is known to broadly label stem/progenitor cells in different organ systems including teeth. Here we take advantage of transgenic mouse models to specifically target the production of Wntless in the Gli1 expressing stem/progenitor cells and their progeny. Targeted loss of Wnt secretion in the apical papilla using the Wntlessfl/fl mouse line led to an arrest of root development and downregulation of other signalling pathways. The resultant phenotype exhibits cessation in root formation and establishes the vital role of Wnts in radicular hard tissue formation. A clearer understanding of the molecular mechanisms of root development will help decipher the etio-pathogenesis of developmental anomalies with the aim to develop targeted biological solutions for truncated root development.

Isabella Stelle

Acknowledging the gap: a systematic review of micronutrient supplementation in infants under 6 months of age in low- and middle-income countries

Objective: Infants born to women in food insecure areas are at risk of micronutrient deficiency, with consequences on early growth and development. Here we present a systematic review of micronutrient interventions in infants under 6 months of age in low- and middle-income countries (LMICs), with a focus on iron. **Methods:** We searched the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE and Embase databases from 1980 through 2019. Interventions included those in infants under 6 months of age with iron or multiple micronutrients (MMNs). Interventions in low-birthweight or pre-term infants were later excluded due to extensive reviewing elsewhere. **Results:** Of 7,233 records identified, following later removal of studies in low-birthweight or pre-term infants (N=103), 16 relevant articles remained. Of 11 reported trials, five took place before 2000, two of which were in LMICs. A recent trial in India, supplementing iron from birth to 6 months of age, showed significant improvement in iron status. In China, iron supplementation from 6 weeks to 9 months of age significantly improved gross motor scores. Four MMN trials in Tanzania supplementing from 6 weeks of age excluded iron and reported improved iron status, but no improvement in neurocognitive outcomes at 15 months of age or growth and neurocognitive function at 6–8 years of age. **Conclusions:** Very few trials supplemented infants under 6 months of age with iron or MMNs. Of the few, a positive impact on biochemical status was consistently seen, but the lack

and heterogeneity of data limits the assessment of longer-term impact.

Hsiu Tung

Network analysis of associations between clinical variables and psychological symptoms in testing and identifying targets in rheumatoid arthritis therapy – UltraSound Study (TITRATE-US) dataset

Background: Rheumatoid arthritis (RA) is associated with an increased prevalence of common mental disorders. There is a need for more comprehensive understanding of the interactions between mental and physical health to be able to effectively target treatments. Objectives: To use network analysis to identify the leading symptom that connects the clinical and psychological symptoms in RA. **Methods:** 158 patients participated in this cross-sectional study which includes an ultrasound component on all the major joints. Physical, inflammation and psychological symptoms are all included. Network analysis was conducted based on regularised correlations between variables using R-package qgraph. **Results:** The network highlights GAD1 (feeling nervous) and PHQ2 (low mood) as having the highest degree (4.63 & 4.67 indicating they have the highest number of connections), while TPD and fatigue is highest for betweenness centrality (38 & 30), indicating they provide the shortest pathway between symptoms, therefore act as key variables linking inflammation, physical and mental health. Fatigue and pain had the highest closeness centrality (0.02 & 0.019), illustrating that they have the shortest path with other symptoms, and capture the influence of both inflammation and mental health. **Conclusions:** Inflammation in RA does not have a strong influence on mental health but is connected to the physical aspects and vital to how the network runs. Symptoms of mental health were all strongly connected, but low mood and high anxiety provides the main connection between clinical and psychological variables. This indicates mood as potentially a key variable, which is easy to monitor in routine care.

Hester Velthius

Improving health and wellbeing in employment and education: an idea for a 'neurodiversity' safety assessment

Introduction: 41 per cent of the population is estimated to have some sort of neurodivergence, eg a neurodevelopmental condition, specific learning difficulty or other divergent cognitive functioning as a result of neurologic difference. Individuals with resulting hidden disabilities are disadvantaged and lack support or provision of workplace adjustments. This has a big impact on their health and wellbeing, but also on productivity and outcomes. I will be presenting an idea for a module on (neuro)diverse and inclusive working for students and

employees that could be added to the existing mandatory Health and Safety training and assessment. Additionally, this module aims also to improve gender-based and ethnicity-based inclusive practices which are equally resulting from discriminatory societal normative behaviors and practices. The module includes: Training: educating all students and employees, including managers, about the potential workplace adjustments and resources that make work conditions more inclusive. **Assessment:** investigating duties of the individual and identifying their potential for growth. **Feedback:** suggesting workplace and workstyle adjustments and resources fitting the needs and potential of the individual in order to promote development in their role and wellbeing. **Hypotheses:** I expect that implementation of this module will improve wellbeing for employees and students (diagnosed, non-diagnosed and non-disabled) as they are enabled to make informed choices about making workplace adjustments fitting their preference. Discriminatory behaviors and practices are assumed to correlate negatively with the rate of inclusive practices and tools adopted, as this will lead to 'normalization' and 'divergence' of inclusive practices at work.

Sergio Villicana

Finding the DNA methylation sites that are under genetic control by meQTLs in blood samples

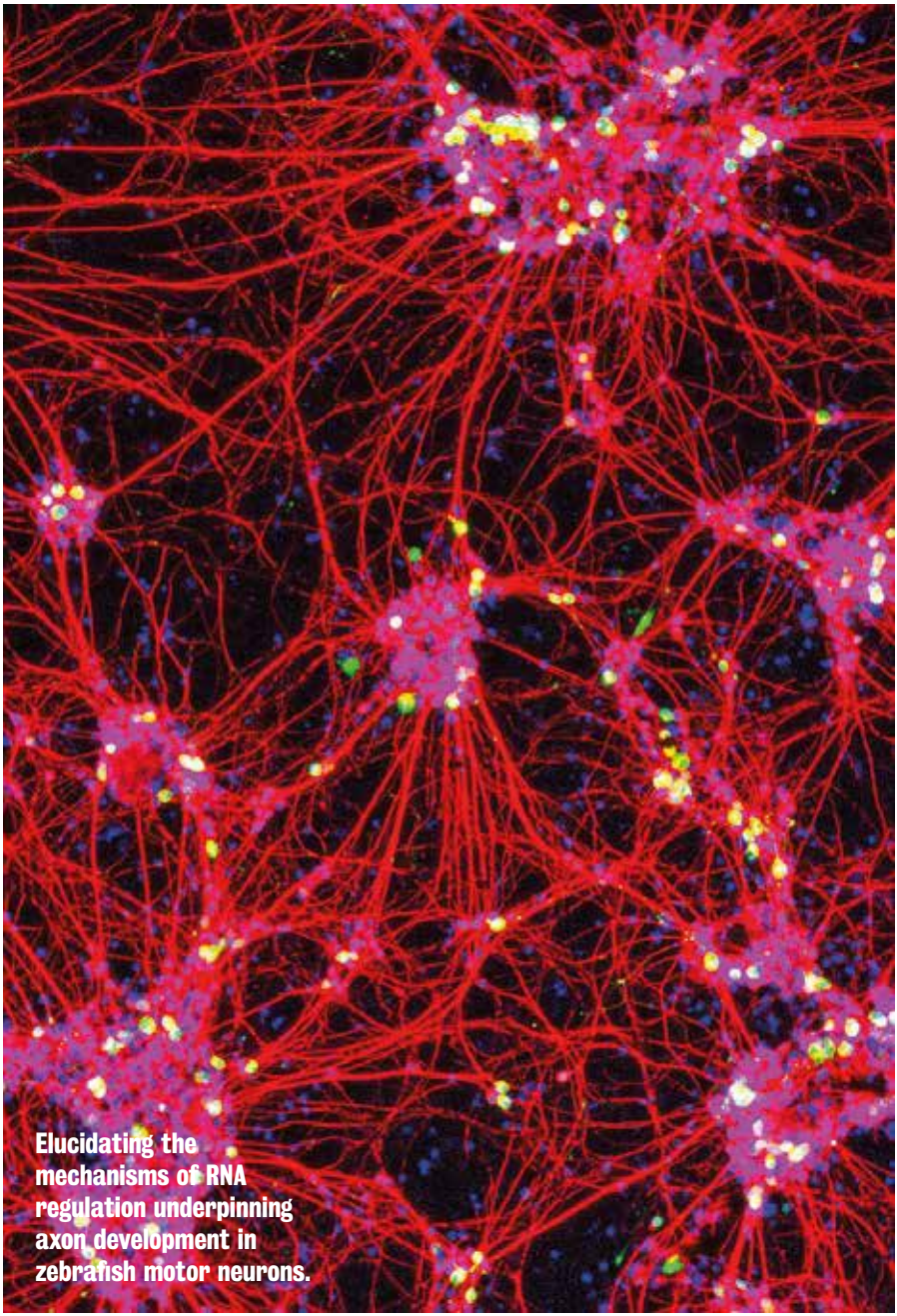
DNA methylation is an epigenetic mark involved in the modulation of gene expression, and their active response to individual environmental factors have been widely studied. Recently, several studies have characterized that the methylation states of certain CpG-sites are under genetic control by quantitative trait loci (meQTLs), mainly through the Illumina 450K array which covers genic and promoter regions. Here, we report a meta-analysis for cis and *trans-me*QTLs coming from 2,358 whole-blood samples from three different cohorts (ie TwinsUK, and birth cohorts 1946 and 1958), by using the Illumina EPIC array for nearly 850,000 CpGs. Our results suggest that 21.2 per cent of the probed methylation sites are associated with one cis-meQTL at least, and 1.2 per cent with *trans-me*QTLs, using stringent Bonferroni significant thresholds. These findings are in accordance with previous estimates in similar sample types profiled on EPIC array, where 12.2 per cent of the CpGs were significantly correlated with a meQTL. Further steps in our research include the definition of a significance threshold based on permutation methods, which potentially would decrease the false-negative rate signals; as well, we aim to characterize the meQTLs and their

CpGs with genomic annotation, in order to trace enriched and depleted features and figure out the underlying mechanisms beyond the associations.

Stavros Vlatakis

Image-guided phase change nanodroplets for the treatment of brain tumours

High-Intensity Focused Ultrasound (HIFU) has attracted notable attention in the last years due to the ability to alter tissue characteristics and enhance the delivery of therapeutic molecules. In preclinical models (including non-human primates) HIFU has proved to intensify the permeability of macromolecules and nanoparticles through the Blood-Brain Barrier (BBB). The combination of HIFU with microbubbles (MB) cause cavitation and, potentially, a reversible permeability of the BBB for a short period occurs. However, the exact mechanism of brain delivery with the combination of HIFU and MB has not been discovered yet. This study will analyse the preparation of lipid-based phase change nanodroplets labelled with fluorescent probes and/or loaded with therapeutic molecules which possess significant advantages than microbubbles. The gas-cored nanodroplets, after the application of HIFU, have shown the localised opening of the BBB due to oscillation/cavitation and they will be adopted to be MRI (magnetic resonance imaging) traceable. After their successful preparation and physicochemical characterisation, the nanodroplets will be investigated in vitro and in vivo. For the in vitro investigation, BBB and tumour cell models will be used in transwells to assess the membrane penetration and the anti-tumour efficacy of the formulations. Finally, mice will be used to introduce tumour cells within the brain, will be injected with nanodroplets and receive HIFU application for the in vivo assessment of the study.



Elucidating the mechanisms of RNA regulation underpinning axon development in zebrafish motor neurons.

RICHARD TAYLOR (2019)

kcl.ac.uk/healthsciences

Design by Susen Vural Design
Approved by brand@kcl.ac.uk
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