QUEEN'S UNIVERSITY BELFAST | POSTDOC SOCIETY

Postdoc Showcase 2023

"Creating Impact Through Collaboration"

Friday 29th September 2023

09:00 – 18:00

Whitla Hall, Queen's University Belfast

go.qub.ac.uk/showcase23

#LovePostdocs #NPAW2023

Welcome to the Postdoc Showcase!

It is with great pleasure that we welcome you to the Queen's Postdoc Showcase which runs the week after National Postdoc Appreciation Week (NAPW) 2023.

This year we are delighted to have Professor Elborn, Provost and Deputy Vice Chancellor for Research to officially open the showcase, our keynote speaker Professor Alcorn, and 5-minute flash talks from across the three Faculties at Queen's. We are also excited to have our panel discussion relating to the theme of this year's showcase 'Creating Impact Through Collaboration'.

The Postdoc Showcase is a celebration of the valuable contribution postdocs play in enhancing the University's research and reputation. As part of this, in an effort to raise the profile of postdocs and research staff across QUB, we will be showing researcher profiles across social media during NPAW and the week leading up to the Postdoc Showcase.

On behalf of this year's organising committee, we hope you enjoy the programme and thank you attending the Postdoc Showcase 2023!

2023 Postdoc Showcase Organising Committee:

Members of the Postdoc Society pictured from left to right Dr Duncan Wells, Dr Danielle Logan, Dr Sarah Baxter and Dr Alex Lucas

With support from Erin Davidson and Alice Dubois from the Postdoctoral Development Centre.

Contents

For sustainability reasons, please do not print this booklet or only print the pages you feel you need. The programme will be displayed at the venue, and QR codes to an electronic version of this booklet will also be available.

Practical information

Location

Whitla Hall

Queen's University Belfast, Belfast BT17 9GA

Food

Food has been ordered to include vegetarian and vegan options in order to offer options to as many guests as possible. When reported to us during online registration, other specific dietary options have been ordered to accommodate additional restrictions or allergies.

Programme

09:00 - 09:30	Registration With Tea, Coffee & Pastries
09:30 - 09:45	Welcome • Dr Danielle Logan & Dr Alex Lucas | Postdoc Society Co-Chairs • Professor Stuart Elborn | Provost and Deputy Vice Chancellor
09:45 - 10:15	Professor Michael Alcorn | Associate Pro-Vice Chancellor Sustainability and Special Projects • "Making your mark – navigating research landscapes then and now"
10:15 - 11:45	Impact and Collaboration Panel Discussion Short introductions by each panellist, followed by a moderated and open panel discussion • Professor David Grieve | Dean of Internationalisation at QUB • Dr Danielle McCarthy | Chief Health Officer at Spoon Guru, Co-Founder and Director of Nutrition Talent and Honorary Professor of Practice at QUB • Dr Maelíosa McCrudden | Research Impact and Engagement Officer at QUB • Dr Neil Galway | Director of Postgraduate Studies in Planning at QUB, expert in planning for inclusive places • Dr Karen Beattie | Head of the Office of Research Ethics Committees Northern Ireland (OREC NI), Business Services Organisation (BSO) *Chairs: Alex Lucas and Omololu Fagunwa*
11:45 – 13:15	Lunch (finger buffet) and Poster Session Poster presenters to please be around their posters as follows: • 12:10 to 12:40 for even poster numbers • 12:40 to 13:10 for odd poster numbers
13:15 – 14:30	Flash Talks: Session 1 Good Health and Wellbeing / Partnerships SDGs:

	1. Thomas Thompson: "Harnessing Cold Plasma to Fight Antibiotic-Resistance" 2. Claire Tonry: "Considerations implementing a digital heart failure intervention- a single centre experience on behalf of the Passion-HF consortium" 3. Najam Sahar: "Understanding anti-microbial resistance vaccine hesitancy or acceptance: The role of psychology in the All Ireland Vaccine Training Alliance (AIVRT)" 4. Calum Marr: "Establishing the prevalence of dementia and cognitive decline among older adults in Northern Ireland" 5. Tayler Truhan: "Influences of personality, parenting, and home environment on youth mental health" 6. Paul McCusker: "Growing pains: disrupting growth and development in parasitic worms" 7. Sarah Abdulmalek "Hallmarks of Premature Ageing in the Heroin Addicted Brain" - said don't know for SDG 8. Ethna McFerran: "Skin in The Game: The Cost Consequences of Skin Cancer Diagnosis, Treatment and Care in Northern Ireland" Climate Action SDG: 9. Abraham Abraham: "PlantCrystals – Green Sciences Shaping a Sustainable Future of Natural Cosmetics" 10. Shamsudeen Dandare: "Biocementation of Carbonate Soil and Construction wastes through Microbially Induced Carbonate Precipitation (MICP)" 11. Joe Livingstone: "Calculating environmental impact for meals and considering the uncertainties in the results" 12. Ross Cuthbert: "Unevenly distributed biological invasion costs among origin and recipient regions" *Chair: Danielle Logan*
14:30 – 15:00	Break (afternoon tea)
15:00 – 16:00	Flash Talks: Session 2 Reduced Inequalities SDG: 1. Stefano Angeleri: "Towards an intersectoral right to health for vulnerable migrants in Colombia"

	2. Erika Jimenez: "Golani youth and the usefulness of human rights in their struggle against the forgotten occupation" 3. Niamh O'Kane: "Factors driving food choice in a secondary school food setting: mapping the system" 4. Ka Ka Tsang: "The Power of Voice: Methodological Reflections on a Discursive Study of the Mobilisation of Marriage Equality in NI" 5. Prabhath Piyasena: "Development of a Diabetic Retinopathy Screening Programme in a Lower Middle Income Country: A Situational Analysis to a Policy Brief" Sustainable Cities and Communities SDG: 6. Bakul Budhiraja: "How Nature plays a role in shaping sustainable cities?" 7. Maria Garcia-Fernandez: "Compressive Subsurface Radar Imaging: fast and smart detection of buried explosive threats" 8. Guillermo Alvarez Narciandi: "Redefining the future of electromagnetic sensing: portable single-pixel millimeter-wave cameras operating in real-time" 9. Timilehin Opeyemi Alakoya: "Traffic network analysis via multidimensional split variational inequality problem with multiple output sets" 10. Jian Gao: "Using computer vision techniques to identify and assess the quality of green space from satellite imagery" *Chair: Lisa Douglas*
16:00 – 16:20	PDC Postdoc Awards *Chair: Alice Dubois*
16:20 – 16:40	Showcase Prize-giving and Closing Remarks *Chair: Postdoc Society Co-Chairs*
16:40 – 18:00	Drinks Reception

Invited Guests & Speakers

Prof Stuart Elbron, Provost and Deputy Vice Chancellor

Stuart Elborn is Professor of Medicine and Provost and Deputy Vice-Chancellor (Interim) at Queen's University Belfast. He is responsible for planning, governance and academic performance across the University, with particular responsibility for the delivery of the Queen's University contribution to the Belfast Region City Deal Programme. He also has responsibility for the institutional approach to equality, diversity and inclusion and climate mitigation and sustainability. Stuart is also a Visiting Professor at Imperial College London. His research interests are in cystic fibrosis and bronchiectasis, focused on identifying new targets and diagnostics for infection and inflammation in lung disease, developing better therapies and the use of digital platforms and artificial intelligence in healthcare delivery. In 2013 Stuart received a CBE for services to Healthcare.

Professor Michael Alcorn, Associate Pro-Vice Chancellor Sustainability and Special Projects

Michael Alcorn is Professor of Music and Associate Pro Vice Chancellor at the Queen's University of Belfast. His research is focused on the use of cutting-edge technology to find new sounds and new modes of musical expression. He has supervised over 35 international PhD students during his career and also has a strong interest in developing musical skills in both youth and amateur musicians. Michael has worked at Queen's University for over 35 years having started as a Composer-in-Residence before becoming a teacher and researcher in the School of Music. He devised and developed the Music Technology pathway at Queen's and led the successful bid to develop the multi-million pound Sonic Arts Research Centre at the University. He was Director of SARC from its inception in 2001 until it joined forces with the School of Music in 2005. Michael has held roles as Head of Music, Film and Drama, and Dean of Graduate Studies and Dean of Internationalisation in the Faculty of Arts, Humanities and Social Sciences. He is the institutional lead on the creative industries and was successful in securing £14m of research funding to support FutureScreens, an industry-facing research programme aimed at developing new products, services and experiences in the media sector. In 2022 he established Queen's MediaLab, an experimental facility exploring next generation media production particularly those involving virtual reality and game engine technologies. He is also an Associate Pro-Vice Chancellor at Queen's working directly with the President and Vice Chancellor on strategic institutional

projects, specifically on developing and embedding sustainability practices across the University in working to help the University to meet its ambitious Net Zero 2040 Plan.

Professor David Grieves, Dean of Internationalisation at QUB

After being awarded a BSc honours degree by the University of Dundee (1995), I completed a PhD focussed on dietary lipoproteins and atherosclerosis at The Royal Veterinary College, University of London (1998). I then worked as a PDRA in the Cardiovascular Division at King's College London until 2005, when I took up an academic position within the School of Medicine, Dentistry and Biomedical Sciences at Queen's University Belfast, where I am currently a full Professor leading an established research programme and also Faculty Dean of Internationalisation. Notable achievements include receipt of the International Society for Heart Research Young Investigator Award (2003) and a prestigious Medical Research Council UK New Investigator Research Grant (2007), and election to the committee of the British Society for Cardiovascular Research (2008) on which I served as Honorary Secretary (2014-20). I am currently Associate Editor of Cardiovascular Drugs and Therapy (2020-), serve on the Medical Research Council Populations and Systems Medicine Board (2023-), and recently completed a term as Vice-Chair of the British Heart Foundation Projects Grants Committee (2017-21). I have published 75 peer-reviewed papers in the cardiovascular field in high impact journals such as Circulation, Circulation Research, Journal of the American College of Cardiology and Proceedings of the National Academy of Sciences USA, with >5,300 citations and an H-index of 34 (Scopus) and have been awarded >£6M in competitive research funding.

Dr Danielle McCarthy, Chief Health Officer at Spoon Guru, Co-Founder and Director of Nutrition Talent and Honorary Professor of Practice at QUB

Danielle has an established career as an applied nutrition scientist, strategist and entrepreneur, working within senior leadership teams across the food system, including food manufacture, pharma, food retail and food tech. Previous positions include Head of Nutrition at Sainsbury's, a leading UK grocer, Principal Scientist at GSK and Co-founder of a leading recruitment and consultancy business specialising in provision of robust nutrition expertise to EU based private and public organisations. She is a co-host of the Humans of Nutrition Podcast, a platform she established with Anna Wheeler to share first hand insights into the world of those working as Nutrition Professionals. This strong portfolio of professional practice in the private sector is complemented by direct experience working within academic research and education as a Senior Lecturer at Queen's University Belfast in the Institute for Global Food Security. Her unique expertise in translational and multi-sector applied research helped QUB secure UKRI, Horizon 2020 and EIT research funding.

Dr Maeliosa McCrudden, Research Impact and Engagement Officer at QUB

Dr Maelíosa Mc Crudden is the Research Impact and Engagement Officer for the Faculty of Medicine Health and Life Sciences at Queen's University Belfast (QUB) and the Co-ordinator of QUB's Personal and Public Involvement (PPI) Network. Following completion of her PhD in Biochemistry, Maelíosa spent over a decade in postdoctoral research, focussing on the areas of host defence responses to injury and pharmaceutical sciences. Following this, she spent almost three years in biomedical sciences education, teaching undergraduate students across a range of degree programmes. She moved into her current role at QUB in 2022. Open and accurate communication of scientific research has always been the central principle of Maelíosa's work, as exemplified through her collaborations with non-profit organisations such as United States Agency for International Development (USAID) and the receipt of institutional and national awards for science communication.

Dr Neil Galway, Director of Postgraduate Studies in Planning at QUB, expert in planning for inclusive places

Neil Galway MRTPI is Director of Postgraduate Education in Planning at Queen's University Belfast. His research and pedagogy focuses on broadening participation in planning and contested heritage. He has focused extensively on researching both: how planning can capture the unheard voices of young, disabled and neurodiverse groups within society and engaging with governmental and council stakeholders to promote more progressive urban practices.

Dr Karen Beattie, Head of the Office of Research Ethics Committees Northern Ireland (OREC NI), Business Services Organisation (BSO)

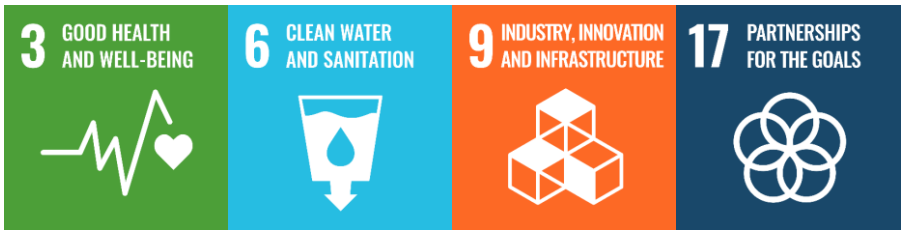
Karen graduated with a BSc (Hons) in Social Policy and Administration in 1998, and in 2004 was awarded a PhD in Policy Studies from Ulster University. Karen is very interested in issues to do with equality, diversity and inclusion, and this is reflected in her career path. Following 4 years as a Research Associate/ lecturer within Ulster University, Karen worked in the Health Intelligence Unit in the Public Health Agency (PHA) for 10 years evaluating the impact and equality implications of public health policies and programmes. Having worked in the Equality Unit in BSO for 4 years, Karen took up the post of Head of OREC NI in November 2021. OREC NI aims to facilitate high quality research in the HSC/NHS, while ensuring the protection of the rights, dignity, safety and well-being of participants and of those conducting research. Research Ethics applicants include NHS/HSC researchers and clinicians, social care researchers, and university researchers (including students), and the commercial healthcare sector. OREC NI works closely with the Health Research Authority England, and the Scottish and Welsh Research Ethics services to ensure that a cohesive UK Research Ethics service is provided.

Flash Talks: Session 1 Abstracts

1. Thomas Thompson: “Harnessing Cold Plasma to Fight Antibiotic-Resistance"

Email: t.thompson@qub.ac.uk

Sustainable Development Goals:



Antibiotic resistance is a looming global health crisis. In response, our research explores the potential of cold plasma technology - a state of matter consisting of charged particles - to combat antibiotic-resistant infections. This innovative approach is not a futuristic concept, but a tangible solution that we're actively investigating. Our research focuses on bacterial biofilms, structured communities of bacteria that are notoriously resistant to antibiotics. These biofilms contribute to persistent infections such as chronic wounds and lung infections in cystic fibrosis patients. We're using cold plasma to target these biofilms, particularly those formed by Staphylococcus aureus and Pseudomonas aeruginosa, two bacteria that are often resistant to multiple antibiotics. Our approach involves treating these biofilms with cold plasma and assessing the effects using microscopy, viability assays, and next generation bioinformatics. Our recent studies have shown that cold plasma can disrupt biofilms and reduce bacterial viability, indicating its potential as a new tool in our fight against antibiotic resistance. Furthermore, our research suggests that cold plasma could be used alongside traditional antibiotics to enhance their effectiveness, particularly against biofilm-associated infections. This strategy could lead to the development of innovative treatments for persistent infections, contributing to global health (SDG 3), improving access to clean water (SDG 6), driving innovation in medical technology (SDG 9), and international partnerships (SDG 17). Our ongoing work includes evaluating cold atmospheric plasma devices for biomedical applications in bone biofilm infections. As a researcher with a background in both pharmacy and microbiology, I bring a unique, interdisciplinary approach to this work. This research is about translating scientific understanding into real-world solutions that can make a difference in people's lives. Our

goal is to bring this technology from the lab bench to the bedside, where it can transform lives and combat antibiotic resistance.

2. Claire Tonry: "Considerations implementing a digital heart failure intervention- a single centre experience on behalf of the Passion-HF consortium"

Email: claire.tonry@qub.ac.uk

Sustainable Development Goals

Treatment of heart failure (HF) consumes $108 billion of the global healthcare economy annually. Promoting self-management, with the use of artificial intelligence, may help to guide individualised patient care, with a reduction in frequency of clinic visits and HF-associated hospitilisations. The aim of this questionnaire study was to assess patients' needs and factors determining their acceptance of a digital heart failure intervention. An electronic questionnaire was sent out to 110 stable HF patients who had recently been reviewed and invited to participate by the clinical Heart Failure Team within a tertiary healthcare trust. All invited participants had a diagnosis of HF, were over 18 years old, had no serious cognitive impairment and were willing and able to provide written consent. Frequency and chi-squared analyses, with post-hoc corrections, of the questionnaire data were performed using SPSS Version 27. Response rate to the survey was 92% (n=101). Almost 50% of patients surveyed had been treated in hospital for their HF in the previous 12 months. The majority (>70%) indicated that they could see themselves using an e-Health device to manage their HF. Nearly 60% (n=59) of participants were classified as having a 'healthy lifestyle' i.e. they did not smoke and consumed alcohol less than once per week. These people were more likely to have positive attitude towards technology (p adj.=0.013). Although the oldest patients (80-89 years, n=5) were less likely to use an e-Health device (p adj.=0.003), advanced age was not significantly associated with patients' attitudes towards modern technology (p adj.=0.994). Education level, employment and marital status also did not influence patient attitudes toward technology or their health (p>0.05). These data indicate an overall agreeable response from patients on the benefits of an e-Health device for self-management of their HF. These results will inform further development of the e-Health intervention.

3. Najam Sahar: "Understanding anti-microbial resistance vaccine hesitancy or acceptance: The role of psychology in the All Ireland Vaccine Training Alliance (AIVRT)"

Email: n.sahar@qub.ac.uk

Sustainable Development Goals:

World Health Organization (WHO) has identified vaccine hesitancy as a major threat to global health. Interdisciplinary efforts are required to improve the vaccine coverage for general public through psychosocial interventions focusing on behaviour change, attitude formation, public understanding, and uptake. In Ireland, the All-island Vaccine Research and Training Alliance (AIVRT), funded by the HEA North-South Research Programme is aiming to develop vaccines for anti-microbial resistance. Central to the success of this will be the adoption of any developed vaccine by those who would benefit. This behavioural science work package as part of the wider AIVRT programme will evaluate individual and broader health and societal factors contributing to vaccine hesitancy and vaccine acceptance in Ireland. As part of this programme of work, a review of reviews will be conducted into vaccine hesitancy and why individuals may, or may not wish to use vaccines. This will inform later activities including interventions and developing understanding in Ireland. This presentation will also discuss how vaccine hesitancy and the role of psychology intersects with the wider programme of work on the collaborative efforts of microbiologists, pharmacists, virologists, and psychologists for addressing the wellbeing through some preventive measures and both at individual and community level. AIVRT will contribute to the sustainable development goals of good health (SGD 3), innovation and infrastructure (SGD9), and partnerships for the goals.

4. Calum Marr: "Establishing the prevalence of dementia and cognitive decline among older adults in Northern Ireland"

Email: c.marr@qub.ac.uk

Sustainable Development Goal

Maintaining brain health in older age remains a key research priority, particularly in light of global ageing trends. The Harmonised Cognitive Assessment Protocol (HCAP) project was established within the US-based Health and Retirement Study, with the aim of harmonising cognitive assessment across multiple national population-based studies of ageing. The HCAP protocol has been implemented in several countries, providing an important international data resource to understand cross-country variations in the prevalence of and risk factors for dementia and cognitive decline. In Northern Ireland, the HCAP protocol has been implemented within the Northern Ireland Cohort for the Longitudinal Study of Ageing (NICOLA), an ongoing study of the health of older adults living in Northern Ireland. The NICOLA sample consists of ~8500 adults aged 50 and over. Between February 2022 and August 2023 the NICOLA-HCAP study administered a comprehensive cognitive assessment to a subsample of 1000 NICOLA participants aged 65 and over. In collaboration with partners in the US, England and the Republic of Ireland, data will be used to develop algorithms to estimate the prevalence of dementia within the subsample. These will then be extrapolated to provide the first estimates of the prevalence of dementia and cognitive impairment in the population of Northern Ireland. Analyses are planned to examine potential risk factors for dementia and cognitive decline, including cardiovascular health, sensory impairment and, uniquely in Northern Ireland, stress and long-term exposure to conflict. Additional analyses will examine the links between physical activity, environmental factors and cognitive health. Given the personal, societal and economic impact of dementia, this data will provide a valuable resource for researchers and policy-makers. This presentation will provide an overview of the study methodology and discuss planned future analyses.

5. Tayler Truhan: "Influences of personality, parenting, and home environment on youth mental health"

Email: t.truhan@qub.ac.uk

Sustainability Development Goal:

According to data collected by the NHS in 2020, one in six young people aged 5 to 16 years have been identified as having a probable mental ill health concern. Recent findings from our team show that parent and adolescent personality influences important correlates to adolescent mental health, such as externalizing and internalizing problems. While this may not come as a surprise, there are few studies that have tested the mechanisms through which parent and adolescent personality contributes to individual differences in adolescent mental health. Therefore, the overarching aim of my research is: to explicate associations among parent and adolescent personality, parenting behaviour, and economic and parental adversity contexts in affecting adolescent mental health. This involves use of self-report surveys from both parents and adolescents, and advanced statistical modelling, such as network analysis, to examine connections among these variables in affecting adolescent mental health. Beyond contributing novel findings to the fields of personality and developmental psychology, the project aspires to contribute new knowledge on a major public health concern – the mental health of young people. In fact, the Department of Health and Social Care has listed 'early action to prevent poor health outcomes', including mental health, as a key 2023 area of research priority. By examining important early life factors, such as parent and adolescent personality, parenting, and home and family environments, we can begin to understand which components contribute to the mental health of young people, and in turn, their parents. Further, this work contributes to SDG 3: 'good health and well-being'.

6. Paul McCusker: "Growing pains: disrupting growth and development in parasitic worms"

Email: p.mccusker@qub.ac.uk

Sustainability Development Goals:

The common liver fluke is a parasitic flatworm that poses a significant economic burden on the agri-food industry worldwide through livestock infections, costing over $3 billion (USD) annually and threatening food security. Additionally, the World Health Organisation classifies the human disease caused by the liver fluke, fascioliasis, as a Neglected Tropical Disease. During the acute phase of fascioliasis, juvenile worms burrow through the host liver, causing extensive damage. Current treatment relies heavily on triclabendazole, but widespread resistance necessitates the development of new drugs targeting this stage of the disease. We have developed a platform to grow juvenile worms outside of the host, allowing us to study their biology, including their growth and development. In recent years we discovered that stem cells within the worm are responsible for driving liver fluke growth. Similar stem cells are known to exist in other parasitic flatworms, and in free-living flatworms they regulate astonishing feats of regeneration. The stem cells of the liver fluke may contain druggable targets, and our recent research has focused on their biology. We used a combination of irradiation and gene silencing experiments to investigate the effects of stem cell loss on worm growth and development. Eliminating stem cells resulted in reduced growth and development of worms. Prolonged loss of stem cells leads to changes in the expression of genes involved in inter-cell signalling, including neuronal genes, supporting evidence for nervous system-growth interplay and encouraging the interrogation of these neuronal genes as new targets for drug discovery. Additionally, we found several anti-cancer drug targets expressed in liver fluke stem cells, exposing opportunities to repurpose anti-cancer compounds as anti-parasitics. This work encourages a new approach to parasite control, exploiting genes involved in the regulation of parasite growth and development and piggybacking on developments in cancer therapeutics for parasite control.

7. Sarah Abdulmalek: "Hallmarks of Premature Ageing in the Heroin Addicted Brain"

Email: s.abdulmalek@qub.ac.uk

Sustainability Development Goals:

Substance use disorder (SUD) is associated with the development of addiction, premature mortality and early onset of age-related disorders. Opioid use disorder (OUD) can develop from prescribed pain management medications and, in most cases, propagates to the illicit use of opioids. This phenomenon is increasing in Northern Ireland with heroin and tramadol accounting for the majority of drug related deaths in 2019. The use of and/or withdrawal from the acute effects of illicit drugs result in the induction of cellular ageing by the increase in oxidative stress leading to the recruitment of the central immune system creating a chronic inflammatory state. Ageing is a natural progressive state of decline in biological functions impacting multiple physiological systems. Chronological ageing of the central nervous system (CNS) can trigger biological senescence leading to the emergence of age-related cognitive impairment, such as dementia and neurodegenerative disorders. Furthermore, biological senescence can be accelerated by the interaction of biological, environmental and social factors resulting in the outpacing of chronological ageing. Addiction is strongly linked to premature cognitive decline and impaired learning and memory formation. This project investigates the transcriptional profile associated with opioid vulnerability in multiple brain regions involved in the reward system. NIH rats were exposed to heroin, using long access self-administration protocol, for 34 days, and were divided into 3 different groups according to the total consumption of heroin and their response in prime and cued reinstatement of heroin intake with respect to the controls. Animals were subjected to forced abstinence for 2 weeks before they were euthanised and their brain tissues were snap frozen in isopentane and stored in -80 °C for further dissections. Total RNA was isolated from dissected brain region for library preparation. Our results show enriched biological processes related to ageing in multiple brain regions in opioid vulnerable female rats.

8. Ethna McFerran: "Skin in The Game: The Cost Consequences of Skin Cancer Diagnosis, Treatment and Care in Northern Ireland"

Email: e.mcferran@qub.ac.uk

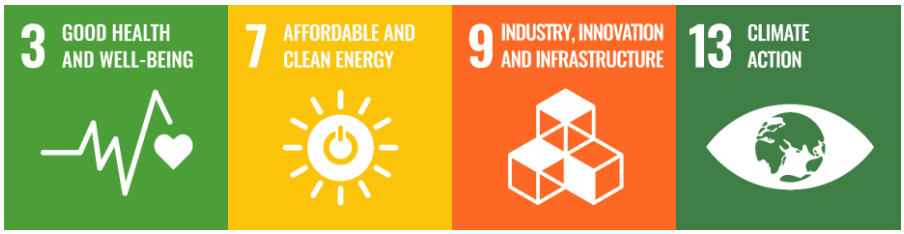
Sustainable Development Goals:

Skin cancer is a prevalent type of cancer in the UK. Its rising incidence and mortality rates are expected to result in substantial financial implications, particularly on diagnostic and treatment services for skin cancer management in Northern Ireland. Such anticipated disease increases underscore the need for prevention and control measures that should guide policymaking and planning efforts. We conducted a cost study to assess the economic impact of skin cancer in Northern Ireland from the healthcare system's perspective, using a bottom-up method, employing NHS reference unit costs (UK£) for skin cancer diagnosis and treatment patient pathways in 2018. We performed sensitivity analyses that varied diagnostic volumes by applying multipliers for benign cases, assuming a diagnostic conversion rate of 6.8%, and examining an alternative chemotherapy regimen compliance rate of 75%. Additionally, proportional cost increases were projected based on future estimated increases of 9% and 28% to malignant melanoma cases for diagnostic, treatment, and follow-up volumes. In 2018, NICR recorded 4142 non-melanoma skin cancers (NMSC) and 423 malignant melanoma (MM) cases. The total cost for managing NMSC was £1,815,936. Costs for MM skin cancer were £12,364,220, including £8,792,208 for procurement, administration, and chemotherapy drug use. Overall healthcare spending on skin cancer care totalled £17,024,115. Sensitivity analysis suggests diagnostic cost would either reduce by £781k to £3,061,524 or increase significantly to £11,212,183 based on referral volume assumptions. If base case rates rise by 9 or 28% estimated total costs of treating skin cancer will increase to £18.1 million and £20.4 million, respectively. Skin cancer management costs in Northern Ireland totalled ~£14.3m to £26.2m depending on diagnostic referral assumptions. Malignant melanoma costs have risen ~10-fold over the past decade due to chemotherapy costs. A predicted 28% increase in melanoma cases by 2040 would lead to £3.3m of additional expenditures.

9. Abraham Abraham: "PlantCrystals – Green Sciences Shaping a Sustainable Future of Natural Cosmetics"

Email: abraham.abraham@qub.ac.uk

Sustainability Development Goals:



Today most of the cosmetic products in the market contain plant active and/or inactive ingredients (e.g. oils, proteins or plant extracts). Extraction of these compounds is still challenging, time-consuming and large amounts of plant starting material and organic solvents are usually required. This also results in a huge non-reusable post-extraction waste. PlantCrystals are novel, green and sustainable formulation principle based on green sciences offering safe and effective products with no post-extraction waste. This study aimed to investigate the PlantCrystal-technology to render plant waste into cosmeceutical formulations. For this, different plant wastes were chosen and homogenized using different techniques to obtain formulations with particle sizes below 10µm. The free radical scavenging potential (i.e. antioxidant capacity (AOC)) of the PlantCrystals was analyzed and compared to the non-processed plant waste and ascorbic acid. Results showed high AOC for all the PlantCrystal-formulations indicating the great potential of plant waste for further use in cosmetic products. Interestingly, it was found that in some formulations the AOC decreased with increasing homogenization cycles. This might be due to the incorporation of oxygen into the formulations, which results in accelerated oxidation of the released plant antioxidants. Therefore, to circumvent oxidation of plant compounds during the process, in a second part of the study, the plant wastes were homogenized under oxygen-free conditions. Results confirmed the data obtained and showed that PlantCrystals, when produced under oxygen-free conditions, can possess extremely high AOC being similar to ascorbic acid. In conclusion, PlantCrystals represent a novel and simple formulation principle to render plants and their waste into effective cosmetic raw materials and in a next step into effective sustainable natural cosmeceutical products. Thus, PlantCrystal-technology is a new eco-friendly technology (without organic solvents and post-extraction waste) that can shape a better future for natural cosmetic products while ensuring sustainability.

10. Shamsudeen Dandare: "Biocementation of Carbonate Soil and Construction wastes through Microbially Induced Carbonate Precipitation (MICP)"

Email: s.dandare@qub.ac.uk

Sustainable Development Goals:

MICP is a widespread biochemical process for CO2 sequestration in the environment (soils, caves, freshwater, marine sediments, etc.). It occurs through major metabolic processes, including urea hydrolysis, denitrification, dissimilatory sulfate reduction, and photosynthesis. MICP has been shown to have potential as an environmentally sustainable solution in the self-healing of concrete, encapsulation of heavy metals in soils, and cementation of erosion-prone soils. While MICP has been widely achieved using Sporosarcina pasteurii due to its high ureolytic activity, the ability of enriched indigenous bacteria to carry out MICP in situ has not been given wide attention. Here, we investigate the biostimulation of the indigenous microbes in carbonate-bearing granular soil (Blessignton sand) and crushed concrete – a mimic of construction demolition waste, to precipitate calcium carbonate and cause the cementation of the materials. This process was achieved in a column microcosm (8cm X 19cm) by pumping a stimulation recipe for ureolytic bacteria and subsequently a cementation recipe to ensure calcite precipitation. Biocementation of the materials was monitored in real-time by measuring the shear-wave velocity (Vs) using bender elements. The presence and quantity of calcite were determined by X-ray diffraction and thermogravimetric analysis respectively. Biocementation was achieved throughout the Blessington sand as there was an exponential increase in the Vs (from 120 - 500 m/s) during the cementation cycle. There was also a 5% calcite formed due to MICP. Cementation in the crushed concrete was only achieved close to the injection point, this is likely due to the high pH (12.0) of the material which inhibits the growth and activity of ureolytic microbes. The grain size of the material is also a crucial factor in biocementation. This study serves as a proof-of-concept for the use of indigenous microbes for stabilisation and valorisation of carbonate soils and construction demolition wastes for several applications.

11. Joe Livingstone: "Calculating environmental impact for meals and considering the uncertainties in the results"

Email: joe.livingstone@qub.ac.uk

Sustainability Development Goals:

Unsustainable agri-food production practices are affecting climate, environmental quality (soil, air, water, biodiversity), animal health and welfare. Transformation may be achieved partly through direct interventions such as taxes and subsidies, but there is a need for the consumer to make food choices to improve the health of the planet and become key drivers of positive change. The aim of this work is to assess the environmental impact of various restaurant and quick service meals, producing an environmental impact score that is easily understood. The environmental impacts of four different meals were assessed: chicken curry, vegetable curry, beef stew and spaghetti and pancetta carbonara. The meals were assessed using life cycle assessment techniques with a system boundary of farm-to-shelf and using publicly available data. Two different methods of environmental impact assessment were used: the global warming potential (GWP) metric and Envrioscore, with the strengths and weaknesses of each discussed. Enviroscore is a 5-scale label that relativizes the environmental impact of a given product based on the Product Environmental Footprint methodology. This work applies Enviroscore to complete meals for the first time. Meals were ranked based on their GWP and on an Enviroscore label, ranging from A (very low environmental impact) to E (very high environmental impact). Results of the GWP and Enviroscore were then compared to determine any discrepancies between the two techniques. Preliminary results found that the vegetarian curry had the lowest environmental impact for both GWP and Enviroscore metrics, with beef stew having the highest impact in both metrics. However, these results depend greatly on the means of production used for each ingredient assessed, adding a degree of uncertainty into the results based on the information provided by suppliers and available data. While the ranking of each meal for both Enviroscore and GWP was aligned, the differences between the meals showed some variation, with GWP showing greater differences in the overall scores of each meal. The Envirscore provides a more holistic approach with 13 different environmental

impact metrics considered. However, there is much more data available to use when assessing the GWP.

12. Ross Cuthbert: "Unevenly distributed biological invasion costs among origin and recipient regions"

Email: r.cuthbert@qub.ac.uk

Sustainable Development Goals

Globalization challenges sustainability by intensifying the ecological and economic impacts of biological invasions. These impacts may be unevenly distributed worldwide, with costs disproportionately incurred by a few regions. We identify economic cost distributions of invasions among origin and recipient countries and continents, and determine socio-economic and biodiversity-related predictors of cost dynamics. Using data filtered from the InvaCost database, which inevitably includes geographic biases in cost reporting, we found that recorded costly invasive alien species have originated from almost all regions, most frequently causing impacts to Europe. In terms of cost magnitude, reported monetary costs predominantly resulted from species with origins in Asia impacting North America. High reported cost linkages (flows) between species' native countries and their invaded countries were related to proxies of shared environments and shared trade history. This pattern can be partly attributed to the legacy of colonial expansion and trade patterns. The characterization of 'sender' and 'receiver' regions of invasive alien species and their associated cost can contribute to more sustainable economies and societies while protecting biodiversity by informing biosecurity planning and the prioritization of control efforts across invasion routes.

Flash Talks: Session 2 Abstracts

1. Stefano Angeleri: "Towards an intersectoral right to health for vulnerable migrants in Colombia"

Email: s.angeleri@qub.ac.uk

Sustainability Development Goals:

The HEAVEN project (funded by the EU MSCA-Global Fellowships scheme) uses the example of Venezuelan migration to Colombia to examine how irregular migrants can enjoy their right to health and understand the resistance to the implementation of a right to primary & preventive health care (PHC) that could better address critical challenges for the achievement of goal 1 (poverty alleviation), goal 3 (universal health coverage & health promotion), goal 5 (gender equality), and goal 10 (inequalities reduction) of the 2030 Sustainable Development Agenda. To test this hypothesis, interdisciplinary research and empirical data collection (participant observation, semi-structured interviews, focus groups) will be used to mobilise synergies between human rights law and public health standards and understand how state and non-state actors, including social leaders, implement legal obligations and actions promoting migrant communities' health that comply with a PHC approach. Besides offering a bird-eye view of the research results & how they were communicated to different target audiences, this presentation will describe social and institutional impact of other project-related initiatives. These included designing and teaching an interdisciplinary module on health a migration for students of different faculties at Universidad del Rosario (UR-the Colombian university partner of this project); Partnering with an influential research and advocacy organisation in Colombia and the Global South (Dejusticia), in the preparation of a research report (in Spanish) & attached policy brief (in English); Building a legal case -strategic litigation initiative, involving both students and academics working together in legal clinics- that will be brought before Colombia's courts to clarify the scope of urgent care for migrants; Designing, coordinating and delivering training (for social leaders, humanitarian staff & territorial health

departments) on health, migration, victims of conflict in collaboration with UR & UN Agencies WHO & IOM.

2. Erika Jimenez: “Golani youth and the usefulness of human rights in their struggle against the forgotten occupation”

Email: e.jimenez@qub.ac.uk

Sustainability Development Goals:

Palestinians have used the language of human rights to 'internationalise' the oppression they face; but, less is known about Golani Druze struggles against what is often referred to as the 'forgotten' occupation. In 1967, around two-thirds of the Syrian Golan was occupied and around 130,000 indigenous Syrians (95%) were forcibly displaced. Golani Druze are a religious minority but are distinct from other Druze in the north of Israel in that they refuse to serve in the Israeli military, identify as Syrian, can attend Syrian universities and have mostly rejected Israeli citizenship. Historically, older generations have opposed the occupation via nonviolent means. Recently, the nearby war in Syria has fuelled Israel’s colonial project in the Golan. Due to border closures and the threat of the terrorist organisation al-Nusra Front in Syria (who target religious minorities such as the Druze), more young people are choosing to study in Israeli universities and Israeli media have reported a rise in the uptake of Israeli citizenship among this group since the war, though this has been disputed. This project will explore the views of Golani youth (ages 14-18) on life under occupation and the usefulness of human rights in strategising against it. The narratives of youth will be accessed via participatory focus groups and interviews. Youth’s perspectives will be compared with those of older Golani generations who also will be interviewed and those of their Palestinian peers (drawing on my previous research). Decolonial strategies will be employed including working alongside a Golani youth research advisory group and partnering with local human rights organisation Al-Marsad. This research is important in addressing the human rights concerns of Golani young people and in doing so redressing how their narratives have been silenced, and exploring what may contribute to the reduction of violence in their society.

3. Niamh O'Kane: "Factors driving food choice in a secondary school food setting: mapping the system"

Email: niamh.okane@qub.ac.uk

Sustainable Development Goals:

Poor diet quality in childhood and adolescence is a global public health concern. Schools act as important settings for improving diet quality and reduction of inequalities. Whole-school approaches to food are recommended in literature, however, the complexity of the school system can cause difficulties in successfully implementing whole-school approaches. This study aimed to use systems mapping – the creation of visual depictions of systems, including the relationships between factors within a system – to better understand what factors drive food choice in secondary schools. Collaborative methods were used with school stakeholders to co-produce a systems map of factors driving food choice in the secondary school food system. Online surveys gathered an initial list of factors, and a group model building workshop was conducted with school stakeholders to establish relationships between factors. Two workshops were conducted with secondary school pupils to capture views from pupils and gather feedback on the map. The map underwent final refinement by the research team, and all stakeholders were offered opportunities to provide feedback on the final version. The map of the secondary school food system contains 24 factors and identifies 43 relationships between them, each factor falling into one of six themes: catering and procurement, school leadership and governance, the priority of food within schools, social experience, behaviours and attitudes, the food space and experience in school and financial. The map demonstrates how each of the factors interact with each other (including direction of influence). The systems map provides a detailed visualisation of the complex secondary school food system and can be used by academics, school leadership and other school stakeholders in future decision making, and for the design and evaluation of whole-school, multi-component interventions and programmes targeting food choice in secondary schools.

4. Ka Ka Tsang: "The Power of Voice: Methodological Reflections on a Discursive Study of the Mobilisation of Marriage Equality in NI"

Email: k.tsang@qub.ac.uk

Sustainable Development Goals:

Examination of public policy processes within devolved legislatures necessitate considerations of the wider contextual influences which govern, shape and constrain the strategic behaviour and communal voice of interest groups within it. In the context of historical institutionalism, deconstructing the political hegemonies of marriage provision in Northern Ireland requires further assessment into the structures which preserve and challenge the traditional, common law definition of marriage. Reflecting on critical methodological debates on how to study power plays and policy disruption, I present the marriage equality movement as a case study and a vivid demonstration of 'cultural interference'. Using interdisciplinary power theories, my talk intends to inform and discuss how critical discourse analysis and the exploration of collaborative voices can help us understand and conceptualise nuances in how campaign communications have changed the landscape of domineering social currencies and value systems in the wider public conversation of LGBT rights. The study triangulates the use of thematic analysis of oppositional plenary statements, original interview data from the pro-equality campaign leadership and discourse historical analysis of campaign communications to explain divergence from a 'traditional' policy change route and the reformative discourses responsible for acclimating growing support for marriage equality in Northern Ireland. The findings of this study contribute to contemporary debates regarding the measurement of mobilization dynamics and operationalization of enduring movement impacts. Restricting academic explanations to solely structural attributions for change, absolves the critical role that movements play in the execution and management of cultural interference in wider social attitudinal transformations. As social scientists, we may help elucidate these processes by designing more inclusive, diverse data samples which are also multi-modal. Only then may we harness better applications of current mobilization-outcome knowledge and better integrations of variable methods of data collection and analysis.

5. Prabhath Piyasena: "Development of a Diabetic Retinopathy Screening Programme in a Lower Middle Income Country: A Situational Analysis to a Policy Brief"

Email: m.piyasena@qub.ac.uk

Sustainable Development Goal:

Diabetic retinopathy (DR) is a common microvascular complication of diabetes mellitus which can lead to sight loss. A situational analysis conducted in the Western province of Sri Lanka identified a major gap in DR screening (DRS) service delivery. I aimed to assess feasibility of integrating DRS services into free public sector medical care in Sri Lanka. The barriers to access DRS were assessed through qualitative studies. A systematic literature review was conducted to assess diagnostic accuracy of DRS using digital retinal imaging. A local context specific DRS modality was defined, based on outcomes of formative stages, and validated at a tertiary level medical clinic by trained physician graders. Imaging strategy was 2-field using a non-mydriatic handheld retinal camera (Visuscout-100®). A health educational intervention (HEI) was adapted and acceptability was assessed using participatory approach. The formative studies revealed that lack of knowledge and awareness on DR, lack of skilled human resources and DRS imaging infrastructure as the main barriers. In the meta-analysis, highest sensitivity was observed in mydriatic more than two field strategy (92%, 95% CI 90-94%). In the validation study, sensitivity of the defined referable DR was 88.7% for grader 1 and 92.5% for grader 2, using mydriatic imaging. The specificity was 94.9% for grader 1 and 96.4% for grader 2. The overall acceptability of the HEI material was satisfactory. Non-mydriatic 2-field strategy is a more pragmatic approach in implementing DRS programs in low-income non-ophthalmic settings, with dilatation of pupils of those who have ungradable images. This evidence was used to inform development of a policy brief on DRS for the first time in Sri Lanka, leading to launching a pilot programme. The proposed DRS screening model will be tested in a definitive cluster randomized trial informing a National Programme.

6. Bakul Budhiraja: "How Nature plays a role in shaping sustainable cities?"

Email: b.budhiraja@qub.ac.uk

Sustainable Development Goals

Cities are the nexus of urban development and human growth. The rapid urbanization causes modifications in the urban climate due to increase in concretized surfaces and lack of water vapour. The rise of extreme events due to climate change put the cities at forefront of climate action. The UN SDGs guide to make cities resilient and sustainable. Nature and communities are catalysing this transformation for a better urban future. The Europe Union recommends using Nature inspired solutions for multiple urban issues. The UPSURGE project aims to use nature based solutions (NBS) for regenerative development in five demonstration cities. The five cities are based in different climate zones, consists of single to multiple demonstration sites, and are deploying various Nature based solutions based on the key city challenges. The cities include Belfast, Breda, Budapest, Maribor, and Katowice. The demonstration sites are being Co-designed with multiple stakeholders to address the local concerns and include citizens to address the longevity of Nature based solutions. The cities have selected Nature based solutions varying from green roof, green wall, raingardens, Miyawaki forest, agroecology community gardens, rewilded zones, climate arboretum, and water gardens. The work aims to model the effect of different Nature based solutions. The urban morphology of the cities is understood using local climate zone scheme. The advanced Weather Research Forecast model is used to model the urban heat island during the heatwave of July 2022. The WRF model is run for 7 days on three domains, 10km, 5km and 1km horizontal resolution using six hourly data from ECMWF. The performance of the model has been assessed by analysing air temperature, wind speed, relative humidity, and surface level pressure. The simulations depict the effect of deploying various Nature based solutions across different cities.

7. Maria Garcia-Fernandez: "Compressive Subsurface Radar Imaging: fast and smart detection of buried explosive threats"

Email: m.garcia-fernandez@qub.ac.uk

Sustainability Development Goals:

Around 100 million explosive threats are currently buried all over the world (causing at least 5,554 casualties in 2019 according to the Landmine Monitor 2020), and unfortunately more and more are being deployed as we are witnessing in the war in Ukraine. However, a system to accurately and fast detect them still does not exist. Subsurface radar imaging has been considered an appropriate technology for detecting buried explosive threats, such as landmines and Improvised Explosive Devices (IEDs). This technology is based on employing electromagnetic waves to provide an image of the subsurface, enabling the detection of buried targets (without physically interacting with them). However, the increased demands in cost, accuracy, resolution, imaging speed and hardware complexity have placed a significant burden on existing subsurface radar imaging modalities. This makes it necessary to develop revolutionary techniques to address these challenges. The ultimate goal of this research project is to develop a fast, reliable, low-cost subsurface radar imaging technology leveraging Compressive Sensing (CS) to overcome the main bottlenecks that subsurface radar imaging currently suffers. Conventional radar imaging systems are based on the synthetic-aperture paradigm, which requires acquiring radar measurements all over the region of interest. However, relying on CS far fewer radar measurements are needed to create the subsurface images. Therefore, the project aims to drastically change our understanding of existing subsurface imaging systems and develop a highly disruptive radar technology (from the imager design to the development of radar algorithms) to achieve superior detection capabilities of buried threats at a faster survey speed. This project intends to be a major contribution towards combatting the worldwide problem of humanitarian demining, having a broad impact in the society. Therefore, its scope is in alignment with the 16th Sustainable Development Goal established in the United Nations' 2030 Agenda, which seeks to promote peaceful societies.

8. Guillermo Alvarez Narciandi: "Redefining the future of electromagnetic sensing: portable single-pixel millimeter-wave cameras operating in real-time"

Email: g.alvarez-narciandi@qub.ac.uk

Sustainability Development Goals:

My research focuses on the development of handheld scanners capable of providing vision through different opaque materials. This technology is based on7.6 emitting electromagnetic waves towards the area under inspection, capturing the reflected signals, and applying processing algorithms to generate images of the inspected areas. Existing electromagnetic imaging systems consider hundreds or thousands of transmitters/receivers, making them significantly large and costly. Thus, their use is restricted to a very few specific applications, such as security screening at airports. Alternatively, some systems rely on employing a reduced number of transmitters/receivers, which are moved according to a fine grid to acquire enough information to reconstruct the images. However, this process can be extremely time-consuming and it usually requires bulky positioning equipment to move the scanner. These drawbacks prevent the use of these systems in time-sensitive applications or those requiring a certain degree of portability and flexibility. In contrast, my research aims at using computational imaging to overcome these challenges. Computational imaging is based on the use of unconventional antennas capable of acquiring enough information from a single position (or a reduced number of them). This enables to produce images in real-time, and bypasses the need of bulky positioning equipment, conferring great flexibility and portability. The scope of my research goes from the design, fabrication, and testing of these unconventional antennas, to the development of processing techniques to generate the images and improve their quality. This could be used to improve safety at security checkpoints and at mass gatherings (detecting dangerous items), to check for structural problems in buildings and other infrastructures, and to detect flaws in materials. Due to its wide range of applications, this work can potentially have a significant impact on the society, and it is aligned with several Sustainable Development Goals (e.g., goal 9 related to building resilient infrastructure).

9. Timilehin Opeyemi Alakoya: "Traffic network analysis via multidimensional split variational inequality problem with multiple output sets"

Email: t.alakoya@qub.ac.uk

Sustainable Development Goals:

The variational inequality problem is an important mathematical model that has been widely utilized to formulate and investigate a plethora of competitive equilibrium problems in various disciplines, such as traffic network equilibrium problems, spatial price equilibrium problems, oligopolistic market equilibrium problems, financial equilibrium problems, migration equilibrium problems, environmental network and ecology problems, knowledge network problems, supply chain network equilibrium problems and internet problems. In this research, we introduce and study a new class of split inverse problem, which we call multidimensional split variational inequality problem with multiple output sets. Our newly introduced problem comprises of a multidimensional parameter of evolution. To demonstrate its applicability in the economic world, we formulate the equilibrium flow of multidimensional traffic network models for an arbitrary number of locations in terms of the problem. Moreover, we define a multidimensional split Wardrop condition with multiple output sets and establish its equivalent relation with the formulated equilibrium flow of the multidimensional traffic network models. Furthermore, we establish existence and uniqueness of equilibria for our proposed model. To further illustrate the utilization of our newly introduced problem, we apply our results to study the network model of a city with heterogeneous networks. More precisely, we consider a city which comprises traffic network of human-driven vehicles, traffic network of electric vehicles and electricity network, and we formulate the equilibrium flow of this network model in terms of our newly introduced multidimensional split variational inequality problem with multiple output sets. In addition, we propose a method for solving the introduced problem, which will be useful in evaluating the equilibrium flow for multiple multidimensional traffic network models simultaneously. Finally, we validate our results with some numerical experiments.

10. Jian Gao: "Using computer vision techniques to identify and assess the quality of green space from satellite imagery"

Email: j.gao@qub.ac.uk

Sustainable Development Goals:

Building on earlier work on air pollution, particularly fine particulate matter, PM2.5, we aim to further characterize environmental characteristics that might influence cognitive ageing and dementia. Access to green (i.e., parks) and blue (i.e., lake) space and other environmental characteristics can influence mobility (e.g., the availability of bike paths, and paved roads). In this talk, we will discuss recent work carried out by the Centre for Public Health (CPH), and the School of Electronics, Electrical Engineering and Computer Science (EEECS), on mapping accessible and high-quality green space from aerial and satellite imagery. We focus on the use of deep-learning neural networks to automatically label satellite images. We will discuss how these models can be designed and some of the challenges of creating a high-quality set of labelled images for the study. Our approach will involve the use of data from Open Street Map, Outdoor Recreation NI, and satellite imagery, enabling us to distinguish between high and low-quality green spaces, providing a valuable tool for public health initiatives.

Posters list

Poster number	Name	Poster title
1	Rina Schiller	Creating Impact Through Musical Collaboration
2	Emma Campbell	The UPSURGE project: co-designing nature-based-solutions to address urban regeneration and pollution alleviation.
3	Agnes Purwidyantri	3D printed microfluidic chip and squaramide receptor for straightforward and low-cost colorimetry detection of nitrate in fresh water
4	Ben McAteer	“We live here and play here, we should have a say”: An exploration of children’s perceptions of place-making in the Market community, Belfast
5	Rebecca Armstrong	Dysregulating the balance between cell survival and programmed cell death - a novel strategy for parasite control?
6	Precious Owuamalam	Bind and distribute: Understanding how cytoskeletal remodelling proteins modulate mRNA localisation within endothelial cells during angiogenesis
7	Mohammadali Mohammadi	Cell-free Massive MIMO for Next-Generation Wireless Networks
8	Trisha Forbes	The Renal Arts Group: improving the physical and psychological quality of life of those living with kidney disease.
9	Lisa Douglas	Highly selective furin inhibition as a therapeutic approach for chronic obstructive pulmonary disease.
10	Diane Morrow	Co-creating digital health tools for adolescents living with type 1 diabetes, and carer's of those living with rare diseases or conditions
11	Linda Oyama	The UK Young Academy,.who we are and how to apply.
12	Fatemeh Mirzadehazad	Spic links metabolism and epigenome in stem cells
13	Ricardo Calderon Gonzalez	Modelling the gastrointestinal carriage by Klebsiella pneumoniae infections

Poster number	Name	Poster title
14	Frances Kane	Then and Now: Application of my Research within The Northern Ireland Place-Name Project
15	Pinakshi Biswas	Tracking the emergence of antibiotic resistance using wastewater-based biomarkers.
16	Martin Robinson	Psychological Distress Among Women With Experience of Miscarriage in Home and Hospital Settings: A Network Analysis and Comparison Test
17	Yara Naser	Hydrogel-forming microarray patches for the transdermal long-acting delivery of a poorly-soluble drug
18	Parisa Naeli	SARS-CoV-2 protein NSP2 enhances microRNA-mediated translational repression and impairs host immune response
19	Ione Avila-Palencia	Causal loop diagram of the complex causal mechanisms between urban environment and cognitive decline
20	Danielle Logan	Development of a nutrient database to analyse dietary intake of older Indians in the Longitudinal Aging Study in India – Diagnostic Assessment of Dementia (LASI-DAD)
21	Melibea Berzosa Suner	Investigating the protein SorLA as potential key factor for novel treatment strategies for maladies related with B cell misfunction
22	Rayhanul Islam	Sensitising prostate tumour models to radiation using novel RALA/AuNPs nanocomplexes
23	Surya Sahdeo	Revolutionizing Construction by Zero-Cement Concrete: Unleashing the Potential of Geopolymer Concrete for Sustainable Construction
24	Zeinab Abdelrahman	Stratification of glioma according to stemness scores in bulk and single cell transcriptomes
25	Elisa Ramazzina	Water, the Natural World, and the Environment in the Middle Ages

Poster Abstracts

1. Rina Schiller: "Creating Impact Through Musical Collaboration"

Email: r.schiller@qub.ac.uk

Sustainable Development Goals:

Ethnomusicology, being a young academic discipline, integrates elements from a variety of other fields of study. Although there is always a strong emphasis on direct qualitative research, an ethnomusicological research topic can be approached from quite different angles. Its closest sister discipline, anthropology, already offers options of focusing more on the cultural or rather on the social aspects of a musical activity. But even when the focus is solely on music, no two academics will approach the research from the same angle. Music is a multifaceted activity that influences our lives on many levels. So, two ethnomusicologists cooperating on a research project will bring surprisingly different aspects to their joint analysis. Possible points of interest may be, for instance: mathematical investigations of pitch relations, status ascriptions that may affect social class participation, spiritual associations that may derive from religion or mythology, gender relations in performance, or the craft of musical instrument construction and instrument makers' role within their community. Musical performance, especially on an informal level, is an ideal means to build immediate bridges, be that between a researcher and a music-making community, or between performing ethnomusicologists. With detailed examples from my personal research experience I will show how musical meeting and collaboration have taken the outcome of projects in surprising new directions that no single researcher could have discovered on their own, and how this has enriched our international socio-cultural knowledge, leading to impact well beyond the field of ethnomusicology.

2. Emma Campbell: "The UPSURGE project: co-designing nature-based-solutions to address urban regeneration and pollution alleviation."

Email: e.j.campbell@qub.ac.uk

Sustainable Development Goals:

As cities rapidly urbanise, they are becoming increasingly vulnerable to the effects of climate change. The United Nations recognises the potential of nature-based-solutions (NBS) in supporting social, environmental, and economic resilience by, for example, helping to treat water pollution, cool air temperatures, restore biodiversity, support pollination, and protect against extreme weather events. Through the EU Horizon-funded UPSURGE project, our multi-disciplinary team in the School of Natural and Built Environment are supporting five cities in Europe; Breda, Budapest, Katowice, Maribor, and Belfast, to use co-creation processes to implement NBS on urban demonstration sites. This poster highlights the range of collaborative methods used to foster inclusive engagement to specifically address urban regeneration and pollution remediation. Using Belfast as a case study, our submission focuses on the design and development of co-design workshops and other engagement activities with Belfast City Council to implement community and research gardens on a site in South Belfast near the QUB campus. Taking place over the last year with a range of collaborators including local citizens, academics, businesses, and representatives from government and environment groups, our work reflects on the challenges of implementing co-designed proposals and highlights ways to consider the needs of people and planet in collaborative urban regeneration processes.

3. Agnes Purwidyantri: "3D printed microfluidic chip and squaramide receptor for straightforward and low-cost colorimetry detection of nitrate in fresh water"

Email: a.purwidyantri@qub.ac.uk

Sustainable Development Goals:

Nitrate ions are common contaminants in water that pose health risks. This research proposes a novel, cost-effective method for detecting nitrate in water using squaramide receptors integrated with a 3D printed microfluidic (MF) chip. The MF chip was designed using AutoCAD software, 3D printed with acrylonitrile butadiene styrene (ABS) filament, and utilized for PDMS casting. The self-powered chip operates without a pump and relies on capillary force. It features two inlets for nitrate samples and polymer solutions, a Y-shaped channel for liquid transfer, a serpentine mixing channel, a Tesla valve to enhance forward flow, and an outlet with a filter paper for facilitating a colour-changing reaction. By introducing only ~50 µL of samples and polymer to each inlet, colour differentiation can be observed within one minute. To optimize the hydrophilicity of the PDMS channel and prolong the chip's shelf life, surface functionalization with polyethylene glycol (PEG) was performed after oxygen plasma treatment. The squaramide receptor for nitrate binding was synthesized using two functional monomers: allylamine nitrosquaramide and (Vinylbenzyl) trimethylammonium chloride ion pair agent. The allylamine nitrosquaramide was found to be the strongest receptor for nitrate binding among other polymerisable squaramide groups, exhibiting an intense colour change due to squaramide deprotonation. The integration of squaramide receptors with the MF chip enables the use of microliter-scale solutions, offering an alternative to the conventional dipstick detection setup. This alternative eliminates the need for large amounts of polymers and sample volumes, resulting in a more efficient

detection protocol. The fabrication process of the MF chip, based on 3D printing, is cost-effective, straightforward, quick, highly reproducible, and environmentally sustainable. The chip's well-defined microchannel structure produced by 3D printing allows for reliable detection of nitrate with a colorimetric response, which can be observed with the naked eye or analysed using portable instruments like smartphones.

4. Ben McAteer: "We live here and play here, we should have a say": An exploration of children's perceptions of place-making in the Market community, Belfast"

Email: b.mcateer@qub.ac.uk

Sustainable Development Goals:

Children and young people learn through interaction with their surroundings, meaning that their experiences of place directly contributes to their personal development. Despite this, the needs of the youth are rarely factored into development plans. This is a major obstacle to the sustainable and inclusive development of places. Examining potential pathways to correct this issue, this research presents the findings of a study conducted with young people from the Market area of Belfast. The research engaged with two groups of children (n=11) in a participatory investigation of how young people engage with the built environment. Using a range of participatory methods - including narrative walkabouts, semi-structured interviews, and mapping exercises - the participants engaged as co-researchers. By visiting and analysing specific sites within their community, the children debated what they liked and disliked about the area, and why they think they should be provided with the opportunity inform future development plans. From the findings, four key themes associated with perceptions of place-making emerged – place attachment, use of space, environment and sustainability, and children's voice – demonstrating how young people have strong opinions of how space should be designed and managed. We reveal interesting dynamics regarding the use of 'third spaces', perceived exclusion from city centre life, and the acknowledgement that young people's concerns are commonly overlooked. We conclude by presenting two outcomes of our study that hint at the potential future role of young people in co-designing the built environment.

5. Rebecca Armstrong: "Dysregulating the balance between cell survival and programmed cell death - a novel strategy for parasite control?"

Email: r.armstrong@qub.ac.uk

Sustainable Development Goals:

The liver fluke Fasciola hepatica, a flatworm parasite, places a significant disease burden on ruminant livestock worldwide and causes fascioliasis, a neglected tropical disease affecting 17 million people, globally. Reports of drug (flukicide) resistance are increasing, such that there is a pressing need for novel drug targets to support the discovery of new drugs. A delicate balance between cell proliferation/survival and programmed cell death (apoptosis) mediates the cellular turnover that supports the maintenance and growth of tissues. A key facet of juvenile F. hepatica is their ability to rapidly replace various cell and tissue types, a process driven by a population of specialised stem cells. Further, stem cell division/proliferation drives juvenile fluke growth and development, such that their dysregulation represents an appealing avenue for control. Bioinformatic analyses of relevant gene sequence datasets revealed that F. hepatica possesses key genes required for a functional intrinsic cell death pathway, in addition to key components of major pro-survival signalling pathways known to regulate cell turnover and promote cell survival in mammals. Silencing (turning off) genes designated putative "pro-survival" apoptotic (cell death) kinases led to profound reductions in juvenile fluke growth, coupled with elevated levels of cell death and a temporal shift in stem cell division/proliferation levels, which ultimately proved fatal to the parasite. The localisation of apoptotic (cell death) kinases revealed their ubiquitous expression within juvenile fluke tissues, supporting their fundamental and widespread role within the worm. These data indicate that the dysregulation of the cell cycle-cell death balance represents a novel strategy to undermine the biology of pathogenic juvenile F. hepatica, underscoring the appeal of cell death and pro-survival signalling pathway components as targets for novel anti-parasite drugs.

6. Precious Owuamalam: “Bind and distribute: Understanding how cytoskeletal remodelling proteins modulate mRNA localisation within endothelial cells during angiogenesis”

Email: p.owuamalam@qub.ac.uk

Sustainable Development Goal:

During the process of gene expression in eukaryotic cells, information stored in the DNA is decoded and transcribed into messenger RNA (mRNA) molecules, which bear the relevant information required for the synthesis of functional proteins. Most of these mRNAs are not equally distributed in the cell and localise in certain cell regions depending on regulatory factors. The resulting mRNA asymmetry in the cell therein leads to subcellular patterns of mRNA distribution, hence the phenomenon of RNA localisation, which is conserved across organisms from bacteria to mammals. Previous studies have shown that correct localisation of mRNA is fundamental for cellular homeostasis and normal response to stimuli, including blood vessel formation in endothelial cells. Our preliminary data show that proteins involved in cytoskeletal remodelling processes of cell-to-cell and cell-to-substrate adhesion bind mRNAs. Whether mRNA asymmetries would result from direct interactions between these cytoskeletal proteins and mRNAs is unknown. Combining state-of-the-art technologies with in vivo and in vitro experimental models, we aim to uncover novel mechanisms that link subcellular mRNA localisation to blood vessel formation and homeostasis. The results from our studies will demonstrate the importance of mRNA localisation in tissue biology and the gained knowledge will be beneficial in precision medicine for treating vascular-related pathologies and other cellular disorders.

7. Mohammadali Mohammadi: “Cell-free Massive MIMO for Next-Generation Wireless Networks”

Email: m.mohammadi@qub.ac.uk

Sustainable Development Goal:

Not disclosed due to confidentiality issues

8. Trisha Forbes: "The Renal Arts Group: improving the physical and psychological quality of life of those living with kidney disease"

Email: trisha.forbes@qub.ac.uk

Sustainable Development Goals:

The Renal Arts Group (RAG) is a collaboration between patients, carers, clinicians, academics and artists to develop a programme of research with the ultimate aim of improving the physical and psychological quality of life of those living with kidney disease. In 2016, RAG was established at Queen's University Belfast, School of Nursing and Midwifery to highlight the effects of living with kidney disease through the medium of art and to promote kidney transplantation. Since its inception, RAG has taken part in various events at The Black Box, Belfast City Hospital, The Brian Friel Theatre, the Crescent Arts Centre, Accidental Theatre and the Ulster Museum, primarily to raise public knowledge of kidney disease. Professor Noble and Anna Wilson were awarded funding by the Economic and Social Research Council (ESRC) in 2020 to develop a series of online arts activities for the renal community in response to the COVID-19 pandemic. More recently, RAG have partnered with researchers from the QUB Centre for Public Health, alongside local and national renal charities, to facilitate events as part of the 2022 and 2023 NI Science Festivals. In 2022, funding was received from NI Kidney Research Fund to undertake the PAINT project, which is an international mapping exercise to identify the current provision of arts programmes for renal patients. The mapping exercise was co-produced by the research team, including Research Fellow Dr Trisha Forbes, with a consortium made up of members of RAG and project partners from Chong Hua Hospital, Philippines, Center for Arts and Health, University of Florida, Waterford Healing Arts Trust and the World Health Organisation. There has also been an international PAINT summer series of online workshops in 2023 exploring the link between science and art and the positive impact that art can have on individuals experiencing chronic illness such as kidney disease.

9. Lisa Douglas "Highly selective furin inhibition as a therapeutic approach for chronic obstructive pulmonary disease"

Email: l.douglas@qub.ac.uk

Sustainable Development Goal:

Chronic obstructive pulmonary disease (COPD) is associated with two major clinical phenotypes; chronic bronchitis (CB) and emphysema. Impaired mucociliary clearance is a feature of CB which is influenced by Cl- secretion by the cystic fibrosis transmembrane conductance regulator (CFTR) and Na+ absorption by the epithelial sodium channel (ENaC). Furin, a cellular proprotein convertase, is a key proteolytic activator of ENaC. We have recently shown highly selective furin inhibition to inhibit ENaC and improve mucociliary transport (MCT) in cystic fibrosis (CF) airways cells (Douglas et al (2022) Cell Chem. Biol. 29(6):947-957). As mutated CFTR results in CF lung disease that shares phenotypic characteristics with CB, the aim of this study was to investigate the effect of a novel, highly potent, selective furin inhibitor, BOS-857 on ENaC activity and MCT in COPD. This study also aimed to determine whether BOS-857 used in combination with CFTR potentiator, ivacaftor would provide additional benefit. BOS-857 treatment of COPD HBECs significantly reduced ENaC-mediated Na+ absorption by 80% after a 48h exposure and prevented subsequent cell-surface activation of ENaC by neutrophil elastase. Treatment of COPD HBECs with either BOS-857 or VX-770 alone improved MCT rates. When COPD HBECs were treated with a combination of BOS-857 and VX-770, significant improvements in MCT rate over VX-770 alone were observed. These studies support highly selective furin inhibition as a therapeutic approach for COPD and suggest that further therapeutic benefit may also be derived by combining furin inhibition with a CFTR potentiator. This work was funded by a project grant awarded by Boston Pharmaceuticals.

10. Diane Morrow "Co-creating digital health tools for adolescents living with type 1 diabetes, and carer's of those living with rare diseases or conditions"

Email: d.morrow@qub.ac.uk

Sustainable Development Goal:

My role(s) here at Queen's span two different faculties, and schools. My abstract is a combination of the work I will do in my roles here over the next year or so: Living with a life threatening or rare condition often means living in an unseen space. There can be challenges which affect physical health on a minute-by-minute basis, with many experiences of peaks and dips of acute scenarios to navigate. This navigation often can be filled with frustration relating to medical assistance both in person, and with medical technologies. The movement towards self-management, and care at home has put the burden on family life. Medical models of building resilience and coping strategies often times seem divorced from the real lived experience and the result can lead to isolation, loneliness, and disempowerment. This disempowerment can be viewed in more than biopsychosocial terms, but also in terms of socio-technical equity; financial precarity; and societal neglect. In the UK there are rising prevalence of children and young people being diagnosed with type 1 diabetes, a life threatening condition which is also life limiting. Young people living with type 1 diabetes are known to experience substantial distress and burden. Effects of this distress are shown in countless research areas highlighting mortality figures, family conflict, poor psychological outcomes and lack of service provision. Likewise, across the research for carer's, often known as the 'hidden patient', this neglect from service provision, care for quality of life, and absence of interventions leads to a picture of a society which seems to push vulnerable populations to the edges of civilized, compassionate care. My two projects are looking at methods to build digital tools to understand and monitor wellbeing, with the output of being improved wellbeing. Wellbeing is a neutral term, which can allow space for the individual to feel they can shape their own achievements to what may look well for them. In a person-centred approach, the human and computer interactions will be designed with the populations, to ensure appropriate design and usability are achieved.

11. Linda Oyama "The UK Young Academy; who we are and how to apply"

Email: l.oyama@qub.ac.uk

Sustainable Development Goals:

The UK Young Academy has been established as an interdisciplinary collaboration with the Academy of Medical Sciences, British Academy, Learned Society of Wales, Royal Academy of Engineering, Royal Irish Academy, Royal Society of Edinburgh, and the Royal Society. The UK Young Academy is an interdisciplinary network of early career researchers and professionals established to help tackle societal issues and promote meaningful change. The academy provides a forum for emerging leaders from across sectors to exchange ideas, share expertise and participate in local and global policy discussions. As the second round of applications for membership to the UK Young Academy opens, executive group members are calling for emerging leaders from a wide range of sectors to apply. Successful candidates will have the opportunity to work alongside current members in shaping the UK Young Academy's first few years, from developing strategic goals to coordinating activities. This includes establishing work programmes and initiatives with the aim of tackling challenges based on areas that matter to them.

12. Fatemeh Mirzadehazad “Spic links metabolism and epigenome in stem cells”

Email: f.mirzadehazad@qub.ac.uk

Sustainable Development Goal:

Not disclosed due to confidentiality issues

13. Ricardo Calderon Gonzalez “Modelling the gastrointestinal carriage by Klebsiella pneumoniae infections”

Email: R.CalderonGonzalez@qub.ac.uk

Sustainable Development Goal:

Klebsiella pneumoniae is a leading cause of nosocomial and community acquired infections, making K. pneumoniae the second pathogen associated with the most deaths attributed to any antibiotic resistant infection. K. pneumoniae colonises the nasopharynx and the gastrointestinal tract in an asymptomatic manner without dissemination to other tissues; importantly gastrointestinal colonisation is a requisite for infection. Our understanding of K. pneumoniae colonisation is still based on interrogating mouse models in which animals are pre-treated with antibiotics to disturb the colonisation resistance imposed by the gut microbiome. In these models, infection disseminates to other tissues. Here, we report a murine model to allow for the study of the gastrointestinal colonisation of K. pneumoniae without tissue dissemination. Hypervirulent and antibiotic resistant strains stably colonise the gastrointestinal tract of in an inbred mouse population without antibiotic treatment. The small intestine is the primary site of colonisation followed by a transition to the colon over time without dissemination to other tissues. Our model recapitulates the disease dynamics of metastatic K. pneumoniae strains able to disseminate from the gastrointestinal tract to other sterile sites. Colonisation is associated with mild to moderate histopathology, no significant inflammation, and no effect on the richness of the microbiome. Our model sums up the clinical scenario in which antibiotic treatment disturbs the colonisation of K. pneumoniae resulting in dissemination to other tissues, and allowed us to establish which bacterial factors are crucial for it.

14. Frances Kane "Then and Now: Application of my Research within The Northern Ireland Place-Name Project"

Email: f.kane@qub.ac.uk

Sustainable Development Goal:

This paper presents the expansion of the findings in Kane, F., Folli, R. and Sevdali, C. (2016), that argued that previous analyses of Irish complex genitive noun phrases as structurally identical to Semitic construct state nominals (CSNs) could not be correct. Instead, a unified treatment of possessive and attributive genitive phrases that differ only in their ability to host a definite article on the head was provided where the syntactic alternation observed in the grammaticality of the definite article is directly attributed to the particular reference requirements depending on the interpretation of the phrase. This paper expands the empirical domain of the 2016 analysis to account for a subset of Irish language toponymic data, namely tautological placenames. By exploring both phenomena as examples of grammaticalisation of genitive complements, we aim to provide a unified account for and analysis of previously unconsidered language data.

15. Pinakshi Biswas "Tracking the emergence of antibiotic resistance using wastewater-based biomarkers"

Email: p.biswas@qub.ac.uk

Sustainable Development Goals:

Wastewater is a composite matrix consisting of thousands of both simple and complex compounds. It acts as a reservoir for the disposed/excreted daily used substances including pharmaceuticals, personal care products, industrial chemicals, nutrients. Analyzing the concentrations of these chemicals normalized to the catchment population can lead to their per capita consumption highlighting their level of utilization among the target population. These community level assessments can provide details on exposure of the target population to antimicrobials including antibacterials, antifungals, antivirals. Recent studies have confirmed the presence of antimicrobials, especially antibiotics, in wastewater. Antibiotics in many countries can be purchased over the counter, leading to their inappropriate usage. The exploitation of antibiotics has resulted in the worldwide emergence of antibiotic resistance in pathogens. Advancements in mass spectrometry-based techniques have led to further developments in the surveillance of biomarkers specific to antibiotic resistance. Parent antibiotics along with their human metabolites may be considered as biomarkers associated with the development of resistance. Continuous quantification of parent antibiotics using LC-MS/MS may highlight their consumption patterns in the concerned population. These monitoring programs may give rise to a list of widely used antibiotics which should be investigated further for their ability to initiate resistance. However, considering parent antibiotics as biomarkers may underestimate their overall consumption owing to degradation in the sewer networks. Considering antibiotic human metabolites which are less susceptible to environmental degradation as biomarkers may be beneficial to assess the actual antibiotic consumption by the target population. Apart from antibiotics and their corresponding human metabolites, identifying and monitoring enzymes secreted by the resistant microbial population could also play a role in tracing the resistant microbial populations in the environment. Specialized workflows/protocols for the analysis of LC-MS/MS data are required for the identification of those enzymes. Overall,

some progress has been made in this direction, however there is plenty of room for improvement.

16. Martin Robinson "Psychological Distress Among Women With Experience of Miscarriage in Home and Hospital Settings: A Network Analysis and Comparison Test"

Email: martin.robinson@qub.ac.uk

Sustainable Development Goals:

Miscarriage remains a considerable concern for women with as many as 15-25% of pregnancies not ending in a live birth. This potentially traumatic experience has been robustly associated with negative impacts on health and well-being, however much evidence focuses specifically on structured symptomology. Adopting a more holistic approach this study sought to examine the post-trauma distress of women experiencing miscarriage. The current study used Network Analysis to examine associations between indicators of distress as measured by the Revised Impact of Miscarriage Scale. The most influential or central distress indicators were assessed for the total sample of women who experienced a miscarriage in the previous 5 years (N = 839), and for subsamples who experienced management at home (n = 493), or in hospital (n = 273) comparing the networks for these groups. Results suggested "feelings of a person lost", "destroyed zest for life" and "feelings of isolation" as the most central in the network. Comparisons between those who experienced miscarriage at home and in hospital revealed similar distress network structures, however those who experienced miscarriage at home displayed greater global associations between distress indicators in the network. These findings provide a novel concept of post-trauma reactions following miscarriage, suggesting a robust network of non-specific pathological distress may be observed following miscarriage in home and hospital settings. Those most influential distress indicators are highlighted as important targets for screening psychological distress following miscarriage, and as potentially viable intervention targets to promote greater well-being among women experiencing miscarriage.

17. Yara Naser "Hydrogel-forming microarray patches for the transdermal long-acting delivery of a poorly-soluble drug"

Email: yara.naser@qub.ac.uk

Sustainable Development Goal:

Hydrogel-forming microarray patches (HF-MAPs) are used to circumvent the skin barrier and facilitate the noninvasive transdermal delivery of many hydrophilic substances. However, their use in the delivery of hydrophobic agents is a challenging task. This work demonstrates, for the first time, the successful transdermal long-acting delivery of the hydrophobic atorvastatin (ATR) via HF-MAPs using poly(ethylene)glycol (PEG)-based solid dispersion (SD) reservoirs. PEG-based SDs of ATR were able to completely dissolve within 90 sec in vitro. Ex vivo results showed that 2.05 ± 0.23 mg of ATR/0.5 cm2 patch was delivered to the receiver compartment of Franz cells after 24 h. The in vivo study, conducted using Sprague Dawley rats, proved the versatility of HF-MAPs in delivering and maintaining therapeutically-relevant concentrations (> 20 ng·mL-1) of ATR over 14 days, following a single HF-MAP application for 24 h. The long-acting delivery of ATR suggests the successful formation of hydrophobic microdepots within the skin, allowing for the subsequent sustained delivery as they gradually dissolve over time, as shown in this work. When compared to the oral group, the use of the HF-MAP formulation improved the overall pharmacokinetics profile of ATR in plasma, where significantly higher AUC values resulting in ~10-fold higher systemic exposure levels were obtained. This novel system offers a promising, minimally-invasive, long-acting alternative delivery system for ATR that is capable of enhancing patient compliance and therapeutic outcomes. It also proposes a unique promising platform for the long-acting transdermal delivery of other hydrophobic agents.

18. Parisa Naeli "SARS-CoV-2 protein NSP2 enhances microRNA-mediated translational repression and impairs host immune response"

Email: p.naeli@qub.ac.uk

Sustainable Development Goal:

Viruses utilise microRNAs (miRNAs), to impair the host antiviral immune system and facilitate viral infection. miRNAs inhibit translation initiation of their target genes by recruiting the GIGYF2/4EHP repressor complex to the mRNA 5´ cap structure. We previously reported the 4EHP-mediated, miR-34a–directed translational repression of IFN-β production upon vesicular stomatitis virus infection, likely to prohibit prolonged inflammatory responses. Moreover we demonstrated that severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) encoded non-structural protein 2 (NSP2) protein impedes IFN-β expression through translational repression of Ifnb1 mRNA by coopting the GIGYF2/4EHP complex, leading to evasion of a cellular innate immune response and enhanced viral replication. Furthermore, we demonstrate the pervasive augmentation of the miRNA-mediated translational repression of cellular mRNAs by NSP2. We show that NSP2 interacts with Argonaute 2, the core component of the miRNA-Induced Silencing Complex (miRISC) and enhances the translational repression mediated by natural miRNA binding sites in the 3´ UTR of cellular mRNAs. Our data reveal an additional layer of the complex mechanism by which SARS-CoV-2 and likely other coronaviruses manipulate the host gene expression program through co-opting the host miRNA-mediated silencing machinery to suppress the host immune response.

19. Ione Avila-Palencia "Causal loop diagram of the complex causal mechanisms between urban environment and cognitive decline"

Email: i.avila-palencia@qub.ac.uk

Sustainable Development Goals:

There is evidence for the existence of causal mechanisms between the urban environment and cognitive decline, but the interrelations between these mechanisms are unclear. In this study, we aimed to map the causal mechanisms by which urban environment factors impact cognitive decline in older adults. This study was part of the Supportive environments for Physical and social Activity, healthy ageing and CognitivE health (SPACE) project. A 2-day workshop with 12 researchers was conducted using the Group Model Building (GMB) methodology. The workshop aimed to create a Causal Loop Diagram (CLD) that identifies established and potential urban environment, lifestyle, health, and physiological factors determining cognitive decline in older adults, and the dynamic interrelationships between these factors. The workshop was held online using adapted scripts. After the workshop, the modelling team reviewed the CLD to ensure that main hypothesised causal mechanisms were captured. The final CLD contains 34 factors and 109 connections, conceptualised as a complex system which mapped mechanisms between the urban environment and cognitive decline. All factors were classified in nine main themes: urban design, social environment, travel behaviours, by-products, lifestyle, mental health conditions, disease/physiology, brain physiology, and cognitive decline outcomes. Thousands of feedback loops were identified and five were selected to illustrate the main dynamics detected in the system. The CLD detailed numerous plausible causal mechanisms and feedback loops between the urban environment and cognitive decline. The CLD has important implications to inform future analyses and identification of possible systems-based interventions to prevent cognitive decline.

20. Danielle Logan "Development of a nutrient database to analyse dietary intake of older Indians in the Longitudinal Aging Study in India – Diagnostic Assessment of Dementia (LASI-DAD)"

Email: d.logan@qub.ac.uk

Sustainable Development Goals:

Investigating diet-related disease in India's ageing population is challenging due to poor dietary assessment infrastructure and limited capacity for nutritional analyses. We developed a Food Frequency Questionnaire (FFQ) to capture dietary intake among older Indian adults. Nutrient analysis of FFQ data requires linkage to a nutrient database. However, the Indian Food Composition Tables (IFCT) provided only partial coverage for FFQ items, nutrient data for cooked foods was unavailable, and nutrients were missing (iodine and vitamin B12). The objective was to develop a nutrient database maximising the IFCT to analyse FFQ data. Development of the nutrient database involved: (1) Creation of a core dataset within the Nutritics (2019) software comprising analytical data for matched foods in the IFCT reference database. (2) Selection of suitable matches for additional foods/beverages consumed in the FFQ informed by local dietetic expertise. (3) Import of nutrient profiles for additional foods/beverages from international food tables to provide full coverage for all FFQ items. (4) Filling of nutrient data gaps in the core IFCT dataset to ensure all foods/beverages have a value for each nutrient. (5) Generation of a conversion file for food frequencies to daily intakes (servings/grams) to facilitate FFQ linkage with the nutrient database. The nutrient database provides full coverage of FFQ raw and cooked food/beverages and has capability to analyse 53 nutrients. Overall, 53% of FFQ items were matched to the IFCT, whilst 28% were from UK, 15% from USA and 4% from Singapore food tables. All FFQ items matched to the IFCT had missing nutrients mapped from other databases. For cooked FFQ items matched to the IFCT (n=21), an appropriate cooking method was applied. The nutrient database developed through integration of nutritional expertise and dietary assessment software, will allow nutrient analysis of FFQ data and investigation of diet-related disease in the older Indian population.

21. Melibea Berzosa Suner "Investigating the protein SorLA as potential key factor for novel treatment strategies for maladies related with B cell misfunction"

Email: m.berzosasuner@qub.ac.uk

Sustainable Development Goal:

B cells play a crucial role in humoral adaptative immune responses which are initiated upon antigen and B-cell receptor (BCR) binding, resulting in their endocytosis, trafficking, and docking of the antigenic peptides on MHC class II molecules (MHCII) for their delivery to cell surface and presentation to T cells. This interaction induces B cell differentiation to plasma cells which are responsible of the production of high-affinity antibodies conferring protection against pathogens and providing long-term immunity. In contrast, disruption of BCR-antigen endocytosis, trafficking or downstream antigen presentation can promote the development of B cell-mediated immunodeficiencies or malignancy. With increased incidence of these conditions in the western world, there are still gaps in knowledge related to B cell biology and function (e.g., regulators of the aforementioned processes are uncharacterised), which are critical to address in order to design novel therapies. Using genome-wide screening we identified a potential new role for the transmembrane protein, SorLA, in antigen induced BCR internalisation which could be essential for an adequate B cell function. To investigate SorLA's role, our research group have generated SorLA knock-out B cells using CRISPR-CAS technology. We have observed that the absence of the protein SorLA in B cells results in an increased of BCR surface expression, but a decreased of antigen internalisation. In addition, the downstream trafficking of antigen is altered which could lead potential implications for T cell-dependent activation. Moreover, we have recently detected that wild-type B cells release a soluble form of SorLA (sSorLA), particularly following antigen stimulation, representing a new mechanism of B cell communication. For this reason, we are currently evaluating the immunomodulatory effect of sSorLA on B cells and other immune cells. Results from these studies could lead to the proposal of SorLA as key factor for novel treatment strategies for maladies related with B cell misfunction.

22. Rayhanul Islam "Sensitising prostate tumour models to radiation using novel RALA/AuNPs nanocomplexes"

Email: r.islam@qub.ac.uk

Sustainable Development Goal:

Gold nanoparticles (AuNP) are effective radiosensitisers, however, successful clinical translation has been impeded by several limiting factors, notably, physiological instability and poor cellular internalisation efficiency. Previously, our group developed an AuNP formulation utilising a short cell penetrating peptide, RALA; (RALA-AuNP). RALA-AuNP shows efficient intracellular delivery, and a consequent radiosensitisation at low microgram AuNP concentrations in prostate cancer cell models which potentiates AuNPs as a promising radiosensitisation agent. However, it was challenging to establish a controlled delivery system for this formulation due to limited stability and issues relating to sufficient hyper-concentration enabling sustained implant release. To address these issues the RALA-AuNP complex was modified by incorporating 5 kDa polyethylene glycol into the AuNP-RALA nanocomplex. Optimised w:w ratios of RALA:AuNP:PEG yielded a positively charged nanocomplex sized <50 nm with PDI values <0.25 as measured by dynamic light scattering (DLS). This formulation was successfully lyophilised, and following reconstitution remained stable within physiological saline over two weeks. Efficient cellular internalisation of lyophilised AuNP-RALA was observed in both PC-3 and DU145 prostate cancer cell models, treated at an ultralow dose of 3.5 μg/mL, confirmed by ICP-MS and enhanced dark field/hyperspectral microscopy. Additionally, initial studies indicate significant radiation dose modulation (sensitivity enhancement ratio=1.9) using this novel formulation. Future work will ascertain the ability of this formation as a radiosensitiser following release from a biodegradable, sustained release implant.

23. Surya Sahdeo "Revolutionizing Construction by Zero-Cement Concrete: Unleashing the Potential of Geopolymer Concrete for Sustainable Construction"

Email: s.sahdeo@qub.ac.uk

Sustainable Development Goals:

Recently, there has been a lot of global concern about environmental issues such as increased carbon emission, and building sectors are experiencing a strong demand to embrace sustainable construction practices and materials. This article provides an overview of a new technology known as Geopolymer concrete or No-cement concrete, which has had a significant impact on the building industry because to its high relevance, technique, and real-world applicability. The study of geopolymer concrete has had a significant influence on both academics and industry. Every researcher is eager to learn more about this incredibly useful subject. As is well known, the manufacture of cement significantly increases greenhouse gas emissions. The ability of geopolymer concrete to cut carbon emissions made it a ground-breaking addition to the construction. One of the best aspects is that the majority of it is made up of industrial wastes like fly ash and granulated glass blast furnace slag. As a result, geopolymer concrete not only eases the problems associated with waste management, but also promotes resource efficiency. Therefore, the usefulness of the geopolymer concrete will be clear for changing construction processes and tying them to the current objective of sustainable developments. The research's technique comprises a number of different facets. Since industrial by-products make up the majority of the materials, a methodology that begins with material characterization techniques like X-ray diffraction and scanning electron microscopy is preferred to understand the characteristics of the geopolymerization process. This methodology is then followed by mix design optimization techniques. The systematic differences in binder content and activator types come next. Compression and flexural testing are frequently used to assess strength. Assessment of durability for areas exposed to extreme conditions such as the ocean. A thorough grasp of the mechanical and durability characteristics of geopolymer concrete will be provided by the research for this particular article. In conclusion, this technology has proven to be a game changing approach to sustainable construction as it makes an most appropriate

choice for environmental responsible construction industry. Adopting geopolymer concrete can be a crucial step toward a more sustainable and resilient built environment as the international community speeds up its efforts to combat climate change and decrease environmental harm.

24. Zeinab Abdelrahman "Stratification of glioma according to stemness scores in bulk and single cell transcriptomes"

Email: z.abdelrahman@qub.ac.uk

Sustainable Development Goal:

The aggressive nature of brain tumors, especially gliomas, and their resistance to conventional treatments make them a significant health challenge. Clonogenic glial stem cells have been a prime focus in glioma research due to their potential role in resisting chemotherapy and radiation therapy. This has incited a reassessment of glioma biology and therapeutic approaches that target these stem cells and their stemness traits. We collected gene expression profiles from various origins, ranging from bulk tumor to single-cell RNA sequencing data, from databases such as TCGA, NCBI GEO, and the Chinese Glioma Genome Atlas. In order to evaluate the stemness signatures, we obtained 12 gene sets linked to stem cells from the StemChecker webserver. Single-sample gene-set enrichment analysis (ssGSEA) was employed to quantify the level of stemness in each sample, providing a valuable gauge of stem cell characteristics. Through stemness scores, Glioma subtypes were distinguished using hierarchical clustering. Our survival analysis, employing Kaplan-Meier curves, uncovered distinct survival outcomes among subtypes. Specifically, stem-H exhibited the poorest prognosis, while stem-L demonstrated the most favorable overall and disease-free survival rates. Intriguingly, stem-H displayed enhanced activities in processes like epithelial-mesenchymal transition, invasion, proliferation, differentiation, and metastasis. This subtype also exhibited greater DNA damage repair activity, intratumor heterogeneity, and a higher prevalence of TP53 and EGFR mutations. Conversely, stem-L gliomas had lower stemness scores, with a higher proportion of MGMT methylation. They were characterized by increased stromal and immune cell infiltration within the tumor microenvironment, suggesting a more favorable immunological response. Additionally, we observed differences in tumor mutation burden, cell cycle activity, and T-cell exclusion potential between stem-H and stem-L gliomas. Stem-H consistently exhibited higher TIDE prediction scores, indicating a reduced likelihood of responding to immunotherapy. In summary, our study introduced a novel classification of gliomas

based on stemness signatures, shedding light on their biological characteristics and clinical implications. This approach may pave the way for more tailored and effective management strategies for glioma patients, offering improved prognostic information and potential therapeutic targets.

25. Elisa Ramazzina "Water, the Natural World, and the Environment in the Middle Ages"

Email: e.ramazzina@qub.ac.uk

Sustainable Development Goals:

My interdisciplinary research investigates how water is related to the natural world and the environment in early medieval English texts, which are frequently entangled with other medieval European literatures such Middle English, German, French, Italian, and Latin writings. For instance, I have looked at the significance, symbolism, and connection between baptism and water in Old English poetry manuscripts. Combining literature, linguistics, and codicology, individual manuscripts were reexamined as a whole, reevaluating the reasons behind their production based on the various interpretations of water. The value of water in the medieval worldview as one of the four elements—earth, water, air, and fire—and how these elements linked to the four humours that made up the human body are explored in another area of research that blends literature and medical history. For instance, I have researched therapeutic baths and the usage of thermal water in medieval English and European medical literature. I am currently researching the influence of waterways on different border types, highlighting their cultural, ethnic, linguistic, and sociocultural aspects, integrating literature, the histories of geography and cartography, historiography, the histories of science and medicine, and monster studies. The goal of the research is to show how these borders during the Middle Ages contributed to conflicts, encouraged integration, forged national identities and languages, aided trade, and disseminated illnesses, culture, literature, science, and technologies. This presentation/poster provides an overview of my research, emphasising how it helps understand Anglo-Saxon and medieval culture, and their influence on contemporary European culture. It highlights the impact of both completed and upcoming activities, including public talks, an exhibition on borders and waterways—both "physical" and online— developed in collaboration with museums and non-academic organisations, that will also produce educational materials, sessions at international conferences, edited volumes, etc. It demonstrates how the research is multidisciplinary and international, facilitating interdisciplinary and cross-disciplinary collaborations both

within and outside of academia. My network will expand as a consequence of the Postdoc Showcase, which will also promote future partnerships.