I&I NETWORK NEWSLETTER

University of BRISTOL
Elizabeth Blackwell Institute for Health Research

NOVEMBER - DECEMBER 2020

Tackling HIV inequalities in Bristol communities

A major three-year-project is to launch in Bristol to work with people of African and Caribbean heritage to increase HIV testing and awareness and reduce the stigma of the virus.

The project has been awarded a £483,697 Common Ambition Grant from The Health Foundation with the aim of reducing HIV health inequalities experienced by people of African and Caribbean heritage living in Bristol and the surrounding area. The results achieved by this project will help Bristol achieve the goals set out by the global Fast Track Cities partnership which Bristol Mayor Marvin Rees signed up to in November 2019.

These are to reduce new HIV transmissions in the city to zero by 2030, whilst at the same time eradicating HIV stigma.

The project will be run by Brigstowe, a Bristol-based charity for people living with HIV, in partnership with African Voices Forum, Unity Sexual Health, Bristol City Council and Fast Track Cities Bristol. Researchers from the University of Bristol (NIHR Applied Research Collaboration West [ARC West] and NIHR Health Protection Research Unit [HPRU] in Behavioural Science and Evaluation) will work in collaboration with community members to evaluate the project.

INFECTION & IMMUNITY

UoBRISTOL EVENTS

Applied social care research using routine data: potential and challenges
10 December 2020, 10.00 - 15.00, online

How Cryo-EM Revealed the Structure of Human Transcription Factor IIH
10 December 2020, 10.00 - 11.00, Dr Basil Greber (ICR, London), online

Reconstructing regulatory principles of stem cell niches and cell fate dynamics using organoids
11 December 2020, 12.00 - 13.00, Dr Leah Biggs (University of Helsinki), online

Womxn in Science
17 December 2020, 13.00 - 14.00, Amber Roguski (PhD Student at the School of Physiology, Pharmacology and Neuroscience, University of Bristol) & Dr Leanne Melbourne, Lecturer in Marine Paleontology (School of Earth Sciences, University of Bristol), online

Precision Neuroinflammation
22 January 2021, 13.00 - 14.00, Prof David Hunt (University of Edinburgh), online

A machine learning approach to predict the availability of stem cell donors / Self-tracking fertility and monitoring pregnancy; new thinking on bodies and technologies in digital reproductive health
28 January 2021, 12.00 - 13.15, Prof Xiaojun Wang (Management) and Dr Maria Fannin (Geographical Sciences), online

OTHER EVENTS

Defence is the Best Attack: Immuno-Oncology Breakthroughs
16 - 17 February 2021, online

114th Annual Meeting of the Association of Physicians of Great Britain & Ireland
15 - 16 March 2021, Plenary: Prof Paul Workman (Chief Executive Institute of Cancer Research), Oxford

Infection and Immunity Early Career Researchers' symposium 2021
13 January 2021, 9:30 - 13:00, online

This event will comprise oral and poster presentations from ECRs And two keynote talks. A fantastic opportunity for Early Career Researchers, junior and senior staff to hear about all the different research taking place across the wider Infection and Immunity community.

Keynotes:

- Professor Deirdre Hollingsworth, Senior Group Leader, Big Data Institute, University of Oxford
- Professor Christopher Dye, FRS, Visiting Professor of Zoology, University of Oxford

Go to the event webpage to view the programme and for further information
REGISTER HERE

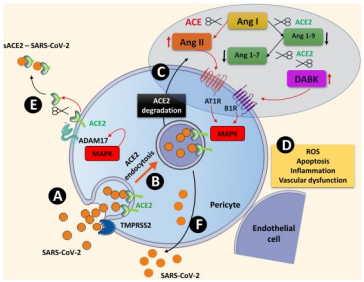
NEWS

Cardiovascular complications of COVID-19

Prof Paolo Madeddu (Bristol Medical School: Translational Health Sciences, based at Bristol Royal Infirmary) wrote an editorial in *Vascular Biology* which explores the mechanisms of COVID-19 infection with particular focus on interactions between the virus and cell surface angiotensin converting enzyme 2 (ACE2) receptors.

Researchers around the world are racing to learn how the virus behaves and which health factors put people most at risk. The crucial question they are trying to work out is whether there may be some specific mechanism in cells of the lung and heart that could mean some people suffer respiratory complications and heart attacks more than others. While the increased frailty of cardiovascular patients may account for the susceptibility to infection and organ damage, the reason why COVID-19 causes cardiovascular complications is less obvious.

The team secured funding from the Elizabeth Blackwell Institute COVID-19 rapid response call (COVID-19 S-protein binding to ACE2 negatively impacts on human cardiac pericyte function – a mechanism potentially involved in cardiac and systemic microvascular failure) and have a pending application to the British Heart Foundation to support further research on this topic.



New avenues for infection imaging

Dr Annela Seddon (Physics) won an Engineering and Physical Sciences Research Council (EPSRC) Exploratory Impact Acceleration Award to develop protein coated magnetic particles for use in imaging. Alongside co-investigators Dr Jim Spencer, Dr Sara Correia Carreira (both Cellular and Molecular Medicine) and Prof Walther Schwarzacher (Physics), the £15,700 award will help develop their magnetic particle technology with industry partners, Magnetic Insight. These protein-based nanoparticles have previously been used to bind to stem cells and capture and concentrate bacteria and Drs Seddon and Spencer with Prof Carmen Galan (Chemistry) were recently awarded EPSRC Global Challenge Research Fund funding to work with KEMRI, Nairobi, to use this methodology for the detection of tuberculosis. This new collaboration with Magnetic Insight will allow the team to explore the use of these particles for imaging.

magnetic INSIGHT

Magnetic Insight are the world leaders in magnetic particle imaging technology, which allows *in vitro* and *in vivo* clinical imaging with exceptional detail. By working together to adapt the particles developed by Dr Correia Carreira for use as novel tracers it is hoped that new avenues for imaging in infection can be explored.

Using AI to identify sick livestock

The welfare of livestock could be improved thanks to a new research project that will use novel artificial intelligence methods combined with behavioural analytics to provide rapid and reliable insights to animal health for farmers across the UK. The research and commercial feasibility program, co-funded by Innovate UK will be led by the Quant Foundry (QF) in collaboration with the Bristol Veterinary School and Agri-EPI Centre. The project aims to provide a new cost-effective solution for farmers and vets to identify illness in livestock providing not only cost savings but also a means to reduce the impact of farming on the environment.

Since its inception in 2018 Quant Foundry has specialised in developing Innovative solutions in artificial intelligence and finance.

Agri-EPI Centre is accelerating the adoption of precision agriculture and engineering technologies to boost productivity across the whole agri-food chain. It does this by exploring how to optimise performance of the highly complex agricultural production and processing systems.

Antivenom to reduce 100,000 fatalities a year

A new approach of treating life-threatening snake bites responsible for around 100,000 deaths globally each year is being pioneered by an international research consortium led by University of Bristol scientists. The EU-funded ADDovenom study, involving teams in the UK, France, Belgium and Portugal, set out to create a new type of antivenom treatment to neutralise and eliminate venom toxins from the bloodstream with more efficacy, safety and affordability than what is available today.

Declared by the WHO last year as one of the most neglected tropical diseases, snakebites can be life-threatening when venom toxins are injected and enter the bloodstream attacking the blood circulatory system or nervous system. In particular, in poor and remote tropical regions where immediate access to specialised medical care is limited, venomous snake bites cause between 81,000 and 138,000 deaths and 400,000 disabilities in surviving victims each year.

The project, led by Prof Christiane Berger-Schaffitzel Biochemistry), will use the innovative ADDomer© platform to design an antivenom virus-like particle (VLP) therapy of unparalleled clinical effectiveness. Importantly, unlike antivenom which must be refrigerated, this new therapy is being developed so it can be stored at room temperature. Rapid treatment can significantly improve a victim's chances of survival, this new advance would allow medication to be stored at local sites across the remote farming communities of sub-Saharan Africa where the disease is most prevalent.

E ocellatus (saw scaled viper) snake
© Ray Wilson

Bristol study completes COVID-19 antibody testing

Children of the 90s has published results from a study testing almost 5,000 participants for COVID-19 antibodies.

Whilst a positive result does not indicate immunity to the virus, the results are an important step in helping scientists to answer vital questions about who is affected, how it spreads through the community, and possible immune responses. Key findings were:

- 4.3 per cent of participants reported a positive result on their antibody test (206 participants)
- Almost twice as many young people reported a COVID-19 infection than those of their parents' generation - 5.9 per cent of young people and 3.1 per cent of their parents age reported a positive antibody response
- Of those who tested positive, around a quarter were asymptomatic

The research will now form part of a national collaboration with the UK Coronavirus Immunology Consortium (UK-CIC), which is led by Prof Paul Moss at the University of Birmingham. Three hundred Children of the 90s participants are being invited to take part in the ongoing study over the next 12 months, which will offer a unique insight into how people respond to the virus and the condition known as 'long Covid'.

Funding successes: Part 1

The **Medical Research Council** awarded Dr Andrew Davidson and co-Investigator Dr David Morgan (both Cellular and Molecular Medicine) £204,323 for *The production and application of SARS-CoV-2 reverse genetic systems to facilitate vaccine development and biosafe drug discovery platforms*.

Prof Ian Collinson and co-Investigator Dr Will Allen (both Biochemistry) received £480,103 from the **Biotechnology and Biological Sciences Research Council** (BBSRC) for *Hijacking the Sec machinery in bacterial warfare*.

Also from the **BBSRC** £514,014 was awarded to Prof Mark Dillingham and co-Investigator Dr Anna Chambers (both Biochemistry) for *Structure:Function Correlation in the Human DNA Repair Factor CtIP*.

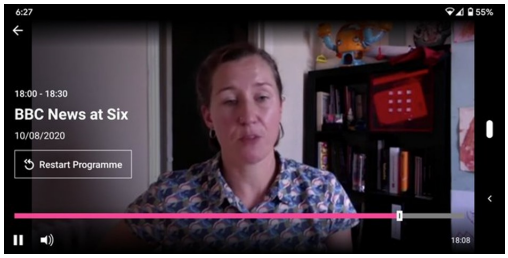
Dr Julian Hamilton-Shield (Bristol Medical School: Translational Health Sciences) was awarded £69,928 from **Innovate UK** for *Transforming the management of Urea Cycle Disorders using non-invasive breath ammonia monitoring.*

Determining the role of Wnt signalling & IGFBP6 in enhanced atherosclerosis risk in periodontal patients: biomarker & therapeutic potential evaluation has been supported by a £207,504 grant from the **Medical Research Council**. The project, led by Prof Sarah George (Bristol Medical School: Translational Health Sciences), will start in Apr 21 and last 2.5 years.

Dr Ashley Hammond (Bristol Medical School: Population Health Sciences) received £57,539 from the **British Medical Association** for *Emerging nitrofurantoin resistance in England*.

External engagements: Part 1

Dr Ellen Brooks-Pollock (Bristol Veterinary School) was interviewed by the BBC on their news programme aired 10 August 2020 to discuss the UK's coronavirus R rate.



Representatives of Bristol Health Partners Sexual Health Improvement Programme Health Integration Team (SHIP HIT) attended the HIV Evidence Commission on 9 March 2020. The commission has been convened by the government to collect evidence and make clear recommendations about how to end the HIV epidemic in England within the next decade. The event was fully subscribed, with community members, people living with HIV, researchers, clinicians, politicians and support workers attending. Roundtable discussions contributed lively debate, and representatives of Bristol Fast Track Cities (see front page story) and SHIP contributed evidence and feedback. After the hearing commissioners visited a local sexual health clinic, a healthcare centre for refugees and a support centre for people living with HIV. Updates to the work of the commission can be found online.

Rapid antibiotic susceptibility testing

Dr Massimo Antognozzi (Physics), Prof Matthew Avison (Cellular and Molecular Medicine) and industrial partner Vitamica Ltd have been awarded an Engineering and Physical Sciences Research Council Impact Acceleration Award Knowledge Transfer Secondment (KTS) of £31,744. The funds will allow the team to explore a new approach to combine their current Sub-Cellular Fluctuations Imaging (SCFI) technique with bioprinting technology. SCFI enables real-time imaging of bacteria when exposed to antibiotics. However, this method requires an incubation step to treat bacteria with antibiotics which takes approximately two hours. With bioprinting technology, an inkjet-based deposition method can accurately print an array of bacteria-containing droplets on a glass surface and, using the same technique, different antibiotic droplets can be rapidly dispensed onto the micro-printed bacteria.

In addition to the reduced testing time, the method of micro-printing bacteria and antibiotics will greatly simplify the test through automation, resulting in a more attractive diagnostic technology. These improvements are all necessary steps in the journey of taking the technology towards a viable diagnostic tool suitable for near-patient clinical use and greatly reduce the required time for an antimicrobial susceptibility test (AST) from 2 hours to under 20 minutes, making it more suitable for the management of urinary tract infections (UTI) in primary care settings. The 6-month project started on 1 September and Witek Szeremeta, a final year PhD student (Physics) will join the team as a postdoctoral researcher.

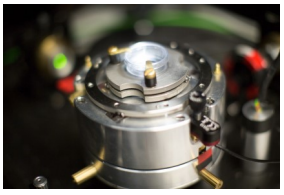


Image: Innovative SCFI microscope © Dr Charlotte Bermingham

Funding success: Part 2

Prof Kathleen Gillespie (Bristol Medical School: Translational Health Sciences) was awarded £18,000 from the **Diabetes Research and Wellness Foundation** for *Does a leaky gut increase risk of diabetes in children with Down's syndrome?* The project will run from Jul 20 for one year.

Dr Neelam Hassan (Bristol Medical School: Translational Health Sciences) received a £300,285 two and a half year fellowship from the **Medical Research Council** to pursue *Identification of Novel Drug Targets for Osteoporosis through Characterisation of the Genetic Basis of High Bone Mass*.

A one-year project to be undertaken by Dr Abigail Lay (Bristol Medical School: Translational Health Sciences) on *Exploring cell-specific, epigenome-wide DNA methylation changes in diabetic kidney disease* received £9,992 from the **Society for Endocrinology.**

The **Elizabeth Blackwell Institute** awarded Prof Eric Herring (Sociology, Politics and International Studies) £20,000 for *COVID-19 response and sustainable development in Somalia/Somaliland: Phase 2*.

Prof Adrian Mulholland (Chemistry) was awarded £24,736 from the **British Society for Antimicrobial Chemotherapy** for *A drug repurposing pipeline for COVID-19*.

Prof Alastair Poole (Physiology, Pharmacology & Neuroscience) was awarded £8,000 from **Above and Beyond** for *Research into underlying thrombosis in severe COVID-19 cases*. The project will run from May 20 for one year.

Quality of Life assessment of cats with joint disease

Anna Garvey (PhD student, Bristol Veterinary School) and Dr Evelyn Maniaki (Zoetis Feline Scholar, Langford Vets) are involved in the Feline Activity Study. Feline degenerative joint disease (DJD) has an insidious onset and can lead to impaired mobility and pain. Prevalence estimates range from 60% in cats of all ages, reaching 91% in geriatric cats. Being able to detect changes early in its development will allow veterinarians and owners to adopt a preventative multimodal approach and possibly delay or even reverse disease progression. This blinded, case-control study aimed to compare the activity profiles and quality of life (QoL) of cats with and without mobility changes that may indicate joint disease. Participating cats were required to be at least 6-years-old, live indoors or have restricted outdoor access, and have no underlying medical conditions or receive medications affecting their mobility.

Cats in the 'control' group had no mobility impairment, whereas 'Case' group cats had signs of early mobility impairment as assessed by their owners. The study concluded that both Feline Musculoskeletal Pain Index (FMPI) questionnaires and orthopaedic examination were able to differentiate cats with early owner-reported signs of impaired mobility from healthy cats and can thus be used for the timely diagnosis of degenerative joint disease (DJD). Evelyn presented a poster on the research at the Feline Medicine International Feline Congress in August 2020 and further publications are in progress.

Can the past inform the present?

Dr Barbara Caddick (Bristol Medical School) was awarded an EBI Medical Humanities Research Strand grant for *Can the past inform the present? Exploring attitudes and approaches to the management of common infections*. The study seeks aims to better understand the extent to which the historical management of common infections informs and explains current practice. Wholesale antibiotic prescription, since Alexander Fleming's 1928 discovery of penicillin, which entered popular consumption in the 1940s, has left a legacy on patient expectation in which an antibiotic prescription is viewed as the optimal outcome of a visit to the GP, whether the medication is required or not. Hence reducing antibiotic prescribing in primary care is a key part of the current antimicrobial resistance agenda. To understand how healthcare professionals managed and treated common infections and patient experience, the cluster will carry out a scoping review of archival and museum collections as well as historical and primary care literature. With relevant professional stakeholders and community groups, the cluster will explore the experience of the pre- and early antibiotic era in primary care, and develop a larger programme of work. The proposed pursue will develop a novel interdisciplinary methodology for data collection in order to stimulate discussion of past infection management, and to prompt conversations about how infections are managed today.

Childhood abuse and cardiovascular disease

Individuals who have suffered maltreatment in childhood have a higher risk of cardiovascular disease (CVD). The study, which analysed the medical records of 89,071 women and 68,240 men aged 40-69 years and different types of CVD, such as heart attack and stroke, found that women who have suffered physical abuse as a child have a 50% higher risk of having a heart attack, while men have a 20% increase. Physical, sexual and emotional abuse, and neglect are consistently associated with cardiovascular disease (CVD). However, few studies have used medical records, that are more reliable than self-report, and investigated different types of CVD, such as heart attack and stroke separately.

Using data from UK Biobank researchers found that associations of maltreatment with the different types of CVD (any CVD, hypertensive disease, ischemic heart disease and cerebrovascular disease) were similar across all the types of childhood maltreatment, however stronger associations were observed for ischemic heart disease (heart attack) and cerebrovascular disease (stroke).

This study is particularly important as it will help clinicians identify individuals who might benefit from early screening and interventions to prevent cardiovascular consequences.

Gonçalves Soares *et al*. (2020). Sex differences in the association between childhood maltreatment and cardiovascular disease. *Heart*.

Funding successes: Part 3

To Prof Andrew Dick (Bristol Medical School: Translational Health Sciences), £903,005 from the **National Institute for Health Research** Health Technology Assessment board for *ASTUTE: Adalimumab vs placebo as add-on to Standard Therapy for autoimmune Uveitis: Tolerability, Effectiveness and cost-effectiveness*.

Diabetes UK awarded Prof Kathleen Gillespie (Bristol Medical School: Translational Health Sciences) £98,865 for *COVID-19 antibody screening in families with type 1 diabetes: infection rate and effects on diabetes*.

Dr David Matthews (Cellular and Molecular Medicine) was awarded £100,000 for *Constructing a recombinant 2019 -NCOV* from **Public Health England**.

Prof Ian Collinson (Biochemistry) was awarded £4,961 from the **Elizabeth Blackwell Institute** for *Characterisation of the dynamic interaction of COVID19 spike protein with the human receptor ACE2*.

The **Medical Research Council** awarded £404,309 to Dr Becky Foster (Bristol Medical School: Translational Health Sciences) for *A global approach to prevent secondary microvessel complications in diabetes*.

Prof Adam Finn (Bristol Medical School: Translational Health Sciences) received £58,513 from Bristol's **The Grand Appeal** for *LOnGItudinal Study of COVID-19: Symptoms, Virology & Immunity (LOGIC Study)*.

Dr Ash Toye (Biochemistry) was awarded a **Medical Research Council** project grant of £576,000 for *Dissecting the role of host receptor context and cytoskeletal disruption in malaria parasite invasion*.

COVID-19 transmission from anaesthesia procedures

Since the outset of the COVID -19 pandemic, there has been much debate about the danger to hospital staff from anaesthetic procedures. Concerns include that placing a tube in the patient's airway (intubation) before surgery or removing it at the end (extubation) may produce a fine mist of small particles and spread the COVID-19 virus to nearby staff. This risk was judged so high that the procedures are classified 'aerosol generating procedures' (AGPs) for which respirators and high level personal protective equipment (PPE) are worn routinely, and after which surgery stops while the operating room is cleared of aerosols and special cleaning is undertaken. These requirements have dramatically slowed surgery and contributed to enormous NHS waiting lists for surgery, and similar problems in hospitals worldwide. Despite the presumed risk, no direct measurements of aerosols have ever been made during anaesthetic care in a hospital. New research shows that these procedures may only produce a fraction of the aerosols previously thought, much less than would be produced during a single regular cough.

Brown J *et al*. (2020). A quantitative evaluation of aerosol generation during tracheal intubation and extubation. *Anaesthesia*.

Monitoring for disease detection in foals

Drs Laszlo Talas, John Fennell and Sarah Smith (Bristol Veterinary School) have secured £14,769 in funding from the Engineering and Physical Sciences Research Council Impact Acceleration Account to install sensory platforms equipped with small thermal cameras to monitor foals for early disease detection. Foals are susceptible to respiratory infections (e.g. *Rhodococcus equi* bacteria) resulting in fever which can be detected by thermal cameras. Early detection can help to reduce antimicrobials required to tackle disease, mitigate risk of infecting other horses and increase animal welfare. The work is being carried out at a racehorse stud near Newmarket in collaboration with Rossdales Veterinary Surgeons.

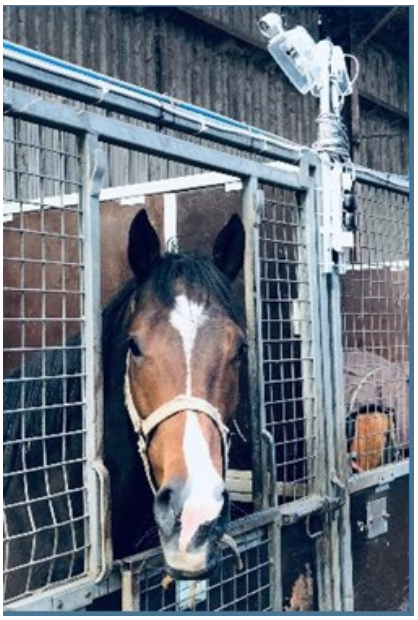
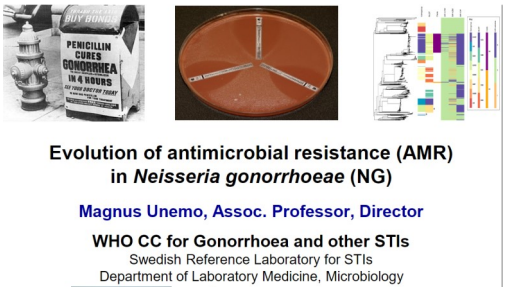


Image credit: Laszlo Talas

The threat of AMR to sexually transmitted infections control

Anti-microbial resistance (AMR) in sexually transmitted infections (STIs) is a major public health threat, with *Neisseria gonorrhoeae* being designated as a "high priority antibiotic resistant pathogen" by the World Health Organization (WHO). In the United Kingdom, the O'Neill review recommended that no antibiotics should be prescribed before an appropriate diagnostic test result is available in high-income countries. This is ambitious for the UK, let alone for most low- and middle-income countries where syndromic management is commonplace. In the absence of new diagnostics, antimicrobials and vaccines, combined with limited AMR surveillance data to inform national and global STI programming, there will be serious global sexual and reproductive health consequences.

The Sexual Health Improvement Programme Health Integration Team co-hosted *From global to local: addressing the threat of AMR to sexually transmitted infections control* with the London School of Hygiene & Tropical Medicine's (LSHTM) STIs Research Interest Group (STIRIG), LSHTM's AMR Centre, Public Health England and the World Health Organization on 9-10 January 2020. The two-day conference brought together experts working at the interface of antimicrobial resistance (AMR) and STI research, policy and practice. Themes covered included surveillance, treatment guidelines, new treatment initiatives, new diagnostic initiatives, antibiotic stewardship, and vaccines.



Evolution of antimicrobial resistance (AMR) in *Neisseria gonorrhoeae* (NG)

Magnus Unemo, Assoc. Professor, Director

WHO CC for Gonorrhoea and other STIs
Swedish Reference Laboratory for STIs
Department of Laboratory Medicine, Microbiology

Presentations can be viewed online

How COVID-19 affects people with type 1 diabetes

JDRF, the world's leading type 1 diabetes charity, is partnering with Diabetes UK to find out how the coronavirus pandemic is affecting people with type 1 diabetes. Scientists don't know how many people with type 1 have had coronavirus and recovered, obscuring the full impact that the virus is having on the UK's 400,000 people with type 1.

A funding award to Prof Kathleen Gillespie (Bristol Medical School: Translational Health Sciences) will allow her team to work with a research group in Milan that has developed a test that can detect coronavirus antibodies in a small sample of blood – small enough to be collected via post. By offering this test to around 5,000 people participating in ongoing studies of type 1 diabetes (the Bart's Oxford study and UK TrialNet), Prof Gillespie will be able to estimate how many people contracted coronavirus. She will also ask participants to share their experiences of COVID-19 and lockdown – including whether they have been shielding, if they have had any COVID-19 symptoms, and how their blood glucose levels have reacted.

With this information, the will be able to see how the type 1 diabetes community has been hit by COVID-19.

Watch the video

Funding successes: Part 4

Prof Paul Martin and Dr Helen Weavers (Biochemistry), alongside Sussan Nourshargh at Queen Mary University of London, were awarded £1.65M for a **Medical Research Council** programme grant entitled *Screening for, and characterisation of, novel immune cell extravasation genes in* Drosophila*, mice and man*.

Helen Weavers was also successful with her application for a National Centre for the Replacement, Refinement & Reduction of Animals in Research (**NC3Rs**) PhD studentship. The project, *A new in vivo Drosophila model of chronic inflammatory lung disease*, is in collaboration with David Sheppard (Physiology, Pharmacology and Neuroscience) and Eshwar Mahenthiralingam (Cardiff).

Dr Howard Thom (Bristol Medical School: Population Health Sciences) was awarded funding from the **Elizabeth Blackwell Institute** to investigate the cost-effectiveness of the UK public health response to COVID-19. This is in collaboration with Will Hollingworth (Prof of Health Economics) and infectious disease modellers Josephine Walker and Peter Vickerman. They intend to compare reported outcomes to modelled "no mitigation" strategies and estimate the healthcare costs and benefits that were saved by government action. They will compare across European countries and draw conclusions on the success, or otherwise, of the UK's approach.

South African antibiotics "hub"

An international research collaboration has received £1.9m from the Newton Fund and the South African Medical Research Council to discover novel compounds from natural sources that have the potential to be developed into new antimicrobial drugs. The project will bring together scientists from the UK and South Africa to establish an Antibiotic Accelerator Hub to significantly boost capacity for discovery of new antibiotics. The focus will be on unexplored, biodiversity-rich habitats, including deep sea and polar environments, offering real potential for new 'natural product'-derived drugs. Alongside medical benefits, the project aims to support future growth in the bioeconomies of both countries, ensuring fair and equitable sharing of the benefits of any new drugs arising from the research with communities from low and middle-income countries.

Professor in Medical Microbiology Mat Upton at the University of Plymouth is leading the project from the UK alongside partners at the Universities of Bristol, Leeds, Aberdeen and St Andrews. The £1.9m includes £412,000 for a seed project, which will explore the diversity of antimicrobial peptides in South Africa to identify potential new antibiotics.

Read more

Bats' superpowers revealed

The raw genetic material that codes for bats' unique adaptations and superpowers such as the ability to fly, to use sound to move effortlessly in complete darkness, to survive and tolerate deadly diseases, to resist ageing and cancer - has been fully revealed. In order to uncover bats' unique traits, the Bat1K consortium led by researchers at University College Dublin, the Max Planck Institutes of Molecular Cell Biology and Genetics (Dresden), and the Max Planck Institute for Psycholinguistics (Nijmegen), generated and analysed six highly accurate bat genomes that are ten times more complete than any bat genome published to date.

To generate these genomes, the team used the newest technologies to sequence the bats' DNA, and generated new methods to assemble these pieces into the correct order and to identify the genes present.

Given these … genomes, we can now better understand how bats tolerate viruses, slow down ageing, and have evolved flight and echolocation. They are the tools needed to identify the genetic solutions evolved in bats that ultimately could be harnessed to alleviate human ageing and disease.
Emma Teeling, co-Founding Director, Bat1K

The team, which included Prof Gareth Jones (Biological Sciences), systematically searched for gene differences between bats and other mammals, identifying regions that have evolved differently in bats and the loss and gain of genes that may drive bats' unique traits.

Jebb *et al*. (2020). Six reference-quality genomes reveal evolution of bat adaptations. *Nature.*

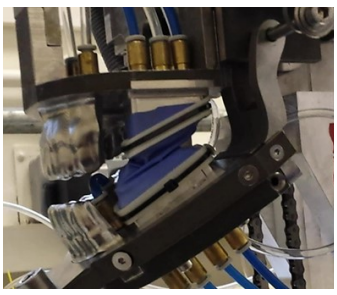
Funding successes: Part 5

The AERosolisation And Transmission Of SARS-CoV-2 in Healthcare Settings (AERATOR) study, led by North Bristol NHS Trust (NBT) together with the University of Bristol and University Hospitals Bristol and Weston NHS Foundation Trust (UHBW), will rapidly study the amount and type of aerosol generated when medical procedures are performed, and how infectious this aerosol is. The project, led by Prof Nick Maskell, Professor of Respiratory Medicine at NBT, was supported by a grant award of £433,000 from the National Institute for Health Research (NIHR) and UK Research and Innovation (UKRI) COVID-19 rapid response initiative. The 12-month study will run until August 2021; initial results have already been published (see item p10). Read more

Dr Rebecca Kandiyali (Bristol Medical School: Population Health Sciences) received an award from the the National Institute for Health Research Research for Patient Benefit grant for FLASH (*Implementation of flash glucose monitoring in four paediatric diabetes clinics – before and after study to produce real world evidence of patient benefit*). Flash monitoring is a relatively new method of glucose monitoring that offers an alternative to painful finger prick testing. In 2019 NHS England made flash monitors available on prescription to all eligible children and adults in order to remove the postcode lottery. Evidence on clinical outcomes and cost-effectiveness is limited. This study aims to provide NHS policy makers with information on the resource implications and costs associated with the introduction of the new technology; it will also provide evidence on the effectiveness, safety and perceived patient benefit of flash monitors.

A future of medicated chewing gum?

Medicated chewing gum is a new and advanced drug delivery method but there is no gold standard for testing drug release *in vitro*. A team has built a chewing robot with built-in humanoid jaws which could provide opportunities for pharmaceutical companies to develop the gum more easily. The project's aim was to confirm whether a humanoid chewing robot could be used to assess the efficacy of medicated chewing gum. It is capable of closely replicating the human chewing motion in a closed environment and features artificial saliva which allows the release of xylitol in the gum to be measured. The team compared the amount of xylitol remaining in the gum between the chewing robot and human participants. Results found that the robot demonstrated a similar release rate of xylitol as human participants, with the greatest release of xylitol occurring in the first five minutes. After 20 minutes of chewing only a low amount of xylitol remained in the gum bolus, irrespective of the chewing method used. The robot gives pharmaceutical companies the opportunity to investigate medicated chewing gum with reduced patient exposure and at lower cost.



Alemzadeh K *et al*. (2020). Development of a chewing robot.... *IEEE Transactions on Biomedical Engineering*.

UTI diagnoses since the advent of COVID-19

Dr Ashley Hammond (Bristol Medical School: Population Health Sciences) wrote an invited blog article for the British Society for Antimicrobial Chemotherapy (BSAC) on the disruption the pandemic has had on primary care in terms of the diagnosis of urinary tract infections (UTIs). She found that UTI diagnoses (laboratory culture of urine samples) have plummeted since the pandemic started owing to patients not being assessed face-to-face (to avoid the COVID-19 risk). UTI infections can cause serious infections such as sepsis, particularly in the elderly and frail. Troubling trends have emerged during this time, including an increase in broad spectrum antibiotic prescribing in the over 80s, cases of non-COVID-19 deaths increasing and a decline in sepsis hospital admissions, raising suspicion that sepsis cases were being missed. Ashley suggests that continuing to request urine samples from patients is important as this can prove invaluable in the management of complicated UTIs, particularly in our elderly population who could be more likely to suffer serious consequences of inappropriate infection management. Read the blog which was published ahead of a BSAC webinar on this subject on 16 Nov 20 given by Dr Hammond, Prof Alastair Hay (Bristol Medical School) and Prof Peter Wilson (UCL) .

First steps toward a cure for HIV

Researchers have developed a way to pull HIV out of the latent reservoir making the virus visible to the immune system and providing the potential to be killed by treatment. Part of what has made HIV infection so difficult to cure is its ability to hide in a dormant state inside cells, making it invisible to both the immune system and antiretroviral drugs. This hiding virus is known as the 'latent reservoir'. Treatment with combined anti-HIV drugs can bring down virus levels in the body so that it cannot be measured by conventional tests and a person lives disease free; however, if an individual ever stops their life-long therapy, some of the virus will come out of hiding and rapidly re-emerge, while some of it stays dormant in the cells. The aim of the study is to get it all out of dormancy with a targeted punch, so the remaining virus can be killed.

The team, from Western University, in collaboration with Case Western Reserve University and Imperial College London, has shown for the first time that their formulation, called Activator Vector (ACTVEC), was successful in targeting the latent HIV reservoir. By reactivating this dormant HIV, they bring it out of hiding so it can be killed by antiretroviral treatment. Dr Jamie Mann was involved in the study while at Western (now Lecturer in Vaccinology and Immunotherapy in Bristol Veterinary School).

Antiretroviral therapies work by disrupting various aspects of the replication cycle of HIV. By reactivating the virus, we can either inhibit it through antiretroviral therapy or it can be targeted by the body's immune response. The next step will be to determine if they can activate the body's immune cells to kill it.

Mann J *et al*. (2020). A targeted reactivation of latent HIV-1 using an activator vector in 1 patient samples from acute infection. *EBioMedicine*.

Accuracy of rapid COVID test in doubt

The accuracy of a rapid finger-prick antibody test for SARS-CoV-2, the virus responsible for Covid-19 infection, may be considerably lower than previously suggested. Results of a study suggest that if 10% of people given the test had previously been infected, around one in five positive test results would be incorrect. The conclusions contrast with an earlier study suggesting that the test gives no false positive results. The findings suggest the test can deliver a sufficient degree of accuracy for surveillance studies of the population, but laboratory confirmation of positive results is likely to be needed if these tests are to be used to provide evidence of protection from the virus.

The AbC-19™ Rapid Test uses a drop of blood to see if it's likely that someone has previously been infected with SARS-CoV-2 with results in 20 minutes, without the need to go to a laboratory. The team tested blood samples in a laboratory from 2,847 key workers in England in June 2020. Following analysis, researchers estimated its specificity (ability to correctly identify a true negative sample) to be 97.9%, meaning that 2.1% of people who did not have a previous SARS-Cov-2 infection incorrectly tested positive. They estimated the sensitivity of the AbC-19 test (ability to correctly identify a true positive sample) to be 92.5%based on PCR confirmed cases but considerably lower (84.7%) in people with unknown previous infection status prior to antibody testing.

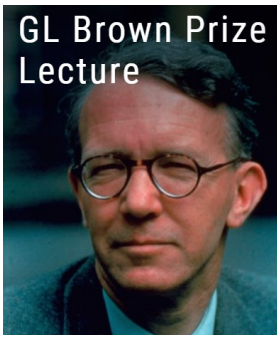
Mulchandani R *et al*. (2020). Accuracy of UK Rapid Test Consortium (UK-RTC) "AbC-19 Rapid Test" for detection of previous SARS-CoV-2 infection in key workers: test accuracy study. *BMJ*.

External engagements: Part 2 and Awards

Prof Adam Finn (Cellular and Molecular Medicine) took part in the Radio 4 Today programme on 10 November 2020 during which he was interviewed about the new Pfizer COVID-19 vaccine (starts 1:09:26).

The documentary *Lockdown 1.0 - Following the Science?* was aired on BBC TWO on 19 November 2020, find it on BBC iPlayer (registration required). The documentary hears from a number of scientists including Dr David Matthews (Cellular and Molecular Medicine) and Prof Gabriel Scally (Bristol Medical School: Population Health Sciences) and tells the extraordinary story of what really happened behind the scenes in the run up to the first lockdown.

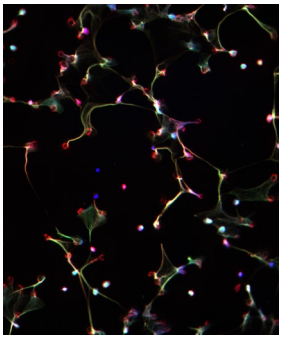
Prof David Sheppard (Physiology, Pharmacology and Neuroscience) has been awarded the Physiological Society's GL Brown Prize Lecture in recognition of his outstanding contribution to physiology though his research on the cystic fibrosis transmembrane conductance regulator (CFTR), the epithelial anion channel defective in the genetic disease cystic fibrosis. The GL Brown Prize Lecture series is aimed at an early career audience to stimulate an interest in physiology. Departments around the UK can invite the G.L. Brown Lecturer to their institutions to showcase their research.



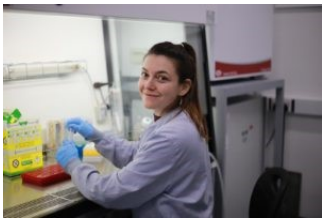
British Society for Cell Biology image competition

The British Society for Cell Biology runs an annual image competition to showcase the remarkable developments in microscope and staining tools and the wide range of cellular research being undertaken by researchers across the country.

This year PhD student Drinalda Cela won third prize. Drinalda began her research project two years ago under Dr Borko Amulic, aiming to unravel the intracellular signalling that drives neutrophils into neutrophil extracellular trap (NET) release. NETs were initially described as an antimicrobial response, however nowadays NETs are also associated with multiple inflammatory conditions.



Her winning entry is a fluorescence microscopy image showing NETs, produced in response to haem and TNF stimulation. NETs are composed of DNA (in blue), granule proteins (such as neutrophil elastase, in red) and histones (in green). When neutrophils die via NETosis they release these web-like structures, which trap microbes and stimulate additional immune responses.



Back to School Study: report 1

COVID-19 prompted the UK government to introduce lockdown measures that rapidly changed the way education was delivered. Most young people had to learn from home, with schools only remaining physically open for vulnerable pupils and children of key workers. Local councils and schools reopened schools fully from September 2020. This posed a challenge due to the need for social distancing to prevent local COVID-19 outbreaks. These challenges had to be balanced against the benefits for young people of returning to school, such as resuming their education and seeing their friends. To stop the spread of the virus, schools have put in place a range of measures including hand-washing campaigns, staggered break times and test and trace schemes.
To understand how schools can give young people, parents and teachers the best support, the Back to School study looked at how people in Bristol feel and their concerns about returning to secondary school.

Their interim report, published in August 2020, found that young people struggled with the lack of socialising and teacher interaction and sometimes minimal teacher feedback. Staff were concerned that unequal access to technology and space exacerbated socioeconomic divides in educational attainment. Families were keen to return unless they had vulnerable family members. Some young people were concerned about returning to socialising after lockdown, and the effectiveness of their home learning. There was particular concern about young people with additional needs or who struggle with structured learning/have shorter attention spans, and exam year groups. It was recognised that social distancing would be particularly difficult at lunch/break times, arrival/leaving school, and in active lessons such as PE.

Handgrip strength to gauge risk of type 2 diabetes

A simple test such as the strength of your handgrip could be used as a quick, low-cost screening tool to help healthcare professionals identify patients at risk of type 2 diabetes. In new research, scientists at the Universities of Bristol and Eastern Finland measured the muscular handgrip strength of 776 men and women without a history of diabetes over a 20-year period.

In a recent literature review the team demonstrated that people with higher values of handgrip strength had a 27% reduced risk of developing type 2 diabetes. However, while findings suggested handgrip strength could potentially be used to predict type 2 diabetes, the hypothesis needed to be tested.

In this latest study, the team measured the power of the cohort's hand grip strength using a handgrip dynamometer (pictured). An analysis of the results demonstrated that the risk of type 2 diabetes was reduced by about 50% for every unit increase in handgrip strength value. This association persisted even after taking into account several established factors that can affect type 2 diabetes such as age, family history of diabetes, physical activity, smoking, hypertension, waist circumference and fasting plasma glucose. When information on handgrip strength was added, the prediction of type 2 diabetes improved further.

Kunutsor SK *et al.* (2020). Handgrip strength improves prediction of type 2 diabetes: a prospective cohort study. *Annals of Medicine*.

Self-sampling for STIs and HIV could reduce waiting times

Enabling asymptomatic patients to self-sample for sexually transmitted infections (STIs) and human immunodeficiency virus (HIV) could reduce waiting times at sexual health clinics. This finding could inform the redesign of sexual health services across the UK, at a time when demand for HIV and sexually transmitted infection testing is rising but local authority budgets for these services are shrinking.

The research team developed a discrete event simulation (DES) model to analyse the flow of patients within Bristol's Unity Sexual Health Services to find ways to improve their services. This identified bottlenecks in the consultation and treatment queues for walk-in patients. Unity introduced an online self-sampling service for STIs and HIV in June 2017. Modelling this new service alongside existing services showed that the average waiting time for all patients decreased to 88 minutes from 128 minutes. Self-sampling also reduced the cost of staff time for managing each patient to £72.64, compared to £88.74 under the same system but without self-sampling. The service, which Unity delivered in-house, has been well-received by patients and particularly useful for helping manage patients following lockdown as a result of the COVID-19 pandemic.

Mohuiddin S *et al*. (2020). Modelling patient flows and resource use within a sexual health clinic through discrete event simulation to inform service redesign. *BMJ Open*.

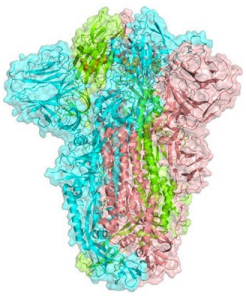
Singing no more risky than talking finds COVID-19 study

The performing arts has been badly affected during the pandemic with live musical performances cancelled as singing was identified as a potential "higher risk" activity. The research project, known as PERFORM (**P**articulat**E** **R**espiratory Matter to In**F**orm Guidance for the Safe Distancing of Perf**O**rm-e**R**s in a COVID-19 Pand**M**ic), looked at the amounts of aerosols and droplets (up to 20 µm diameter) generated by a large group of 25 professional performers completing a range of exercises including breathing, speaking, coughing, and singing. Carrying out measurements in an orthopaedic operating theatre, an environment of "zero aerosol background", allowed the team to unambiguously identify the aerosols produced from specific vocalisations. They found that there is a steep rise in aerosol mass with increase in the loudness of the singing and speaking, rising by as much as a factor of 20-30. However, singing does not produce very substantially more aerosol than speaking at a similar volume.

Gregson FKA *et al*. (preprint). Comparing the Respirable Aerosol Concentrations and Particle Size Distributions Generated by Singing, Speaking and Breathing. *ChemRxiv*.

Druggable pocket in SARS-CoV-2 could stop infection

A druggable pocket in the SARS-CoV-2 Spike protein that could be used to stop the virus from infecting human cells has been discovered by an international team of scientists led by the University of Bristol. SARS-CoV-2 is decorated by multiple copies of a glycoprotein, known as the 'Spike protein', which plays an essential role in viral infectivity. Spike binds to the human cell surface, allowing the virus to penetrate the cells and start replicating, causing widespread damage. In this ground-breaking study, the team, headed by Profs Christiane Schaffitzel (Biochemistry) and Imre Berger (Max Planck-Bristol Centre for Minimal Biology), used electron cryo-microscopy (cryo-EM) to analyse SARS-CoV-2 Spike at near atomic resolution. Enabled by Oracle high-performance cloud computing, a 3D structure of SARS CoV-2 Spike protein was generated allowing the researchers to peer deep inside the Spike identifying its molecular composition. Their analysis revealed the presence of a small molecule, linoleic acid (LA), buried in a tailor-made pocket within the Spike protein. LA is a free fatty acid, which is indispensable for many cellular functions; we maintain levels of LA in our bodies by absorption through our diets. LA plays a vital role in inflammation and immune modulation, which are both key elements of COVID-19 disease progression. The discovery provides the first direct link between LA, COVID-19 pathological manifestations and the virus itself. The question now is how to turn this new knowledge against the virus.



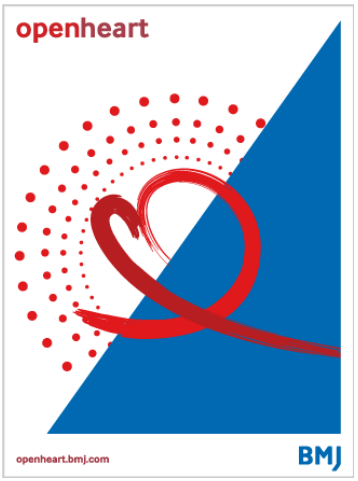
3D structure image of SARS CoV-2 Spike protein

Toelzer C *et al.* (2020). Free fatty acid binding pocket in the locked structure of SARS CoV-2 spike protein. *Science*.

Top 10 priorities for advanced heart failure research

Patients with advanced heart failure and their carers have collaborated with clinicians and researchers to identify a top 10 list of questions for advanced heart failure research. The project was led by researchers at the University of Bristol's Centre for Academic Primary Care. Heart failure is a common condition that affects 1-2% of the population in the UK each year and one in six people aged over 85, many of whom are frail and have multiple health conditions. Symptoms include breathlessness, tiredness and leg-swelling.

The right treatment approach is not always clear and guidelines often focus on those receiving treatment in hospital, even though the majority of people with heart failure are cared for at home or in the community.



The top 10 priorities for advanced heart failure research were developed with the support of the James Lind Alliance using their well-validated Priority Setting Partnership approach, and involved researchers from Bristol, Oxford, Lancaster, Birmingham and Cambridge. It is hoped that these research priorities will galvanise heart failure researchers and funders to focus on the questions that are most important to these groups.

Taylor CJ *et al*. (2020). Research priorities in advanced heart failure: James Lind alliance priority setting partnership. *Open Heart*.

Implications of COVID-19 for AMR in China

Prof Helen Lambert (Bristol Medical School: Population Health Sciences, pictured) and colleagues at Bristol and Imperial College London have been awarded in the region of $99,000 by the British Society for Antimicrobial Chemotherapy (BSAC) to work on a study entitled *Implications of COVID-19 for antimicrobial resistance (AMR) and antimicrobial stewardship in China and other LMIC settings*. This was one of 8 awards from a worldwide open call (with funds provided by Pfizer) for research grant applications in response to the current coronavirus (COVID-19) public health emergency. The call supported all aspects of COVID-19 research from all countries but with specific interest from researchers in low-to-middle-income (LMIC) countries, or applications that address aspects of COVID-19 in LMIC communities, or address the impact of COVID-19 on the antimicrobial resistance and antimicrobial stewardship agenda. As part of the application, the Elizabeth Blackwell Institute-funded Bristol AMR Research Strand has pledged a further £10k of institutional support to help with the study.

Corticosteroids reduce critical COVID deaths by 20%

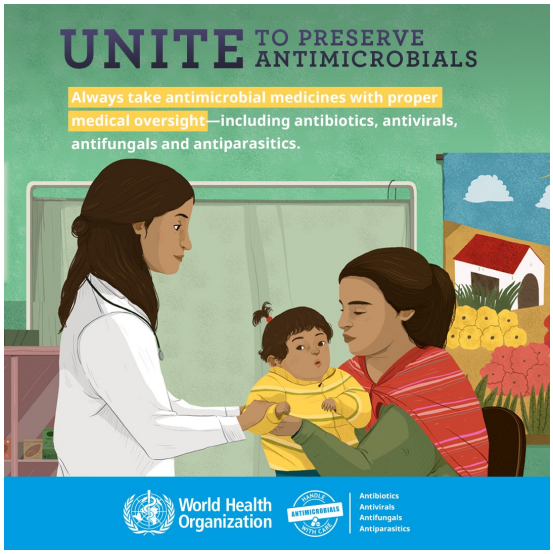
An international study co-ordinated by the World Health Organisation (WHO) looked at mortality among critically ill COVID-19 patients over a 28-day period after the start of treatment. They found that treatment with one of the three corticosteroids dexamethasone, hydrocortisone or methylprednisolone led to an estimated 20% reduction in the risk of death. This is equivalent to around 68% of patients surviving after treatment with corticosteroids, compared to around 60% surviving in the absence of corticosteroids. The dexamethasone finding is mainly based on results from the RECOVERY trial. Mortality results were consistent across the seven trials with two types of corticosteroid, dexamethasone and hydrocortisone, giving similar effects. Too few patients were included in trials of methylprednisolone to allow its effect to be estimated. There was evidence of benefit from corticosteroids regardless of whether patients were receiving invasive mechanical ventilation at the time they started treatment. The benefit appeared greater among patients who were not so sick that they needed medicine to support their blood pressure.

Read more / Watch the video
Sterne JAC *et al*. (2020). Association between administration of systemic corticosteroids and mortality among critically ill patients with COVID-19: a meta-analysis. *JAMA*.

WHO World Antibiotic Awareness week

Each November, the Word Health Organization's (WHO) World Antibiotic Awareness week (WAAW) aims to increase the global awareness of AMR and to encourage best practices among the general public, health workers and policy makers to stop the further emergence and spread of drug-resistant infections. As resistance grows to a wider range of drugs, the WHO have broadened the focus of their campaign from antibiotics to all antimicrobials. The theme for 2020 World Antimicrobial Awareness Week, which ran from 18 - 24 November 2020, for the human health sector was "Unite to preserve antimicrobials."

To mark WAAW, Dr Ashley Hammond (Bristol Medical School: Population Health Sciences) and Dr Kristen Reyher (Bristol Veterinary School) prepared short video presentations for the Bristol AMR Research Strand that focussed on aspects of antimicrobial prescribing in primary care in the light of the COVID-19 pandemic and their use in livestock production and veterinary medicine, respectively.



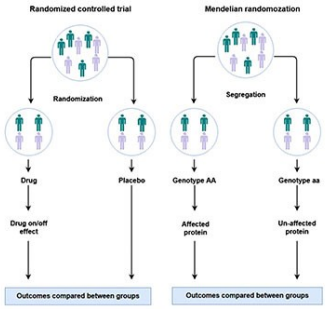
Watch the videos

Image © WHO's WAAW 2020 campaign 'Unite to Preserve Antimicrobials'

Genetic study of proteins for drug development

An innovative genetic study of blood protein levels, led by researchers in the MRC Integrative Epidemiology Unit (MRC-IEU) at the University of Bristol, has demonstrated how genetic data can be used to support drug target prioritisation by identifying the causal effects of proteins on diseases. Working in collaboration with pharmaceutical companies, researchers have developed a comprehensive analysis pipeline using genetic prediction of protein levels to prioritise drug targets, and have quantified the potential of this approach for reducing the failure rate of drug development.

Genetic studies of proteins are in their infancy. The aim of this research was to establish if genetic prediction of protein target effects could predict drug trial success. Dr Jie Zheng, Prof Tom Gaunt and colleagues worked with pharmaceutical companies to set up a multidisciplinary collaboration to address this scientific question. The team built a causal network of 1002 plasma proteins on 225 human diseases. In doing so, they identified 111 putatively causal effects of 65 proteins on 52 diseases, covering a wide range of disease areas. The results of this study are accessible via EpiGraphDB.



Comparison between randomised controlled trial and the genetic approach "Mendelian randomization".

Zheng J *et al.* (2020). Phenome-wide Mendelian randomization mapping the influence of the plasma proteome on complex diseases. *Nature Genetics*.

Increasing the uptake of HPV vaccine

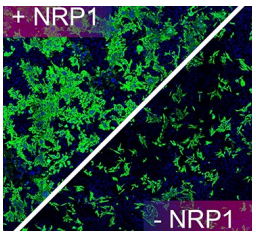
An evaluation of new procedures for getting parents' or young people's consent to the human papillomavirus (HPV) vaccination has found some evidence of improved uptake of the vaccine but results were mixed. The evaluation, led by the NIHR Health Protection Research Unit in Behavioural Science and Evaluation, concluded that increasing uptake in low-uptake populations remains a challenge. The English schools-based HPV vaccination programme aims to prevent death and illness from HPV-related diseases, including cervical cancer. Since introduction in 2008, high coverage has been achieved amongst vaccine-eligible young women, with over 10 million receiving immunisation against HPV. However, there are pockets of lower uptake among some populations – such as minority ethnic groups and those educated in alternative provider settings. The requirement for written parental consent has been shown to be a barrier to vaccination.

New consent procedures were introduced in 2017–2018 which included contacting parents to ask for verbal consent, and in England, the legal framework allows young people to be vaccinated without parental consent provided they are deemed 'Gillick-competent'.

Audrey S *et al*. (2020). How acceptable is adolescent self-consent for the HPV vaccination: Findings from a qualitative study in south-west England. *Vaccine*.

Neuropilin-1 drives SARS-CoV-2 infectivity

In a major breakthrough an international team of scientists, led by the University of Bristol, has potentially identified what makes SARS-CoV-2 highly infectious and able to spread rapidly in human cells. The findings describe how the virus's ability to infect human cells can be reduced by inhibitors that block a newly discovered interaction between virus and host, demonstrating a potential anti-viral treatment. To infect humans, SARS-CoV-2 must first attach to the surface of human cells that line the respiratory or intestinal tracts. Once attached, the virus invades the cell then replicates multiple copies of itself. The replicated viruses are then released leading to the transmission of SARS-CoV-2. The virus's process of attachment to and invasion of human cells is performed the 'Spike' protein (see p18). The team used multiple approaches to discover that SARS-CoV-2 recognises a protein called neuropilin-1 on the surface of human cells to facilitate viral infection. By using monoclonal antibodies they have been able to reduce SARS-CoV-2's ability to infect human cells, thus highlighting the potential therapeutic value of the discovery in the fight against COVID-19.



Watch the video

Read the paper in *Science*

Neuropilin-1 (NRP1) is a host factor for SARS-CoV-2 infection. The image shows human cells infected with SARS-CoV-2 and expressing viral proteins (shown in green). Removal of NRP1 from cells or treating cells with a drug or an antibody targeting NRP1 reduces SARS-CoV-2 infection

COVID-19 Mapping and Mitigation in Schools

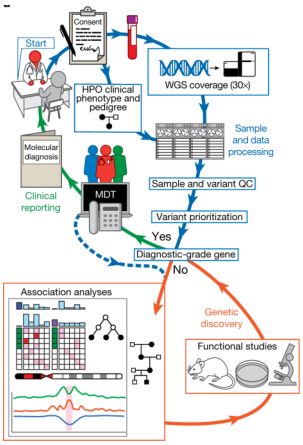
A £2.7 million project funded by a National Institute for Health - UK Research and Innovation COVID-19 rapid response initiative, COVID-19 Mapping and Mitigation in Schools (CoMMinS), will test whether 5,000 staff and pupils have active or past COVID-19 infection, develop systems to help schools prevent and cope with an outbreak and assess strategies to support the mental wellbeing of the school community now and moving forward.

Around nine million 4- to 18-year-old children attend school in England, around 16% of the total population, but little is known about the impact and transmission patterns of COVID-19 in schoolchildren, how patterns of infection amongst pupils might impact the wider community, or the long-term consequences of school closure on the health of pupils. Limiting transmission of coronavirus in schools is challenging because children with COVID-19 often show no obvious symptoms and schoolchildren normally interact with a large number of other children and adults.

Working with Bristol City Council, Public Health England, local primary and secondary schools and other city stakeholders, CoMMinS will test for infection in schools and test whether staff and pupils have current or past COVID-19 infection. This is a highly multidisciplinary project involving epidemiologists, virologists, data scientists, engineers, health psychologists, headteachers and others. Infection patterns will be mapped across the city to highlight areas that may need more support. The study will run until July 2021.

Unmasking the genetic causes of rare diseases

A research programme pioneering the use of whole genome sequencing in the NHS has diagnosed hundreds of patients and discovered new genetic causes of disease. The project offered whole-genome sequencing as a diagnostic test to patients with rare diseases across an integrated health system, a world first in clinical genomics. Whole genome sequencing is the technology used by the 100,000 Genomes Project, a service set up by the government which aims to introduce routine genetic diagnostic testing in the NHS. The integration of genetic research with NHS diagnostic systems increases the likelihood that a patient will receive a diagnosis and the chance this will be provided within weeks rather than months. The multi-centre study demonstrates how sequencing the whole genomes of large numbers of individuals in a standardised way can improve the diagnosis and treatment of patients with rare diseases. The researchers studied the genomes of groups of patients with similar symptoms affecting different tissues, such as the brain, eyes, kidney, blood, or the immune system. They identified a genetic diagnosis for 60% of individuals in one group of patients with early loss of vision. Rare diseases in their entirety are common, in that there are more than 7,000 different rare diseases in total affecting about 7% of the population.



Turro E *et al*. (2020). Whole-genome sequencing of patients with rare diseases in a national health system. *Nature*. 583, pp96-102.

Meningococcus B vaccine efficacity

Meningococcus group B, the most prevalent strain of meningococcal infection, is prevented with 79% effectiveness in children and young adults inoculated with the 4CMenB vaccine, also known as Bexsero, according to a new collaborative study which evaluated the vaccine's performance in a real-world setting. Following the vaccine's UK roll-out in 2015, reductions in meningococcus group B disease cases have been observed in vaccine-eligible age groups but no studies have conclusively demonstrated its effectiveness over time using comparison of vaccination rates among cases with closely matched controls.

Of the 299 children included in the study, the likelihood of full vaccination with 4CMenB among children old enough to be fully immunised was significantly lower among cases with group B invasive meningococcal disease compared with controls without invasive meningococcal disease. This shows that during the first 5 years of vaccine availability in Portugal, full vaccination with 4CMenB was less likely among children who developed group B invasive meningococcal disease compared with matched controls.

Rodrigues FMP *et al*. (2020). Association of use of a Meningococcus Group B Vaccine with Group B Invasive Meningococcal Disease Among Children in Portugal. *Journal of the American Medical Association.*

University of Bristol Doctoral Dissertation Prize

Every year each of the University's six faculties awards one prize to a postgraduate student for the outstanding quality of their research degree thesis based on nominations from internal and externals examiners.

This year the Faculty of Health Sciences awarded the prize to Dr Simon Haworth for his dissertation entitled The use of genetic data in dental epidemiology to explore the causes and consequences of caries and periodontitis under supervisors: Professor Nic Timpson and Professor Steve Thomas.

Simon's research looked at the impact of genetics on dental diseases. He collaborated with the Swedish leads of the Gene-Lifestyle Interactions and Dental Endpoints (GLIDE) Consortium to lead a series of research projects which used large collections of data on child and adult tooth decay. The findings may help understand the molecular basis of dental diseases.

Simon is an Honorary Lecturer in Bristol Medical School and a National Institute for Health Research (NIHR) Academic Clinical Fellow in Dental and Maxillofacial Radiology with University Hospitals Bristol and Weston NHS Foundation Trust.

Bristol Health Partners annual review

Bristol Health Partners (BHP) is a collaboration between the city region's health institutions, local government and universities. Their 2019-20 annual review highlights the milestones and achievements of this strategic partnership, which works to improve the health of people living in Bristol, North Somerset and South Gloucestershire, and the services on which they rely. Their partnership and Health Integration Teams (HITs), networks which tackle health priorities by working in new ways, harnessing the best research, innovation, care and education, have achieved much overt the past year, with highlights including:

- *Enabling new research*; HITs have secured £2.8m in research funding and BHP has supported or enabled successful large-scale regional funding bids worth £26m
- *System change and pathway redesign*; 5 HITs (Stroke, Chronic Pain, Dementia, Bristol Bones and Joints, and Sexual Health Improvement Programme) have worked closely with the Healthier Together Sustainability and Transformation Partnership on pathway redesign
- Embedding patient and public involvement; developed and delivered a digital health training programme for patient and public (PPI) contributors, 19 patient and service user-led events attended by more than 670 people
- Enabling city-wide work; Over 8,000 older people took part in activity initiatives such as Walk Fest Bristol and across 19 'age friendly' activity hubs across Bristol

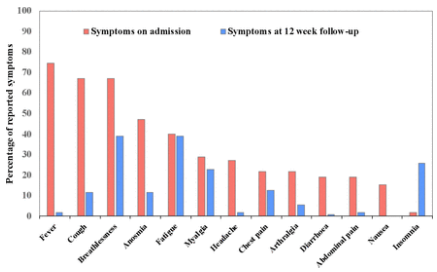
Explore the full review

Long-term effects of COVID

Researchers at North Bristol NHS Trust found that 81 out of 110 discharged patients were still experiencing symptoms such as breathlessness, excessive fatigue and muscle aches when invited back to clinic. Many were also suffering from poor quality of life compared to the rest of the population, struggling to carry out daily tasks such as washing, dressing, or going back to work.

Most of the patients did, however, report improvements in their initial symptoms of fever, cough and loss of sense of smell. Reassuringly, the majority of patients had no evidence of lung scarring or reductions in lung function.

The findings came as part of the preliminary results of the DISCOVER (**DI**agnostic and **S**everity markers of **COV**ID-19 to **E**nable **R**apid triage) project, the first of its kind, into the longer-term effects of coronavirus. This research helps to describe what many coronavirus patients have been saying: they are still breathless, tired, and not sleeping well months after admission. Reassuringly, however, abnormalities on X-rays and breathing tests are rare in this group. Further work in the DISCOVER project will help the team understand why this is, and how medical professionals can help coronavirus sufferers.



Arnold DT *et al.* (2020). Patient outcomes after hospitalisation with COVID-19 and implications for follow-up; results from a prospective UK cohort. *Thorax*.

Improving the primary care response to COVID-19

The COVID-19 pandemic has required GP practices to rapidly change the way they deliver consultations, for example by ensuring physical distancing. In March 2020, most stopped making face-to-face appointments. Instead, patients either phoned their practice, completed an online written assessment or phoned NHS 111 and, because of the risk of infection, most patients were offered telephone or video consultations. While GP practices are experienced at conducting telephone consultations, we know much less about how they use video consultations.

The team looked into how GP practices responded to the pandemic in terms of coping with changes in demand, implementing alternatives to face-to-face consultation, and the impact these changes are having on patient care. Rapid research is required to enable the results to be shared and used as early as possible to help improve GP practices response to the pandemic. The Rapid COVID-19 intelligence to improve primary care response (RAPCI) project team worked with Bristol, North Somerset and South Gloucestershire Clinical Commissioning Group and OneCare to collect information on 111 calls and GP appointments for the one million patients in Bristol, North Somerset and South Gloucestershire.

Interim and final reports are now available to read.

Understanding severe coronavirus infection

Bristol is part of a major new international project to improve our understanding of severe coronavirus infection in humans. The study, funded by the US Food and Drug Administration (FDA), will analyse samples from humans and animals to create profiles of various coronaviruses, including SARS-CoV-2, which causes COVID-19. The results will help inform the development of new treatments and vaccines to tackle coronavirus infections. The three-year project will bring together collaborators from the University of Liverpool, Public Health England, the University of Bristol (Dr David Matthews and Dr Andrew Davidson of the School of Cellular and Molecular Medicine), the University of Oxford, A*STAR in Singapore, and King Fahd Medical City in Saudi Arabia. Building upon their expertise in coronaviruses and other highly infectious virus threats the teams will use advanced transcriptomic/proteomic, immunological and computational techniques to analyse clinical specimens from people and model systems infected with coronaviruses that can cause severe disease in humans. The study will also examine newly developed technologies such as organ-on-chips to rapidly characterise coronaviruses/novel diseases and medical countermeasures. The team comprises corona virologists, immunologists, physician scientists and experts in translational medicine.

Read more

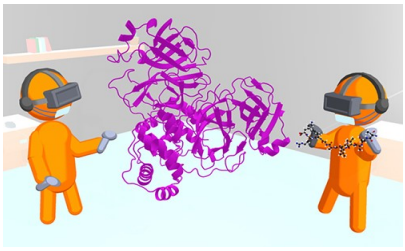
COH-FIT project

The COH-FIT (Collaborative Outcomes study on Health and Functioning during Infection Times) is an online survey project to identify risk and protective factors that will inform prevention and intervention programmes for the COVID-19 pandemic, and if other pandemics occur in the future. The study, led by clinicians Professor Christoph Correll from the US and Dr Marco Solmi from Italy alongside 200 researchers from 35 countries including Bristol, aims to collect data from around 100,000 participants. To date, over 114k in 148 countries have completed the online survey, which aims to measure the impact of the virus over an 18-month period by collecting data on a range of issues that could affect peoples' mental and physical wellbeing, including access to open space, care and coping strategies.

The survey will be conducted in three stages, the first of which will took place during the first wave (April-June) of the COVID-19 pandemic. This will be followed by further surveys at six and twelve months after the end of the pandemic (as per WHO estimates). Endorsed by the World Psychiatric Association, the study's immediate aim is to see who has been affected most by the virus and help identify the effects and factors influencing the impact of the COVID-19 so we can learn how to provide the appropriate support in the future. In Bristol, our specific interest is whether the pandemic will result in more people reporting serious mental health problems such as psychosis.

Interactive virtual reality to study coronavirus

Bristol scientists have demonstrated a new virtual reality [VR] technique which should help in developing drugs against the SARS-CoV-2 virus – and enable researchers to share models and collaborate in new ways. The tool will help scientists around the world identify anti-viral drug leads more rapidly. A SARS-CoV-2 enzyme known as the main protease (Mpro) is a promising target in the search for new anti-viral treatments. Molecules that stop the main protease from working (enzyme inhibitors) stop the virus reproducing, and so could be effective drugs. Interactive virtual reality can model how viral proteins and inhibitors bind to the enzyme. Researchers can use this tool to help understand how the enzyme works, and also to see how potential drugs fit into the enzyme. This should help design and test new potential drug leads.



The Bristol team have developed a virtual framework for interactive 'molecular dynamics' simulations. It is an open source software framework, called Narupa, which uses readily available VR equipment.

Mulholland A *et al*. (2020). Interactive molecular dynamics in virtual reality (iMD-VR) is an effective tool for flexible substrate and inhibitor docking to the SARS-CoV-2 main protease. *Journal of Chemical Information and Modeling*.

Repurposed antiviral drugs effects on COVID patients

Repurposed antiviral drugs - remdesivir, hydroxychloroquine, lopinavir and interferon - to treat COVID-19 appear to have little or no effect on patients hospitalised for the disease, in terms of overall mortality, initiation of ventilation and duration of hospital stay. The study by an international team of scientists, which was co-ordinated by the World Health Organisation, compared the effects on major outcomes in hospital of the local standard of care alone (the care all patients usually receive) versus the local standard of care in addition to one of four potential drugs to treat COVID-19. The Bristol Trials Centre at the University of Bristol rapidly developed and deployed the first SOLIDARITY randomisation system during March 2020. None of the study's four repurposed antiviral drugs substantially reduced mortality (in unventilated patients or any other subgroup) or delayed the need for ventilation. The global Solidarity trial is still recruiting about 2,000 patients per month, thanks to the contributions of nearly 500 hospitals, 1,500 clinicians and research staff and their patients. It will now rapidly evaluate promising new treatment options, such as new antivirals, immunomodulators and specific anti-SARS-Cov-2 monoclonal antibodies. Its primary objective is to provide reliable estimates on any effects of potential drugs to treat COVID-19 on in-hospital mortality in moderate and in severe COVID.

WHO Solidarity Trial Consortium (2020). Repurposed antiviral drugs for Covid-19 — interim WHO solidarity trial results. *New England Journal of Medicine*.

What's the STORY of infectious diseases in the UK?

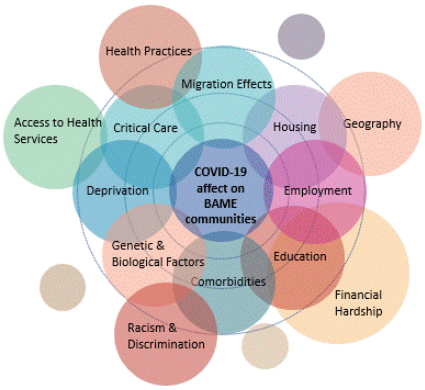
A study looking at how children's immune systems respond to COVID-19, and to vaccines for other infectious diseases, is being run by the Bristol Children's Vaccine Centre (BCVC) at Bristol Medical School, and the Oxford Vaccine Group. The aim of this study is to help understand the STORY (Serum Testing Of Representative Youngsters) of infectious diseases in the UK. One of the ways people's bodies develop protection against infectious diseases is by developing antibodies, either after an infection or following a vaccination. Researchers are able to measure the antibodies to see how well protected people are from those infectious diseases.

The team, working with Public Health England, will develop a new way of surveying how well protected people are from infectious diseases by collecting blood samples from people who represent different groups across society. The study team is particularly interested in Group C meningococcus (MenC) and diphtheria and in the novel coronavirus (COVID-19).

Impact of COVID-19 on minority ethnic communities

The risk of death from COVID-19 is higher among black, Asian, and minority ethnic (BAME) people than the white British population. An ARC West rapid review commissioned by Bristol City Council and led by Dr Loubaba Mamluk and Dr Tim Jones explored why and summarised their policy recommendations that could help reduce these health inequalities. They found a complex mixture of factors, including being poorer, where people live, overcrowded housing, types of job, other illnesses and access to health services, all influenced BAME communities' outcomes. No one factor alone could explain all of the disparities found. Recommendations that the review uncovered include:

- ensuring adequate income protection for those in low paid or precarious employment, so workers can follow quarantine recommendations
- reducing occupational risks, such as providing appropriate personal protective equipment (PPE)
- providing culturally and linguistically appropriate public health, developed with affected communities and tailored to culturally specific challenges, such as preventing transmission in overcrowded households or shielding vulnerable people in multigenerational households
- removing all NHS charges during this public health emergency could ensure that no migrant or individual from a BAME group delays seeking healthcare and risks death through fear of being charged for their NHS care



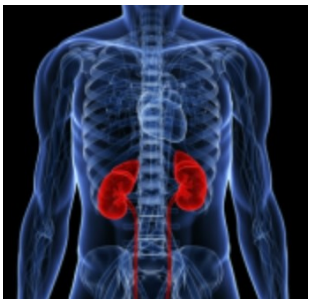
Read more

£45m to advance gene therapy treatment of CKD

The University of Bristol has secured a £45million deal to advance its ground-breaking gene therapy technology for chronic kidney diseases (CKD). The commitment, made by healthcare company Syncona Ltd to Bristol spin-out Purespring Therapeutics, aims to address a global unmet need for renal conditions in one of the largest single investments made to a new UK university biotech company.

Over two million people worldwide currently receive treatment with dialysis or a kidney transplant to stay alive, yet this number may only represent ten per cent of people who need treatment to live. This investment marks a significant step forward in the innovation of long overdue new therapies for kidney diseases, which have historically been disproportionately expensive to treat.

Syncona's £45 million investment to Purespring will be used to progress to the clinic



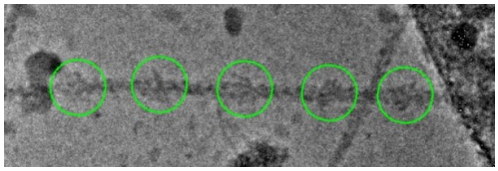
gene therapy research pioneered by Prof Moin Saleem, Professor of Paediatric Renal Medicine (Bristol Medical School) and Dr Gavin Welsh (Associate Professor of Renal Medicine).
Purespring will develop gene therapies directly targeting the glomerulus in the kidney, which could see treatment progress from lab to patients in three or four years. The company will also have access to an in-vivo functional screening platform, FunSel, to screen for cell-specific protective factors delivered via gene therapy, that could have applications across several kidney diseases.

Machine learning and heart disease

The Data Study Group final report on the University's of Bristol's *Applying AI and machine learning to reveal the molecular basis of heart disease* is an output of the Cryo-EM challenge organised by The Alan Turing Institute and Jean Golding Institute as part of the Turing Data Study Group event in Bristol, August 2019.

Automated Actin Filament Detection in Cryo Electron Microscopy Images Using Image Segmentation Deep Neural Networks

Hypertrophic Cardio Myopathy (HCM) is an inherited heart disease caused by mutations in certain proteins in the heart. The protein troponin contains 15-20% of the known mutations linked to HCM, including some of the most severe ones. The study aimed to determine positions of the mutations and establish their effect on muscle function.
Cryo Electron Microscopy images of troponin located along an actin filament were viewed. With hundreds of thousands of images of troponin available, a high-resolution molecular model can be created. However, the detection of troponin in these images is a semi manual process. The labelled data used in this challenge represent 60GB of raw data and 6 months of data preparation. The challenge was to create an automated image processing workflow of actin filament identification, straightening, and extraction.



View the publication

Materials on COVID-related changes to health law

Prof John Coggon (Centre for Health, Law, and Society), in collaboration with the UK Faculty of Public Health, PolicyBristol and colleagues in Law Schools at Cardiff University, the University of Edinburgh, and Queen's University Belfast, is leading an Elizabeth Blackwell Institute-funded project to track and analyse COVID-19 related developments in law and policy as these apply to health professionals and the contexts in which they work. The public health emergency created by the outbreak of SARS-CoV-2 has led to governments across the world instituting extraordinary legal and policy measures. Across the UK, these initially included a general lockdown and changes to shore up workforce capacity within the NHS. As the lockdown situation has eased, the regulatory questions have grown more complex, with more varied and localised measures being implemented. At the same time, professional, regulatory, and advisory organisations have been issuing guidance with a view to coordinating practical responses to the pandemic. This project analyses developments in law and policy with reference to concerns about public health ethics, social justice, the protection of human rights, and respect for the rule of law. It also monitors these changes as they apply to health professionals and the contexts in which they work across the four nations of the UK. A series of explanatory resources has been generated.

Spread Germ Defence, not the virus!

With Covid-19 infections still high and people preparing for Christmas gatherings, it is vitally important to try to reduce the spread of infection in people's homes as this is where infections are now most likely to be transmitted. Research suggests people who follow the advice from Germ Defence are less likely to catch flu or other viruses and less likely to pass it on to members of their household.

Germ Defence [freely available from www.germdefence.org/] is the only web-based advice in the world that has been scientifically proven to work against respiratory infections. In a *Lancet* study of over 20,000 people, using Germ Defence reduced the spread of swine flu and seasonal flu in the home.

Germ Defence provides personalised advice on how to protect everyone in the household from infection. The website has been updated for COVID-19 by a team of health researchers at Bristol, Southampton and Bath universities, working with members of the public and Public Health England, and with funding from National Institute for Health Research (NIHR) and UK Research Institute (UKRI).

Germ Defence can help everyone and includes advice on what to do if someone in the household may be infected, or could become very ill if they are infected.

ELIZABETH BLACKWELL FUNDING

Nurturing
Research.
Improving
Health.

EBI Identifying Candidates for Wellcome Trust Investigator Awards

This scheme is designed to support a small number of permanent academic staff at UoB within the first five years of their appointment, who are planning to apply for an Investigator Award from the Wellcome Trust. Applications will be accepted on a rolling basis.

Heads of School are asked to nominate members of staff who can be eligible for this scheme by emailing ebi-health@bristol.ac.uk

Closing date: none

EBI Seed Fund: Public Engagement with Health Research

Seed funding is available for health researchers who would like to deliver public engagement events and activities. Applications accepted on a **rolling** basis.

Closing date: none

EBI Workshop Support

Support interdisciplinary workshops in health research at new or emerging interface between two or more disciplines. Applications reviewed all year.

Closing date: none

Returning Carers Scheme

To support academic staff across all faculties in re-establishing their independent research careers on return from extended leave (16 weeks or more) for reasons connected to caring (e.g. maternity leave, adoption leave, additional paternity leave, leave to care for a dependant).

Closing date: 30 April and 31 October each year

FUNDING OPPORTUNITIES

Would you like to receive timely, tailored funding opps information?
Do you want to know what funding opportunities come up in your research area?
Get tailored funding alerts?

Research Professional provides access to an extensive database of funding opportunities, and can send out tailored alerts based on keywords that you input, ensuring that the funding alerts you receive are the ones you want to hear about. UoB staff and students have **FREE** online access to the database from any device – once you've registered then you can view upcoming funding opportunities from home or away, not just while on the University network.

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**, an easy process that will take just a few minutes to set up through the use of keywords
- **Save searches and bookmarks** - store items of interest for future reference, download and email to colleagues
- **Sign up for higher education news bulletins** – want to hear about what is going on in the broader HE environment? Latest news on the REF, setting up of UKRI etc? Sign up for the 8am playbook or the Research Fortnight news publications and stay up to date with the latest news.

For further information on Research Professional, go to the RED website.

National Institute of Allergy and Infectious Diseases (USA)
Novel RNAs in virology and immune regulation – basic science and therapeutic discovery (R21 clinical trial not allowed): AIDS-related

Closing date: 7 –Jan-21 Award amount: USD 275,000

This supports basic science research in novel biologically active viral or host RNAs involved in virology, including HIV biology, and immune regulation.

Medical Research Council
Research grants - infections and immunity

Closing date: 13-Jan-21 Award amount: £1 million

These fund focused research projects that may be short- or long-term in nature related to infections and immunity, as well as method development and continuation of research facilities. Projects may involve more than one research group or institution.

Medical Research Council
Programme grants - infections and immunity

Closing date: 13-Jan-21 Award amount: unspecified

These provide large and long-term renewable funding for projects related to infections and immunity. The purpose is to help the medical science community to think bigger. A programme is defined as a coordinated and coherent group of related projects that may address an interrelated set of questions across a broad scientific area.

Food Standards Agency
Third study of infectious intestinal disease in the UK

Closing date: 29-Jan-21 Award amount: unspecified

The tenderer will assess the incidence of infectious intestinal disease in the community, allowing the re-estimation of parameters measured during previous IID studies conducted in the UK.

British Infection Association
Research Project Grants

Closing date: 29-Jan-21 Award amount: unspecified

These support infection-related research projects in an academic centre in the UK. The goal is to support preliminary studies with the intention of developing the work through a research fellowship or as an independent investigator.

Medical Research Council / Department for International Development / National Institute for Health Research / Wellcome
Joint global health trials scheme – trial development grants

Closing date: 04-Feb-21 Award amount: £200,000

These support research that addresses the health problems affecting LMICs by funding definitive trials that are likely to produce implementable and generalisable results to change policy and practice. The scheme is focused on late-stage clinical and health intervention trials evaluating efficacy and effectiveness. The scope includes: behavioural interventions; psychological therapies; disease management; drugs; vaccines; hygiene interventions; diagnostic strategies.

National Cancer Institute (USA)
Advancing translational and clinical probiotic/prebiotic and human microbiome research (R01 clinical trial optional)

Closing date: 05-Feb-21 Award amount: unspecified

Supports translational & clinical studies using probiotic and prebiotic carriers to generate measurable functional evidence for the safe and effective use of these in maintaining health.

THIS ISSUE'S FEATURED ARTICLE

SARS-CoV-2 candidate vaccine ChAdOx1 nCoV-19 infection of human cell lines reveals a normal low range of viral backbone gene expression alongside very high levels of SARS-CoV-2 S glycoprotein expression

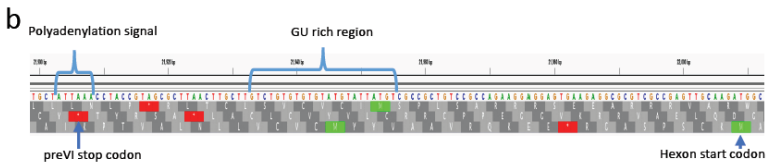
Almuqrin A, Davidson AD, Williamson MK, Lewis P, Heesom K, Morris S, Gilbert S & Matthews DA (preprint posted 20 October 2020). *ResearchSquare.*

The AstraZeneca Oxford COVID-19 vaccine (ChAdOx1 nCoV-19 and also known as AZD1222), now undergoing Phase III clinical trials, has already undergone rigorous testing to ensure the highest standards of quality and safety. A team at Bristol has used recently developed techniques to further validate that the vaccine accurately follows the genetic instructions programmed into it by the Oxford team. This novel analysis provides even greater clarity and detail about how the vaccine successfully provokes a strong immune response. the Bristol researchers' focus was to assess how often and how accurately the vaccine is copying and using the genetic instructions provided by the Oxford team. These instructions detail how to make the spike protein from the coronavirus, SARS-CoV-2 that causes COVID-19.

The Oxford vaccine is made by taking a common cold virus (adenovirus) from chimpanzees and deleting about 20 per cent of the virus's instructions. This means it is impossible for the vaccine to replicate or cause disease in humans, but it can still be produced in the laboratory under special conditions. By removing these genetic instructions there is space to add the instructions for the spike protein from SARS-CoV-2. Once inside a human cell the genetic instructions for the spike protein need to be 'photocopied' many times – a process known as transcription. In any vaccine system, it is these 'photocopies' that are directly used to make large amounts of the spike protein.

Once the spike protein is made, the immune system will react to it and this pre-trains the immune system to identify a real COVID-19 infection. So, when the person vaccinated is confronted with the SARS-CoV-2 virus their immune system is pre-trained and ready to attack it.

Adenoviruses have been used for many years to make vaccines, and these are always tested to very high standards to make sure every batch of vaccine has the correct copy of genetic instructions embedded in the vaccine. However, thanks to very recent advances in genetic sequencing and protein analysis technology, researchers at Bristol were for the first time also able to directly check thousands and thousands of the 'photocopied' instructions produced by the Oxford vaccine within a cell. In this way they were able to directly validate that the instructions are copied correctly and accurately, providing greater assurance that the vaccine is performing exactly as programmed. At the same time, the researchers checked the spike protein being made by the vaccine inside human cells also accurately reflects the instructions as programmed. This brand-new approach may be more routinely used in the future to help researchers fine tune the performance of these kinds of vaccines.



Novel polyadenylation site usage for preVI. Part b focusses on the sequences at the proposed polyadenylation site on ChAdOx1 showing the location of the polyadenylation signal and the GU rich region that is often present downstream of a polyadenylation signal.

CONTACTS

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

Co-Chair: Philip Bright
Clinical Immunologist

Co-Chair (interim): Katy Turner
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- Matthew Avison - Co-Director, Bristol AMR
- Andrew Davidson - Senior Lecturer in Virology
- Stephanie Diezmann - Senior Lecturer in Fungal Pathogens
- Adam Finn - Professor of Paediatrics
- Hannah Fraser - Research Fellow in Infectious Disease Mathematical Modelling
- Wendy Gibson - Professor of Protozoology
- Kathleen Gillespie - Reader in Molecular Medicine, Head of the Diabetes and Metabolism Research Group
- Melanie Hezzell - Senior Lecturer in Cardiology
- Peter Muir - Clinical Virology
- Angela Nobbs - Lecturer in Oral Microbiology
- Annela Seddon - Director of the Bristol Centre for Functional Nanomaterials
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