## **I&I NETWORK NEWSLETTER**



## 2023 - ISSUE 3

# INFECTION TIMMUNITY Improving the lives of type-1 diabetes patients

Researchers at the University of Bristol have shown that reinforcement learning, a type of machine learning in which a computer program learns to make decisions by trying different actions, significantly outperforms commercial blood glucose controllers in terms of safety and effectiveness. By using offline reinforcement learning, where the algorithm learns from patient records, the researchers improve on prior work, showing that good blood glucose control can be achieved by learning from the decisions of the patient rather than by trial and error. Type 1 diabetes is one of the most prevalent auto-immune conditions in the

UK and is characterised by an insufficiency of the hormone insulin, which is responsible for blood glucose regulation.



Many factors affect a person's blood glucose and therefore it can be a challenging and burdensome task to select the correct insulin dose for a given scenario. Current artificial pancreas devices provide automated insulin dosing but are limited by their simplistic decision-making algorithms. However, a new study shows offline reinforcement learning could represent an important milestone of care for people living with the condition. The largest improvement was in children, who experienced an additional one-and-a-half hours in the target glucose range per day.

Emerson H *et al.* (2023). Offline Reinforcement Learning for Safer Blood Glucose Control in People with Type 1 Diabetes. Journal of Biomedical Informatics.

Image © Harry Emerson

# Inside this issue:Infection and Immunity Events2Infection and Immunity Research and Staff News3-12Funding Opportunities in Infection and Immunity13-14This Issue's Showcased Article15Contacts16

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# **EVENTS**

MRC/NIHR Clinical Academic Research Partnerships Scheme: Information Session 11 September 2023, 10.30 - 11.30, online

#### Using Mendelian Randomization to investigate possible causal effects of maternal environmental exposures during pregnancy on offspring short and long-term outcomes

11 September 2023, 12.00 - 13.00, Dr Gunn-Helen Moen (IMB, University of Queensland), OS6 Oakfield House and online

#### The UK COVID-19 Infection Survey: data to inference to action

12 September 2023, 16.00 - 17.00, Dr Sarah Walker (University of Oxford), OS6 Oakfield House and online

# Investigating ethnic differences in hypertension and diabetes management using the Clinical Practice Research Datalink (CPRD)

14 September 2023, 14.00 - 15.00, Dr Sophie Eastwood (Clinical Epidemiologist, University College London), Oakfield House OS6 and online

#### Immunomodulation Update Day

20 September 2023, 9.00 - 16.30, Derby and Chester Conference Suite, The Midland Hotel, Peter Street, Manchester M60 2DS

#### **Equality, Diversity and Inclusion in Science and Health (EDIS) Symposium** 26 September 2023, 10.00 - 17.00, The Francis Crick Institute, 1 Midland Road, London, NW1 1AT and online

Laboratory Consumables and Services Fair 26 September 2023, 12.00 - 19.00, Science Creates - Old Market, Midland Road, Bristol BS2 0NS

South West Haemostasis and Thrombosis Meeting 28 September 2023, 9.00 - 16.40, The Castle Hotel, Castle Green, Taunton, Somerset, TA1 1NF

#### 6th South West Blood and Marrow Transplant Training Day

28 September 2023, 9.00 - 16.50, Mercure Exeter Rougemont Hotel, Queen Street, Exeter EX4 3SP

# Cabot Annual Lecture 2023: A just transition - leaving no one behind in the response to climate change

11 October 2023, 18.00 - 19.30, Keynote and panellist: Chris Stark (Chief Executive of the Climate Change Committee), The Great Hall, Wills Memorial Building, University of Bristol

#### **Infectious Diseases Through an Evolutionary Lens**

17 - 19 October 2023, British Medical Association House, Tavistock Square, London

VIEW THE FULL LIST OF I&I EVENTS ON OUR WEBSITE

# NEWS

## Study provides insight into miscarriages in tsetse flies

Tsetse are biting flies that transmit the parasites causing sleeping sickness in hu-

mans and Nagana in animals. Female tsetse flies, which give birth to enormous, adult-sized live young, can experience miscarriages and

these are more likely as they get older.

A new study carried out by researchers from the Universities of Bristol, Oxford, Notre Dame in the US, and the Liverpool School of Tropical Medicine, investigated the



causes and consequences of these miscarriages. They

asked how abortions affected the size and sex of the next offspring produced, and how factors such as the mother's nutrition affect the frequency of

miscarriages. They found that early-stage abortions are initially prevalent in very young female tsetse flies and then gradually increase as tsetse females reach older ages. They did not find evidence that abortions are adaptive strategies, in other words, tsetse flies that had abortions did not go on to have larger offspring or more females.

Findings from the study could feed into predictive modelling of tsetse population dynamics, which could ultimately help predict the spread of tsetseborne diseases.

English S *et al.* (2023). Investigating the unaccounted ones: insights on age-dependent reproductive loss in a viviparous fly. *Frontiers in Ecology and Evolution*.

> Image: Tsetse egg versus pupa © Lee Haines

## **Climate Change and Health - Learning Across Boundaries**

An inclusive and collaborative exploration of the wider effects of climate change on

animal and human health was held on 21 June 2023 at the University of Bristol.

This half-day event was jointly hosted by the Infection and Immunity Research Network and the Climate Change and Health Research Group, an initiative between the Elizabeth Blackwell Institute for Health Research and the Cabot Institute for the Environment at the University of

Bristol.

This multi- and interdisciplinary event welcomed eleven invited oral speakers and five poster pre-

senters all exploring the different facets of how human and animal health are affected by climate change. Topics covered included: nutrition, environmental pollution, insect and parasite-borne infectious diseases, engineering interventions to cope with the effects of climate change, human and animal mental health, changes in human and animal behaviours due to climate change (and how these can lead to greater infection numbers, for example), how world trade policy adapts to circumstances in order to meet needs, and how a One Health approach can influence public policy and the actions of individuals for positive change.

Read the summary of the day

Dann Mitchell, Professor of Climate Science at the Cabot Institute for the Environment, won an award in recognition of his pioneering work to advance understanding of global weather extremes and their impact on society. The Adrian Gill Award for Advances at the Interface of Atmospheric Science and Related Disciplines from the Royal Meteorological Society is awarded annually to a member who has made a significant contribution and authored research in the Society's journals in fields interfacing between atmospheric science and related disciplines. Dann's latest research combines climate modelling and the projected effects on human health. This interdisciplinary focus is especially important in light of the rapidly changing climate and its repercussions on global populations.

Professor of Microbial Patho-

## Awards and recognition

genicity Ruth Massey in the School of Cellular and Molecular Medicine has been elected as a European Molecular Biology Organization Member, in recognition of her outstanding contributions to research on functional genomics approaches to define the pathogenic processes used by bacteria to cause disease in humans. Her team's primary focus is *Staphylococcus aureus* and its ability to cause bacteraemia.

## Public health gaps in the 'levelling up' agenda

The UK government's levelling up agenda is set to fail in its mission to address inequalities unless it tackles the root causes of poor health, according to a new study.

The research, led by the Universities of Bristol and Bath, presents policy recommendations to tackle the root causes of poor health which hold the key to overcome inequalities.

The study used data from interviews with

132 key government and industry professionals to assess if the 12 'missions' published in the Levelling Up White Paper will achieve better quality of urban living to improve public health.

The study is part of TRUUD, a transdisciplinary research project led by the University of

Bristol, which aims to reduce noncommunicable disease (such as cancers, diabetes, obesity, mental illhealth and respiratory illness) and health inequalities linked

to the quality of urban planning and development.

Using seven principles that could underpin a successful

'levelling up' strategy for healthy urban developments, researchers recommend how the Government might address the wider determinants of health in the implementation of its ambitions.

These include establishing a cross-government commitment for health, led by the Prime Minister's office, further local devolution of powers, simplified means of funding, and increased use of evidence from local communities and health sources for decisionmaking.

Ayres S et al. (2023). What needs to happen to 'level up' public health? Contemporary Social Science.



## Improving antibiotic prescribing for urinary tract infections

New research led by the University of Bristol aims to help GPs choose the best antibiotic for treating urinary tract

infections (UTIs) and reducing antimicrobial resistance (AMR), thanks to a £3 million award by the National Insti-

tute for Health and Care Research (NIHR).

UTIs are the most common bacterial infection treated by the NHS, mostly using antibiotics prescribed in primary care. In some cases, antibiotic resistant UTIs are as high as 50%, resulting in longer, more severe infections, requiring multiple antibiotic courses.



During the fiveyear IPAP (Improving Primary Care Antibiotic Prescribing)-UTI pro-

gramme, led by Bristol's Centre for Academic Primary Care (CAPC), the researchers, working with partners in the NHS and UK Health Security Agency, will develop a behaviour change intervention to encourage clinicians to prioritise different first-choice antibiotics and assess the impact on AMR. The National Institute for Health and Clinical Excellence (NICE) has recently encouraged GPs and nurses to prescribe nitrofurantoin instead of trimethoprim, which are both recommended firstchoice antibiotics for treating UTIs. Some studies suggest this has reduced trimethoprim AMR rates in some areas.

Dr Ashley Hammond, Research Fellow in Infectious Disease Epidemiology at CAPC is Programme Lead, and Alastair Hay, a GP and Professor of Primary Care at CAPC, is Senior Programme Co-Lead.

## New Bristol Evidence Synthesis Group awarded £2.5m

The Bristol Evidence Synthesis Group is one of nine new specialist research groups in the UK, set up to provide sound evidence to health and social care policymakers. National Institute for Health and Care Research (NIHR) Evidence Synthesis Groups, part of NIH-R's Evidence Synthesis Programme, will investigate what evidence is available to answer important questions spanning healthcare, public health and social care. Each group has been granted £2.5 million over five years. Together, the groups could work on up to 45 research projects

per year.

These groups will carry out projects requested by stakeholders such as NHS trusts,



local authorities, patient communities and members of the public. Other projects will be identified through NIHR processes and working closely with policymakers to make sure they address policy and practice needs. Research topics will be allocated without the need for a lengthy commissioning process.

Evidence synthesis is an approach that allows researchers to identify, appraise and analyse all the information on a particular research question. It is a powerful way of combining data across many different studies to find more definitive answers.

> Read the full University of Bristol news item

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## **EBI health-related interdisciplinary research awards**

In April 2023 the Elizabeth

Blackwell Institute (EBI) launched a funding call to support health-related interdisciplinary research in a variety of contexts, including: equitable and sustainable health; climate, environment and health; infectious disease research; mental health; and transformative technologies for health.

Amongst the awards were:

 Anu Goenka (School of Cellular and Molecular Medicine [CMM]): Innovative human tonsil organoid system for unlocking mucosal immunogenicity of a nasal nanoparticle SARS-CoV-2 vaccine. This project will evaluate the human immune response to a new COVID-19 vaccine produced in Bristol, called the ADDoCOV. This vaccine could work well if it is administered through the mouth or nose. An 'organoid model' has been developed using cells from tonsils which are removed from patients at surgery in the hospital, and can measure their immune response after adding the ADDoCOV vaccine in the laboratory. It is hoped it

will help open the door to future clinical trials as well as vaccine development for other infections.

 Darryl Hill (CMM): Aerosol Survival of Antimicrobial Resistant Bacteria.
Knowledge of how pathogens survive in exhaled aerosols is critical for understanding transmission, as demonstrated during the COVID-19 pandemic,



ultimately this will lead to more effective mitigation strategies. Using cutting edge techniques developed in Bristol, this project aims to determine whether factors allowing bacteria to become resistant to antibiotics also facilitate their survival during transmission.

 Samuel Okyere (School of Sociology, Politics and International Studies): Strengthening the evidence base for responses to the effects of COVID-19 on sexual and reproductive health among Ghanaian women and youth. This project seeks to promote global health, gender equality and social justice by bringing together a multi-sectoral team of academics, policy makers, practitioners, and community leaders to co-develop a grant application for funding to study and articulate viable responses to the persistent impacts of COVID-19 on sexual and reproductive health (hereafter SRH) in Ghana.

> Jim Spencer
> (CMM): Elucidating the binding target(s) of novel antibacterial G-quadruplex ligands.
> This project investi-

gates the possibility of killing bacteria by targeting specific regions of their DNA with small molecules. New antibiotics for bacteria such as E. coli (the leading cause of bloodstream infections in the UK, which may be severe or lifethreatening) are desperately needed. Molecules, such as those being studied as part of this project, that kill bacteria by a mechanism distinct from those of existing drugs offer a route to new antibiotics that may be less susceptible to known types of resistance.

Read about the other awards

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## Long Covid not caused by immune inflammatory response

Long Covid occurs in one out of ten COVID-19 cases. Theories into what causes it include whether it might be triggered by an inflammatory immune response towards the virus that is still persisting in our body, sending our immune system into overdrive or the reactivation of latent viruses such as human cvtomegalovirus (CMV) and Epstein Barr virus (EBV). A team found patients' immune responses at three months with severe symptoms displayed significant dysfunction in their T-cell profiles, indicating that inflammation may persist for months even after they have recovered from the virus. Results showed that even in severe cases inflammation resolved in time. At 12 months, both the immune profiles and inflammatory levels of patients with severe disease were similar to those of mild and moderate patients.

Patients with severe COVID-19 were found to display a higher number of long Covid symptoms compared to mild and moderate patients. However, further analysis revealed no direct association between long Covid symptoms and immune inflammatory responses in any of the patients. Importantly, there was no rapid increase in immune cells targeting SARS-CoV-2 at three months, but T-cells targeting the persistent and dormant CMV did show an increase at low levels. This indicates that the prolonged T-cell activation observed at three months in severe patients may not be driven by SARS-CoV-2 but instead may be "bystander driven" i.e. driven by cytokines.

Santopaolo M *et al.* (2023). Prolonged T-cell activation.... *eLife*.

## **CONNECTED** molecular diagnostics training

CONNECTED—Community Network for Vector-Borne Plant Viruses—is a sustainable network of over 1600 international scientists and researchers from 94 countries looking to

address the challenges of vector-borne plant viruses.

Network Managers Drs Nina Ockendon-Powell and Diane Hird were invited to give a presentation on their international insect vector and plant virus molecular diagnostics training and capacity building programme. The event was part of the 2023 Phytohealth International Webinar Series organised by Dr Mark Balendres of De La Salle University,

## 140 EARLY CAREER SCIENTISTS



Manila, Philippines. The event was attended by around 50 delegates with a range of interests including senior researchers, plant health regulators and policy makers, and farmers. CON- NECTED's work has been primarily focused on Sub-Saharan African; this event was an important opportunity to reach out and engage with

> new audiences in the Philippines and surrounding region.



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## GPs have a key role to diagnose vulval lichen sclerosus

Vulval lichen sclerosus (VLS) is a chronic inflammatory skin condition and affects one in 70 women who visit a general gynaecology clinic. The condition is painful, can restrict daily life, such as going to the toilet, sitting, exercising, sexual activity and socialising, and can become cancerous if left untreated. Prevalence in the population remains unclear as the condition is underreported and underdiagnosed. The study by the Universities of Bristol and Warwick, and funded by the Eco-

nomic and Social Research Council. found women with VLS often seek help on multi-

ple occasions and are frequently given incorrect diagnoses and

Living with Vulval Lichen Sclerosus This anima

treatments for a range of conditions, such as thrush and GSM. The research team believe vulval symptoms should not be accepted as a normal part of ageing or of being a woman. Examination in person, and not a virtual consultation, is key, ideally by someone with an interest in women's health. Genital problems are distressing for wom-

en, difficult to talk about, and early diagnosis and intervention is based on the experiences of people with tion of VLS are crucial to reducing the im-

pact on a woman's life.

Watch a video explaining what living with VLS is like

Rees S et al. (2023). Vulval lichen sclerosus in primary care: thinking beyond thrush and genitourinary symptoms of the menopause. BJGP.

## New project to use AI in managing type-2 diabetes

A team funded by the National Institute for Health and Care Research (NIHR) is developing a ground-breaking AI system designed to support people with type 2 diabetes in taking control of their health.

Structured diabetes education is a critical component of national efforts to improve health outcomes for people with the condition. The new software named ROMI (Relational Online Motivational Intervention) will provide patients with personalised accessible advice and support. ROMI is a conversational AI that can deliver educational content verbally, as a text or

as a graphic. Health care professionals and patients, including those from underserved communities which research shows have a higher prevalence of type 2 diabetes, will be involved in the design process from the start.

The team is made up of researchers from the University of the West of England, the NIHR Bristol Biomedical Research Centre and Elzware, a technology company that has been developing conversational AI since 2002. ROMI will be co-designed by people who have type 2 diabetes, healthcare professionals, researchers and Elzware's technical

team. Experts in patient and public involvement will ensure that people with type 2 diabetes are represented at every stage of the project. This approach will let the researchers understand what content users would find most helpful and put their needs at the centre of the development process. At the same time the healthcare professionals will input ideas of how to empower patients to be the expert in their own self-management. The team will then aim to trial ROMI among their target population to assess how effective it is at providing patients with health-improving advice.

#### Read more

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## Improving methods for assessing surgical site infection

The Surgical and orthopaedic innovation theme at the NIHR **Bristol Biomedical Research** Centre is running this project to explore methods to improve surgical site infection (SSI) assessment after patients leave hospital. SSIs are a common healthcareassociated infection which develop in parts of the body where surgery took place and are often difficult to assess because problems commonly occur after the patient has left hospital. SSIs are a common adverse event after surgery and an important outcome to measure when eval-

uating new surgical techniques and devices that are being developed and introduced into clinical practice.

Adults undergoing surgery at an NHS trust in Bristol will be asked to complete a Wound Healing Questionnaire (WHQ) 30 days after their procedure. The questionnaire will ask whether patients have experienced any signs or symptoms relating to their wound, or whether they have needed any wound care interventions that may indicate that an SSI has developed. The data collected will validate a scoring system for the WHQ. Findings will demonstrate whether the questionnaire developed is a reliable and feasible source for the remote, automated, electronic collection of SSI data. In turn, this could be a method for use throughout the evaluation cycle of innovative procedures and devices, as they move through early to later phase studies as well as routine practice.

This project builds on research carried out within the MRC ConDuCT-II Hub and previous work on the Bluebelle study.

## Funding awards: Part 1

Dr Helen Weavers (School of Biochemistry) was awarded a Lister Prize by The Lister Institute of Preventive Medicine. Each year the Institute selects applicants whose early-career success indicates exceptional potential for future biomedical research. The cells and tissues within our bodies encounter many challenges over their lifetime, such as physical damage or toxin exposure. Yet many tissues display remarkable resilience to these internal and external threats, continuing to function and even thrive in the face of adversity. Helen's group studies

the molecular basis of this biological resilience. By discovering why some tissues have robust capacity to resist or repair damage and 'bounce back', they aim to harness these powerful biological shields therapeutically to enhance tissue recovery after insult. Helen's team recently discovered that biological resilience is key to maintaining a healthy immune system, where it prevents activated pro-inflammatory immune cells from causing systemic collateral damage. By investigating these processes using cutting-edge imaging and omics approaches, Helen's lab is identifying new ways to enhance immune resilience across the life-course and promote healthy ageing.

Dr Anu Goenka (School of Cellular and Molecular Medicine) is part of an international team working on *The Immunity to* Streptococcus pyogenes *Network: iSpy-Net* who received USD \$5m from the Fondation Leducq (of which £410k will come to Bristol). The project, which starts in Jan '24, will look at the role of Streptococcus A in rheumatic heart disease.

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Bristol BioDesign Institute co-Director Dr Lucia Marucci is part of a team that has been awarded £1.6 million by the Biotechnology and Biological Sciences Research Council to establish an AI in Biosciences Network (AiBio-UK) that will run over a five-year period. The network will run several training activities and networking events as well as fund pilot/feasibility projects, which will aim at accelerating progress and bringing the two communities closer together. The network is led by Andrew French (University of Notting-

## **New AI in Biosciences Network**

ham); with Lucia, Robert Knight (King's College London), Reyer Zwiggelaar (Aberystwyth University), Yizhi Cai (University of Manchester), Dipali Singh (Quadram Institute) as Co-Investigators. Several partners including NVIDIA, Syngenta, ONE Life Sciences (Biohub), The Data Lab - Innovation Centre, CENSIS, The Alan Turing Institute, Biomathematics and Statistics Scotland, and others supported the proposal.

Al is an area of growing inter-

est within the biosciences research and innovation community, but there is a lack of AI-focussed networking opportunities relevant to biosciences in the UK. The network will address this identified need, with key aims being: create a stronger community profile for AI in the biosciences in the UK; facilitate networking, knowledge exchange and the formation of new collaborations; support greater awareness, education and training relating to AI within the bioscience community.

### Funding awards: Part 2

Dr Maria Pufulete (Bristol Medical School) received £2 million from the National Institute for Health and Care Research (NIHR) for The effectiveness and cost effectiveness of COenzyme Q10 in heaRt fAiLure with reduced ejection fraction (CORAL): a pragmatic, patient-centred, data-enabled trial in primary care, starting August 2023 and completing January 2027. The study will find out if taking coenzyme Q10 is beneficial for people with heart failure and reduced ejection fraction. They plan to recruit about 950 people through their GP and will randomise them to assign each

participant to get either coenzyme Q10 or dummy capsules to take every day on top of their existing medications for one year. The findings will help determine if coenzyme Q10 improves quality of life.

Dr Pippa Bailey at North Bristol NHS Trust is leading *Investigating the experiences and management of individuals with failing kidney transplants: preparation for a randomised controlled trial,* funded by a £160,954 award from the **NIHR**. In the UK 1500 kidney transplants fail each year. 2% of living-donor transplants and 5% of deceased-donor transplants fail within a year of transplantation. Many decisions need to be made when a kidney transplant fails, including whether the transplant should be removed, and which immunosuppression medication should be stopped. There is limited evidence on which to base these decisions: national guidelines rely on poor quality evidence. The team will undertake in-depth semi-structured interviews with people who have experienced kidney transplant failure, their family, and healthcare professionals to design and deliver a clinical trial to determine the best management for transplant failure.

## Health Research Ambassador initiative wins HSR UK award

A pilot initiative aiming to build shared, sustainable relationships between researchers and communities in Bristol, North Somerset and South Gloucestershire that

are often underrepresented in health research, won a Health Services Research (HSR



JAMANA

UK) Innovation in Inclusion Award on 5 July 2023.

The Health Research Ambassadors pilot initiative focused on developing and supporting people from under-served communities to participate directly in making decisions about research that affects their lives. The team recruited three people – Olivia Sweeney, Roy Kareem and Asia Yousif – to become

> Health Research Ambassadors. They took part in training, including in public involvement and

co-production in health research.

The ambassadors then ran workshops with women who have experience of seeking asylum in the UK. The workshops benefitted them individually and helped build relationships between women from different migrant communities, as well as with the research team. The Health Research Ambassadors quickly facilitated the development of trust and connection with the migrant women that would have been difficult for the research team alone to develop.

The ambassadors have since taken part in an NIHR Applied Research Collaborations national workshop discussing knowledge mobilisation about research and implementation, and one is involved in a NIHR Health Protection Research Unit advisory group.

## **Environment-friendly programmable bioelectronics**

e-

The University of Bristolled study demonstrates how to make conductive, biodegradable wires from designed proteins. These could be compatible with con-

ventional electronic components made from

copper or iron, as well as the biological machinery responsible for generating energy in all living organisms. The miniscule wires are the size of transistors on silicon chips or one thousandth of the breadth of the finest human hair. They are made completely of natural amino acids and heme molecules, found in proteins such as haemoglobin, which transports oxygen in red blood cells.

> Harmless bacteria were used for their manufacture, eliminating the need for

potentially complex and environmentally damaging procedures commonly used in the production of synthetic molecules.

The multidisciplinary team used advanced computational tools to design simple building blocks that could be combined into longer, wire-like protein chains for conducting electrons. Ultimately, these nanoscale designer wires have the potential to be used in a wide range of applications, including biosensors for the diagnosis of diseases and detection of environmental pollutants.

Hutchins GH et al. (2023). An expandable, modular de novo protein platform for precision redox engineering. Biophysics and Computational Biology. Image © Ross Anderson

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## Gene therapy hope for children with kidney disease

A project has shown that just one dose of gene therapy targeting cells in the kidney has the potential to cure steroidresistant nephrotic syndrome. Findings suggest that replacing one faulty gene that codes for a the podocin protein, essential for the functioning of cells within the kidney's filtration system, could cure the condition.

Nephrotic syndrome is a condition where the kidney's filtering units are damaged, allowing large amounts of protein that should be kept in the bloodstream to leak into the urine. This can lead to swelling, an increased risk of infections and blood clots, and the risk of kidney damage. It can occur at any age but is most common in children under five. Often the symptoms can be managed with steroids, however, around 10% of children do not respond to steroids and many will go on to develop kidney failure and will need dialysis or transplant within two to five years. This is the

group where a faulty gene is frequently the cause of the disease. Using adenoassociated virus (AAV), the team delivered the podocin gene to the correct cell type and were able to replace the original faulty gene in the podocytes, successfully treating several different laboratorybased models of the syndrome.

Ding W *et al.* (2023). Adenoassociated virus gene therapy... Science Translational Medicine.

## Using AI to detect disease in dairy cows earlier

This project is one of 14 awarded a share of £9m funding from the Biotechnology and Biological Sciences Research Council and Department for Environment, Food and Rural Affairs as part of a major initiative to combat endemic livestock disease. It is a collaboration of University of Bristol researchers in veterinary medicine, animal behaviour, computer vision and AI, led by Prof Andrew **Dowsey** in Bristol Veterinary School.

Prof Dowsey and colleagues plan to use Artificial Intelligence (AI) I in order to monitor social interactions of cattle which could indicate developing mastitis or lameness – two of the most significant diseases affecting the UK dairy industry.



While technologies do exist which automate the detection of disease in dairy cows, these tend to focus on observable symptoms which are associated with later stages of disease. The team want to see if they can identify diseases at an early stage by monitoring social interactions using AI. Detecting social behaviour changes is difficult for a busy farmer, but is possible when monitoring them at key points such as queuing for milking or feeding time. A cow's response to infection or trauma is to reduce behaviours which are not immediately essential to survival, such as social interactions; the team believe social behaviour changes could be early predictors of disease.

Read the full University of Bristol news item

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## **FUNDING OPPORTUNITIES**

**Research Professional** provides access to an extensive database of funding opportunities. UoB staff and students have **FREE** online access to the database – once you've registered then you can view upcoming funding opportunities from any device. You can search for funding information by discipline, sponsor, database searches, by recent calls or by upcoming deadlines. If you register for the site and log in, you'll be able to:

- · Set up automated funding opportunity email alerts tailored according to your discipline and research interests
- · Save searches and bookmarks store items of interest for future reference, download and email to colleagues
- · Sign up for higher education news bulletins

#### For further information on Research Professional, go to the Division of Research, Enterprise and Innovation (DREI, formerly RED) website

\* Research Professional

#### British Society for Immunology

Communication and engagement grant

Closing date: 1 October 2023

Award amount: £1,000

These enable individuals to stimulate interest, discussion and understanding of immunology amongst a wider audience. Applicants must have been society members for at least one year prior to application.

#### Coeliac UK

Research programme grants

Closing date: 2 October 2023

Award amount: £750,000

Programme grants are designed to answer a single question or a small group of related questions. The programme should aim to create a virtual network of excellence in research into coeliac disease, with the foundation for longevity and for further research into the condition, beyond the original research programme grant. Applications for projects that will improve the lives of people living with coeliac disease and other gluten related autoimmune conditions (hereafter referred to collectively as coeliac disease) are welcome.

#### National Institute on Minority Health and Health Disparities

Notice of special interest - research to address vaccine hesitancy, uptake and implementation among populations that experience health disparities

#### Closing date: 5 October 2023

Award amount: USD unspecified

Supports research projects that evaluate strategies to facilitate vaccination uptake in clinical and community contexts, and address the barriers to increasing reach, access and uptake of vaccinations among health disparity populations at high risk and likely to experience vaccine hesitancy. Applicants should leverage existing partnerships, to complete the study aims.

#### **Global Polio Eradication Initiative**

Call for proposals for polio eradication

Closing date: 10 October 2023

Award amount: USD \$500,000

This supports research projects contributing to the Polio Endgame Strategy 2022-2026. The current priority is to generate new data or information in the following areas: vaccine schedule immunogenicity; surveillance; product development; epidemiology or virolo-

#### **European Federation of Immunological Societies**

EFIS/EJI Ita Askonas Award

Closing date: 27 October 2023 Award amount: €20,000

gy; monitoring and evaluation; basic immunology; containment.

This acknowledges female group leaders in immunology who have run an independent laboratory for a minimum of four and no more than ten years.

#### Wellcome

Microbiome interactions in health and disease conference bursaries

Closing date: 7 November 2023

Award amount: unspecified

Enable PhD students to attend a conference highlighting the mechanisms of communication between the microbiome and the host, 14-16 February 2024. The conference brings together leading scientists and clinicians from the fields of microbiology, gastroenterology, nutrition, cancer and public health to discuss the latest developments in the fast-moving area of host-microbiome interactions in health and disease.

**Biocodex Microbiota Foundation** International grants

Closing date: 30 November 2023

Award amount: €200,000

Support clinical or fundamental research projects focused on human gut microbiota related to health and disease. Projects must focus on the role of gut microbiota in the mechanisms of pain.

# THIS ISSUE'S FEATURED ARTICLE

# Differences in airborne stability of SARS-CoV-2 variants of concern is impacted by alkalinity of surrogates of respiratory aerosol

Haddrell A, Otero-Fernandez M, Oswin H, Cogan T, Bazire J, Tian J, Alexander R, Mann JFS, Hill D, Finn A, Davidson AD & Reid JP (2023). *Journal of the Royal Society Interface*.

Critical insights into why airborne viruses lose their infectivity have been uncovered by scientists at the University of Bristol. The findings reveal how cleaner air kills the virus significantly quicker and why opening a window may be more important than originally thought. The research could shape future mitigation strategies for new viruses.



Image: Levitating droplets. Each of these droplets have a single SARS-CoV-2 viral particle. The droplets look like lines because they are rapidly moving in an electrodynamic field. © University of Bristol

In the first study to measure differences in airborne stability of different variants of SARS-CoV-2 inhalable particles, researchers from Bristol's School of Chemistry show that the virus has become less capable of surviving in the air as it has evolved from the original strain through to the 'Delta' variant.

Through manipulating the gaseous content of the air, the team confirmed that the aero-stability of the virus is controlled by the alkaline pH of the aerosol droplets containing the virus. Importantly, they describe how each of the SARS-CoV-2 variants has different stabilities while airborne, and that this stability is correlated with their sensitivities to alkaline pH conditions.

The high pH of exhaled SARS-CoV-2 virus droplets is likely a major driver of the loss of infectiousness, so the less acid in the air, the more alkaline the droplet, the faster the virus dies. Opening a window may be more important than originally thought as fresh air with lower carbon dioxide, reduces acid content in the atmosphere and means the virus dies significantly quicker.

# CONTACTS

## The Infection and Immunity Network is run by a Steering Group:

Co-Chair (non-clinical): Co-Chairs (clinical):

Angela Nobbs - Senior Lecturer in Oral Microbiology Julia Colston - Consultant in Infection Ed Moran - Consultant in Infectious Diseases

- Borko Amulic Senior Research Fellow in Immunology
- Matthew Avison Professor of Molecular Bacteriology
- Charles Beck Consultant Epidemiologist & Head of Team, Field Service South West, National Infection Service, UK Health Security Agency
- Hannah Fraser Research Fellow in Infectious Disease Mathematical Modelling
- Clare French Research Fellow in Research Synthesis
- Anu Goenka Clinical Lecturer in Paediatric Infectious Diseases and Immunology
- Melanie Hezzell Associate Professor in Cardiology
- Rajeka Lazarus Consultant in Infection
- Anna Long Senior Research Associate (Diabetes UK RD Lawrence Fellow)
- Jamie Mann Senior Lecturer in Vaccinology & Immunotherapy
- Suzanne Mills Research Development Associate for the Faculties of Health and Life Sciences
- Adrian Mulholland Professor of Chemistry
- Laura Peachey Lecturer in Veterinary Parasitology
- Annela Seddon Director of the Bristol Centre for Functional Nanomaterials
- Luca Shytaj Lecturer in Virology
- Peter Vickerman Professor of Infectious Disease Modelling
- Richard Wall Professor of Zoology
- Catherine Brown Network Administrator

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Affiliations are stated wherever possible, however please note that omissions do happen and we apologise in advance for any you may come across. All information is merely for educational and informational purposes. We cannot offer medical advice and any queries regarding treatment for a specific medical condition or participation in a clinical trial should be addressed to your healthcare provider. While the information herein has been verified to the best of our abilities, we cannot guarantee that there are no mistakes or errors.

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