

I&I NETWORK NEWSLETTER



2021 - ISSUE 2

Computational models for AMR

The University of Bristol has been awarded a record number of European Research Council grants. Six researchers have received over €13 million in Advanced Grants in recognition of their excellent science and potentially ground-breaking research on a global scale.

One of the awards went to Prof [Adrian Mulholland](#) in the School of Chemistry for *Predictive computational models for Enzyme Dynamics, Antimicrobial resistance, Catalysis and Thermoadaptation for*

Evolution and Design



(PREDACTED). The project will focus on modelling enzymes and using simulations to understand and predict how they work. This will include enzymes involved in antibiotic resistance (in collaboration with Prof [Jim Spencer](#), Cellular

and Molecular Medicine). The team will model chemical reactions in enzymes. The simulations will analyse why some bacterial enzymes are able to break down particular antibiotics while others cannot. This sort of understanding should help in understanding the evolution of antibiotic resistance and in the development of enzyme inhibitors to combat it. The researchers will also work on enzyme design and understanding how evolution adapts enzymes to work at high or low temperatures.

[Read more about the projects](#)

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Bristol AMR



EVENTS

UKRI Engineering Biology funding schemes information webinar

1 July 2021, 10.30 - 11.30, online

Autophagy and Medicine: Maintaining health and preventing disease

1 July 2021, 14.00 - 18.10, online

MRC application advice webinar

2 July 2021, 14.00 - 15.15, online

GW4 ECR AMR Symposium 2021: Multidisciplinary Approaches to AMR: Pandemics, Practices and Innovation

5 - 7 July 2021, online

RDS South West: NIHR Grant Applications Seminar

6 July 2021, 10.00 - 12.30, online

Mendelian Randomization Conference: Harnessing the power of population diversity and family relatedness

7 - 9 July 2021, online

Intensive bid support event - Marie Skłodowska-Curie Postdoctoral Fellowship Scheme

8 July 2021, 9.00 - 17.00, online

Introduction to Research Grant Applications

12 July 2021, 10.00 - 11.00, online

Climate change and health: Societal vulnerabilities and opportunities

14 July 2021, 10.00 - 13.00, online

Public Engagement Masterclass

19 - 21 July 2021, online

Virtual regional workshop to inform the development of the Sexual and Reproductive Health Strategy and HIV Action Plan

19 July 2021, 10.00 - 12.00, online

Bristol Cats Study meeting

26 August 2021, 10.00 - 11.30, online

Bristol Health Partners AHSC virtual conference

12 October 2021, 13.00 - 15.00, online

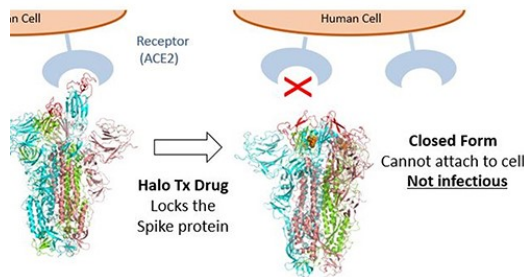
NEWS

Halo Therapeutics Ltd

Launched in April 2021 by a team of researchers at the University of Bristol, new bio-tech company Halo Therapeutics is developing ground-breaking and newly patented potential treatments for coronavirus.

The company is preparing for clinical trials into pivotal, cost-effective antiviral treatments for COVID-19, after discovering a molecule which changes the shape of the virus's spike protein and in so doing inhibits the virus' ability to enter cells. Studies

show the treatments are potentially 'pan-corona antivirals' in that they will work



against all coronavirus strains - including the highly contagious Alpha, Beta and Gamma variants. The company is preparing for clinical trials. If approved, the antivirals could be

used by patients globally at the first sign of COVID-19 symptoms – stopping the virus in its tracks.

Halo Therapeutics was created by the team made a breakthrough discovery, published in *Science*, which found that exposing the SARS-CoV-2 virus to a free fatty acid called linoleic acid locks the virus's spike protein into a closed, non-infective form, stopping it in its tracks.

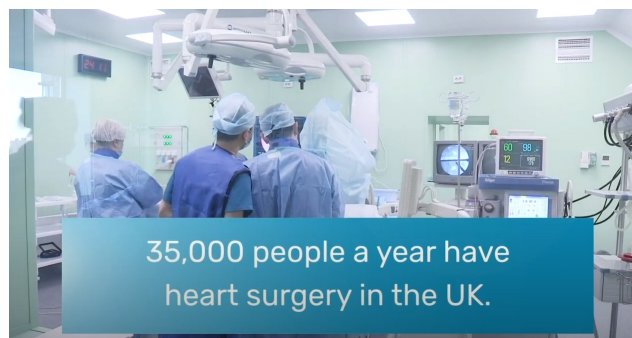
[Read the full press release](#)

Modelling inflammation after heart surgery

Dr Ben Gibbison from the NIHR Biomedical Research Centre Cardiovascular Disease Theme is investigating levels of the stress hormone cortisol in critically ill adults requiring prolonged ventilation after heart surgery, to determine whether cortisol levels correlate with inflammation.

Up to five per cent of patients remain in intensive care for more than 48 hours

after surgery. These patients, who require ventilators for prolonged periods of time,



may be showing signs of uncontrolled inflammation – a poor response to the physiological stress of surgery.

The team are investigating levels of the stress hormone cortisol in critically ill adults requiring prolonged ventilation after heart surgery, to determine whether cortisol levels correlate with inflammation. From this work, we can determine if these patients need higher levels of cortisol, then administer it in a pattern tailored to the individual.

[Watch the video](#)

Pfizer Vaccine Centre of Excellence launches

The Secretary of State for Health and Social Care, the Rt. Hon. Matt Hancock MP, visited the University of Bristol on 25 May 2021 for the official launch of a new Pfizer Centre of Excellence for Epidemiology of Vaccine-preventable Diseases. The centre, which is only the second to launch to date and the first outside the US, will be led by Adam Finn, Professor of Paediatrics at Bristol, Director of the Bristol Vaccine Centre at Bristol Medical School and

lead of Bristol UNCOVER (Bristol COVID Emergency Research Group).



Using an initial investment of £4.6 million from Pfizer, the centre will conduct real-world population-based sur-

veillance studies in hospitals and the community to identify and measure the burden of specific vaccine-preventable infectious diseases affecting adults, including the elderly, as well as children. Research will also be undertaken to support the design, development and use of next-generation vaccines.

Image: The Secretary of State for Health and Social Care, the Rt. Hon. Matt Hancock MP and Professor Hugh Brady, Vice-Chancellor and President at the University of Bristol © Julian James

Funding successes: Part 1

Dr Neelam Hassan (Bristol Medical School: Translational Health Sciences) was awarded a research fellowship worth £3000,285 by the **Medical Research Council** for *Identification of Novel Drug Targets for Osteoporosis through Characterisation of the Genetic Basis of High Bone Mass*. The project started in Feb '21 and will continue for three years.

The Health Foundation awarded Dr Oliver Davis (Bristol Medical School: Population Health Sciences) £74,792 for *Exploring community resilience assets in Wales during the COVID-19 outbreak* which started in Jan '21.

Dr Jie Zheng (Vice Chancellors Fellow, Bristol Medical School: Population Health Sciences) MS/PHS) received a £100,000 Springboard award from the **Academy of Medical Sciences** for the project *Identification of drug targets for cardio-metabolic diseases through integration of proteome and trajectories of intermediates*.

Principal Investigator Prof Alin Achim (Engineering) and co-Investigators Profs Paul Verkade (Biochemistry) and David Bull (Engineering) have been awarded a **British Council** grant of £49,000 for *Development of an automated system for eggs of parasitic worm detection and classification on*

motorized stage microscope.

Nils Kappelmann (PhD student at the Max Planck Institute of Psychiatry, Munich) won a £250,000 **Medical Research Council** (MRC) Neuroimmunobiology Data Generation award for early career researchers. Nils will be working with Profs Golam Khandaker (Bristol Medical School), Gareth Jones (Cellular and Molecular Medicine), Caroline Relton (Bristol Medical School) and colleagues at the MRC's Integrative Epidemiology Unit. The project is entitled *Immunological Mechanisms and Therapeutic Targets for Depression*.

Germ Defence behaviours to reduce virus spread

As the COVID-19 vaccination programme expands and a roadmap for unlocking Britain continues, research which looked at data from over 28,000 users of the online '[Germ Defence](#)' since May 2020 highlights the continued, critical importance of breaking chains of virus transmission within our homes. Whilst the nation has taken to washing its hands regularly, other behaviours, such as cleaning and disinfecting surfaces or social distancing within the home, have proved harder. Psy-

chologists from the Universities of Bath, Bristol and Southampton warn of the continuing risks of household transmission of COVID-19 and the continued importance of breaking chains of transmission. Longer-term, in a post-pandemic world, they emphasise that these behaviours will continue to remain important and could help to reduce the future spread of other infectious diseases, including seasonal flu. They also highlight the need to address barriers that some people might face in

engaging with infection control behaviours, in particular financial ones, where houses are high occupancy, or where individuals have caring responsibilities.

Ainsworth B *et al.* (2021). [Improving infection control behavior patterns in the home during the COVID-19 pandemic... Journal of Medical Internet Research.](#)

[Germ Defence has been rolled out to GP practices across England to help reduce household SARS-CoV-2 infections](#)

Fighting tuberculosis

Although tuberculosis (TB) incidence in the UK is low compared to many parts of the world, it remains a public health threat. Global efforts to counter TB have saved an estimated 63 million lives since the year 2000, but World Health Organisation (WHO) data estimates that in 2019 there were 10 million new cases of TB disease, of which 465,000 were caused by drug-resistant strains, and 1.4 million people died.

The theme of World TB Day (observed on 24 March) 2021 was "The Clock is Ticking", which highlights the risk

posed by the COVID-19 pandemic to progress towards the WHO's *EndTB* strategy and calls upon world leaders to reaffirm recent commitments to the eradication of this devastating, but preventable and curable, disease. Researchers working across the University of Bristol are looking to play their part in the ongoing struggle against one of the world's deadliest infectious killers:

Dr [Annela Seddon](#) (Physics) is working in conjunction with the Kenya Medical Research Institute to develop new tools that can form the basis of TB

diagnostics in resource-limited settings. Profs [Adrian Mulholland](#) (Chemistry) and [Jim Spencer](#) (Cellular and Molecular Medicine) are collaborating with colleagues in Thailand to apply computational methods to TB drug discovery. Prof [Paul Race](#) (Biochemistry) is working with research teams in Kenya and South Africa to identify new treatments for drug-resistant TB. Dr [Ellen Brooks Pollock](#) (Bristol Veterinary School) leads the ZooTB project seeking to establish the extent of transmission of TB from cattle to humans.

[Read the full press release](#)

NIHR Senior Investigator status

Prof [John Macleod](#), joint Head of the Centre for Academic Primary Care at the University of Bristol and Director of the NIHR Applied Research Collaboration (ARC) West, is one of 31 academics in the UK to be awarded Senior Investigator status by the National Institute for Health Research (NIHR) in 2021.

NIHR Senior Investigators are among the most prominent and prestigious researchers funded by the NIHR and the

most outstanding leaders of patient and people-based research within the NIHR research community. Following open competition, 31 researchers have been newly appointed as NIHR Senior



Investigators this year, in the 14th annual round of appointments. They are joined

by 15 current or previous holders of the award who have been reappointed as Senior Investigators for a second term, bringing the total number of appointments for 2021 to 46.

NIHR Senior Investigators are critical to augmenting the ongoing success of NIHR, and developing the health research capability fit for the challenges we must meet.

Awards and external engagements

Dr [Seána Duggan](#), Research Associate in the School of Cellular and Molecular Medicine, won an **Outstanding Reviewer Award** from the Microbiology Society for her work with journal *Access Microbiology*. Seána's research investigates microbial pathogenicity with a focus on the bacterium *Staphylococcus aureus*; she's interested in bacteria and fungi, and how they cause infections in humans.

PhD student Drinalda Cela (Cellular and Molecular Medicine) won first prize for her

talk at the Edinburgh-hosted [International Neutrophil Conference](#) held online 31 May-1 June 2021. The title of her talk was *PAD4 controls chemotaxis and neutrophil trafficking in malaria*.

Dr [Borko Amulic](#) (Cellular and Molecular Medicine) was invited by the [Max Planck Institute for Infection Biology](#) to give a talk for the

New Voices in Infectious Biology series entitled *Neutrophils as protagonists in malaria pathogenesis* on 12 May 2021.

Dr [Yohei Yamauchi](#) (Cellular

and Molecular Medicine) presented at the [1st International Chica and Heinz Schaller \(CHS\) Foundation Virology e-Symposium](#), held 23-23 April 2021. The ongoing SARS-CoV-2 pandemic emphasises the importance of studying viruses and their biology and the necessity to communicate and discuss the latest research, despite the very limited personal interactions. This symposium brought together senior investigators and junior scientists in an interactive fashion to discuss the latest topics in Virology. The title of his talk was *Three ways Neuropilin-1 boosts SARS-CoV-2 infectivity*.



OUTSTANDING REVIEWER
2020

This is to certify that

Seána Duggan

has been recognised as an outstanding reviewer for
Access Microbiology

Access Microbiology

Funding awards: Part 2

Prof [Elek Molnar](#) (Physiology, Pharmacology and Neuroscience [PPN]) received funding from **Innovate UK** for a Knowledge Transfer Partnership (KTP) project with [Hello Bio](#), an Avonmouth-based specialist supplier of life science research tools. The project will facilitate the commercialisation of immunochemicals developed and used by Elek for his research of glutamate receptors. In neuroscience there is a lack of high quality, reliable antibody support and standardised validation procedures for various experimental ap-

proaches. The KTP will address these challenges through closer industrial collaboration. The grant will fund PhD student Matthew Wilkinson (PPN) as a KTP Associate.

Dr [Seána Duggan](#) (Cellular and Molecular Medicine) is part of a new community funded by the **GW4 Building Communities** award scheme. The project, [New Drugs to tackle AMR](#), will bring together researchers from Bristol, Bath, Cardiff and Exeter to rationalise design and test new drugs

targeting Gram positive bacterial cell wall components.

A project co-funded by the [Elizabeth Blackwell and Cabot Institutes](#), led by Dr [Adam Trickey](#), Prof [Peter Vickerman](#) (Bristol Medical School), and Prof [Guy Howard](#) (Civil Engineering), will study associations between climate extremes and HIV outcomes in Eswatini, Malawi, and Zambia. In particular, it will be investigating relationships between rainfall deviations and HIV outcomes by linking drought data with nationally-representative HIV datasets and modelling the associations.

Aerosol generating procedures and SARS-CoV-2

Emerging evidence indicates that many currently defined aerosol generating procedures (AGPs) are unlikely to play any significant role in the generation of infectious aerosol that poses a risk to hospital staff. Current UK infection control guidance for hospitals is centred on the basis that aerosols are only generated by specific medical interventions described as aerosol generating procedures (AGPs). A comment article published suggests it is becoming increasingly clear that transmission of SARS-CoV-2 via aerosol is possible and

might represent a significant transmission route. However, emerging evidence indicates



that many currently defined AGPs are unlikely to play any significant role in the generation of infectious aerosol that poses a risk to staff. More research is ongoing to measure other AGPs across a

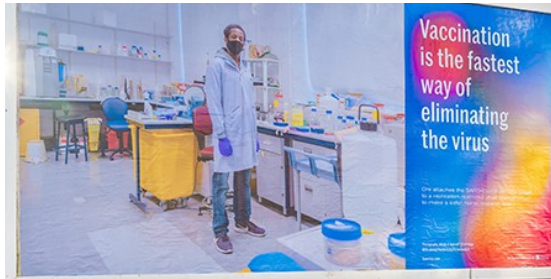
range of clinical settings; however, based on the research to date, a coughing patient with acute COVID-19 is likely to generate more infectious aerosol than many AGPs. This appears to be supported by the epidemiological evidence, which points to an increased risk of infection for ward medical staff compared with intensive care staff.

Hamilton G *et al.* (2021). [Aerosol generating procedures: are they of relevance for transmission of SARS-CoV-2?](#) *The Lancet Respiratory Medicine*.

The faces behind COVID-19 research in Bristol

The human stories behind Bristol scientists who are playing an important role in global efforts to overcome COVID-19 have been captured in a billboard campaign by a Bristol-based photographer. The vaccine poster project is the brainchild of photographer Tom Skipp, who wanted to portray through images some of the key people behind coronavirus research being carried out at the University of Bristol. Tom was concerned by what he felt was a distrust of

science and an anecdotal feeling that minority populations might be dissuaded to take a



vaccine given a historic prejudice by institutions. Tom also felt that the perception of the general public was that scientists aren't like them and that they are usually only seen at

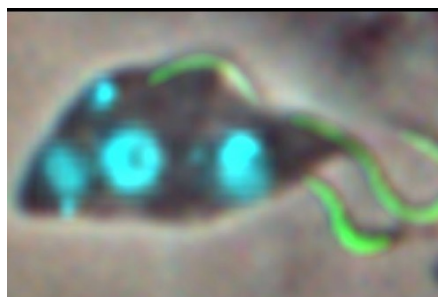
lecterns next to government figures disseminating statistics that suggest the public could have their civil liberties cut. The aim of Tom's campaign is to connect science with the community and posters were unveiled on 27 April 2021 and were available to view until 9 May 2021.

*Image © Tom Skipp
Shows Dr Ore Francis, Research Associate in the School of Cellular and Molecular Medicine*

Sex cells in parasites

Researchers at the University of Bristol have discovered how microbes responsible for human African sleeping sickness produce sex cells. In these single-celled parasites, known as trypanosomes, each reproductive cell splits off in turn from the parental germline cell, which is responsible for passing on genes. Conventional germline cells divide twice to produce all four sex cells – or gametes – simultaneously. In humans four sperms are produced from a single germline cell. So, these strange parasite cells are doing their own thing rather than sticking to the biology rulebook. Trypanosome cell biology has al-

ready revealed several curious features. They have two unique intracellular structures – the kinetoplast, a network of circular DNA and the



glycosome, a membrane-enclosed organelle that contains the glycolytic enzymes. They don't follow the central dogma that DNA is faithfully transcribed into RNA, but will go back and edit some of the RNA transcripts after they've been made.

In the case of disease-causing microbes, sex can potentially lead to a lot of harmful genes being combined in one strain. Thus, research on sexual reproduction helps scientists understand how new strains of disease-causing microbes arise and how characteristics such as drug resistance get spread between different strains.

Peacock L *et al.* (2021). [Sequential production of gametes during meiosis in trypanosomes](#). *Communications Biology*.

Image © L Peacock shows large nucleus in blue and two smaller nuclei in pale blue and kinetoplasts in dark blue

HIV affects growth and bone strength

Children growing up with HIV infection have concerning deficits in skeletal strength which become more apparent towards the end of pubertal growth. The study, led by researchers at the Universities of [Zimbabwe](#), [Bristol](#), [the Biomedical Training and Research Institute in Zimbabwe](#) and the [London School of Hygiene & Tropical Medicine \(LSHTM\)](#), identifies a link between these skeletal deficits and the first-line antiretroviral-HIV drug, tenofovir disoproxil fumarate (TDF), which is widely used across sub-Saharan Africa. The project raises concerns for the long-term impact of this drug

on the skeletal health of adolescents across the region, as they transition into adulthood.



The team found marked deficits in bone density were common in children with HIV, who have a substantially higher prevalence of low bone density compared with their HIV-uninfected peers. However, the effect of HIV on

bone density was most marked in the last stage of puberty, especially affecting the spine in females. Use of TDF was strongly linked with bone deficits, particularly affecting the total body.

Rukuni R *et al.* (2021). [Effect of HIV infection on growth and bone density in peripubertal children in the era of antiretroviral therapy: a cross-sectional study in Zimbabwe](#). *The Lancet Child and Adolescent Health*.

Image: An IMVASK (Impact of Vertical HIV infection on child and Adolescent Skeletal development) clinic in Harare © Cynthia Mukwasi-Kahari, Harare

[Jonathan Sterne](#) (Bristol Medical School) has been elected to The Academy of Medical Sciences' respected and influential Fellowship. Jonathan is Professor of Medical Statistics and Epidemiology at the University of Bristol, Director of the Health Data Research UK South West Better Care Partnership, and Deputy Director of the NIHR Bristol Biomedical Research Centre.

His research uses cutting edge epidemiological and statistical methods to understand how

Academy of Medical Sciences Fellowship

to predict and treat disease. He led development of tools to assess the risk of bias in



randomised trials and nonrandomised studies that are used by systematic review authors worldwide. Since 2005 he has led the ART Cohort Collaboration (ART-CC) of European

and North American HIV cohort studies, which has made substantial contributions to understanding the prognosis and treatment of people living with HIV in the era of combination antiretroviral therapy.

My Fellowship...reflects the vital contributions of medical statistics and epidemiology to medical sciences, in an era when unprecedented availability of big data is opening up new possibilities for impactful research.

Studies on COVID-19 vaccination

A [survey analysis conducted by a team at Bristol and King's College London](#) looked at a range of factors that previous studies had found to be related to hesitancy about getting vaccinated against the coronavirus and found that women, young people, less-educated people, and members of other than white ethnic groups are more hesitant about getting vaccinated, as are people who get their information about COVID-19 from social media. However, they also found that many of these differences can be explained by people's attitudes towards vaccines in general and also by whether or not they suspect that there has been a conspiracy or cover-up connected with COVID -19.

Allington D *et al.* (2021). [Coronavirus conspiracy suspicions, general vaccine attitudes, trust, and coronavirus information source as predictors of vaccine hesitancy among UK residents during the COVID-19 pandemic](#). *Psychological Medicine*.

Preference for the AstraZeneca vaccine declined in April '21 when concerns about blood clots increased. Despite this, vaccine confidence was higher than it was towards the end of 2020, and the proportion of people who say they want to

be vaccinated has risen. The [research](#), led by the University of Bristol, King's College London and the NIHR Health Protection Research Unit in Emergency Preparedness and Response, found that 17% of the public said they'd prefer to



have the AZ vaccine if they had a choice - down from 24% in March '21. 23% of people believed the AZ vaccine causes blood clots – up from 13% the month before. But the public are still most likely to say this claim is false (39%) or that they don't know whether it's true (38%). Vaccine-hesitant people are more than twice as likely as both the public overall and the vaccine-confident to believe the AZ vaccine causes blood clots. But a growing belief that the UK's main COVID-19 vaccine is linked to blood clots [has not dented overall levels of confidence in vaccines](#) in general.

Report: Allington D *et al.* (2021). [COVID-19 vaccines: Confidence, concerns and behaviours](#).

Nearly one in five people who

haven't had a COVID vaccine say they'll feel resentful towards those who have if they don't get one in time for their summer holidays; 39% of the public believe unvaccinated people will face discrimination. The proportion of the public who think vaccine passports will infringe civil liberties has increased since March and about half think they'll be sold on the black market, according to another [new study](#).

They also found that four in ten people think younger age groups will be less likely to get vaccinated when it's their turn, and that some have confusions about second vaccinations and how the jabs affect fertility.

When people are asked how their [trust in the UK government](#) has changed as a result of the overall experience of the pandemic, 18% say it has increased, while 39% say it has decreased (39% say it's made no difference). But they have a much more favourable perception when asked how the vaccination programme has influenced their views.

Reports: Allington D *et al.* (2021). [Covid-19 vaccines: beliefs, uncertainties and passports](#).

Allington D *et al.* (2021). [Coronavirus: vaccine beliefs as the rollout ramps up](#).

Queen's birthday honours

Dr [Ellen Brooks Pollock](#) (Bristol Veterinary School) was been awarded an OBE for her services to the Scientific Pandemic Influenza Group on Modelling (SPI-M) and the Scientific Advisory Group for Emergencies (SAGE) during the COVID-19 response. Dr Brooks Pollock has worked in infectious disease modelling for 15 years. During the pandemic she has been a regular contributor to SPI-M, a subgroup of SAGE that provides modelling evidence to the UK



government. She developed a [methodology](#) for condensing multiple policy options into a single figure that was used by the highest levels of government to [manage and plan the easing of lockdown](#), including for the partial re-opening of schools in June 2020, the full re-opening of schools in September 2020 and vaccination rollout.



[Tim Cook](#), Honorary Professor in Anaesthesia (Bristol Medical School), was been awarded an OBE for his services to anaesthesia during COVID-

19. He is a full time District General Hospital consultant in Anaesthesia and Intensive Care Medicine. In Jan 2020 he became aware of the pandemic risk of COVID-19 and spent the next two months highlighting the risk and raising the alarm that the pandemic was coming to colleagues locally and nationally, working with the Royal College of Anaesthetists and Association of Anaesthetists to disseminate information to allow for early preparedness. Clinically, he spent several months working from home and has since returned to Anaesthesia and Intensive Care medicine in Bath.

An epigenetic clock for bats

New research by the University of Bristol as part of a team led by the University of Maryland (UMD) identifies age-related changes to DNA, revealing longevity-related differences among bat species. The study found that DNA from tissue samples can be used to accurately predict the age of bats in the wild. The study also showed age-related changes to the DNA of long-lived species are different from those in short-lived species, especially in regions of the genome near genes as-

sociated with cancer and immunity. This work provides new insight into causes of age-related declines.



The researchers looked at DNA from 712 bats of known age to find changes in DNA methylation at sites in the genome known to be associated

with aging. Analysing methylation may provide insight into many age-related differences between species and lead to a better understanding of the causes for age-related declines across many species.

Wilkinson GS *et al.* (2021). [DNA methylation predicts age and provides insight into exceptional longevity of bats.](#) *Nature Communications.*

Clockwise from top left: common vampire bat, greater horseshoe bat, velvety free-tailed bat and greater mouse-eared bat.
© Clockwise from top left: G. Wilkinson, G. Jones, M. Tschapka, S. Puechmaille

Tocilizumab cuts mortality in severely ill COVID-19 patients

Researchers from the University of Bristol and [Medanta Institute of Education and Research](#) in India led the COVID India Tocilizumab (COVINTOC) phase 3 randomised controlled trial aimed to investigate whether tocilizumab could prevent disease progression and mortality in hospitalised patients with moderate to severe



COVID-19. Analysis of trial data revealed a subset of patients with severe disease in whom tocilizumab might have a reduced risk for progression to death if treated with tocilizumab in addition to standard care; a suggestion that should be investigated further in future studies. It adds to existing evidence from the [RECOVERY](#) and [REMAP-CAP](#) studies which demonstrate that to-

cilizumab does have a significant impact on reducing mortality in those with COVID-19 requiring oxygen or being ventilated.

Soin AS *et al.* (2021). [Tocilizumab plus standard care versus standard care in patients in India with moderate to severe COVID-19 associated cytokine release syndrome \(COVINTOC\): an openlabel, multicentre, randomised, controlled, phase 3 trial](#). *The Lancet Respiratory Medicine*.

Infants produce strong immune response to SARS-CoV-2

During the pandemic, children have been much less likely to become seriously ill with COVID-19; an unexpected result, especially in infants who are known to be vulnerable to severe disease from other respiratory viruses, such as respiratory syncytial virus and flu. Early in the pandemic, it became evident young infants with COVID-19 who were being cared for by paediatricians at the Bristol Royal Hospital for Children were only mildly affected by the disease.

With very little data published on the immune response to SARS-CoV-2 in young babies, the research team set out to examine antibody and cellular

immune responses to SARS-CoV-2 in young infants compared with adults. They evaluated convalescent immune responses in four infants under three months old with confirmed COVID-19 who pre-



sented in March 2020 with mild febrile illness, alongside their parents, and adult controls who had recovered from confirmed COVID-19. The team found young infants produce relatively high levels of antibodies and immune cells that can specifically protect against COVID-19 com-

pared with adults.

The findings could help explain why young infants appear protected from severe COVID-19, at a period of their life when they could be more vulnerable. They would like to confirm their findings in a larger cohort of infants, as well as compare infant vs adult immune response during COVID-19 during and at several timepoints after their infection.

Goenka A *et al.* (2021). [Young infants exhibit robust functional antibody responses and restrained IFN- \$\gamma\$ production to SARS-CoV-2](#). *Cell Reports Medicine*.

Homelessness and HIV

Homelessness and unstable housing are associated with a substantial increase in HIV and hepatitis C virus (HCV) acquisition risk among people who inject drugs, according to research led by the [NIHR Health Protection Research Unit in Behavioural Science and Evaluation](#) at the University of Bristol. The study found that, among people who inject drugs, recent homelessness and unstable housing were associated with a 55% and 65% increase in HIV and HCV acquisition risk, respectively. The study is the first systematic review and meta-analysis (assess whether homelessness or unstable

housing increases HIV or HCV risk among people who inject drugs. Globally, there are an estimated 15.6 million people who inject drugs; over one in six are infected with HIV and



over half have been infected with HCV. People who inject drugs are at high risk of HIV and HCV infection through the sharing of needles, syringes and other injecting equipment

and experience high levels of homelessness and unstable housing. Globally, an estimated 22% of people who inject drugs reported experiencing homelessness or unstable housing in the past year, with this increasing to 42% in England (having increased from 28% in the last decade), and 50% in North America.

Arum C *et al.* (2021). [Homelessness, unstable housing and risk of HIV and hepatitis C virus acquisition among people who inject drugs – a systematic review and meta-analysis](#). *The Lancet Public Health*.

Smoking and pregnancy: risk of congenital heart disease

A study led by University of Bristol alongside a European collaboration of 7 other institutions brought together birth cohort data on more than 230,000 families. The study analysed associations between body mass index, smoking, and alcohol consumption on offspring congenital heart disease. Measurements were harmonised across cohorts as part of the LifeCycle project; an initiative that aims to research the role



of pregnancy and infancy factors on offspring health and wellbeing across childhood and into adulthood.

Results showed that mothers who smoke during pregnancy are more likely to have a child with congenital heart disease.

The data also suggested that being overweight or obese at the start of pregnancy or con-

suming alcohol may not be causes of congenital heart disease, despite previous research suggesting otherwise. These results might help in supporting women of reproductive age not to start smoking.

Taylor K *et al.* (2021). [Effect of maternal prepregnancy/early-pregnancy body mass index and pregnancy smoking and alcohol on congenital heart diseases: A parental negative control study](#). *The Journal of the American Heart Association*.

Changes in vaccine hesitancy

Half of those who said they would definitely not get a COVID-19 vaccine when asked in Nov/Dec '20 have now done so, indicating that many people's hesitancy has disappeared since the UK's vaccine rollout began.

Among people who said they were not very or not at all likely to accept a vaccine when asked last year, an even greater share (84%) have since been vaccinated. The research, by King's College London and the Univer-

sity of Bristol, is based on a survey of 4,896 UK adults conducted 1 - 16 April '21. It follows up a study in Nov/Dec 2020 and tracks 1,879 of the same individuals to see how their views have changed and why. The analysis reveals that, overall, 94% of people who have been invited for a vaccine have taken up the offer, but there's a need to avoid complacency; vaccine intentions and beliefs still vary among different groups, potentially undermining the

very high levels of coverage needed to stay on track for a further easing of lockdown, and leaving some communities more exposed. Misinformation continues to be a problem: 43% of the public now say they've seen or heard messages encouraging people *not* to get a Covid vaccine since the start of the pandemic.

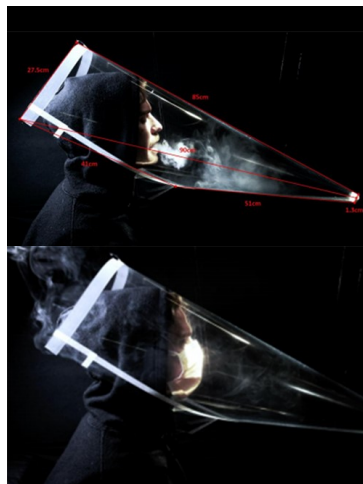
Report: Allington D *et al.* (2021). [Covid-19: vaccine take-up and trust.](#)

Risk of COVID-19 from aerosols to healthcare workers

New research challenges the guidance that special aerosol precautions are only needed when using oxygen therapies for COVID-19 patients, and raises concerns about safety of staff and patients on hospital wards, if they are not protected from infectious aerosols.

The study set out to examine whether oxygen therapies used for patients with severe COVID-19 produce large amounts of small respiratory particles (aerosols), which can transmit virus and can evade routine precautions used on hospital wards. They found these oxygen therapies do not produce excessive amounts of

aerosols and in fact reduce aerosols suggesting these



therapies can be made widely available. The study also showed that respiratory activities such as coughing and deep breathing are a major source of aerosol particles, and this has the potential to expose healthcare workers to

an increased risk of infection.

This challenges the current guidelines which state healthcare staff looking after patients with COVID-19 who are coughing and have breathing difficulty only need PPE that protects against the larger droplets. 'Droplet protection' includes surgical masks but does not prevent aerosol particles passing around the edges of the masks and being inhaled.

Wilson NM *et al.* (2021). [The effect of respiratory activity, non-invasive respiratory support and facemasks on aerosol generation and its relevance to COVID-19.](#) *Anaesthesia.*

GW4 One Health approach to AMR

The GW4 Alliance (Bath, Bristol, Cardiff and Exeter universities) formally [launched their new 'One Health' antimicrobial resistance research consortium](#) on 16 June 2021. The World Health Organisation cites antimicrobial resistance (AMR) as one of the most significant risks facing the world; it threatens global health and development as it impacts on human, animal and plant health and also our environment, water safety and food security. [The GW4 AMR Alliance](#) has been established to tackle this global challenge



and become the UK's leading interdisciplinary 'One Health' AMR research consortium, recognised worldwide.

The COVID-19 pandemic has brought the 'pandemic' of AMR into sharper focus. Antimicrobial use, which drives the emergence of AMR, increased in many intensive care units around the world, as clinicians mitigated the development of secondary bacterial and fungal infections in acutely ill hospitalised patients. AMR is a slower moving, 'silent pandemic', but requires urgent action now to stop resistance expanding and find

drugs to treat these infections. AMR disproportionately affects low-and-middle income countries. GW4 researchers are exploring what drives the emergence of AMR in different settings e.g. the environment (particularly in aquatic systems from industrial and domestic waste), livestock farming, aquaculture and healthcare. Identifying the drivers of AMR will help to help modify them by informing policy and implementing interventions to mitigate this rising threat. In the UK alone, there was a nine per cent increase in deaths caused by drug-resistant infections between 2017 and 2018.

Image © Ginny Gould (aquaculture farm)

Effectiveness of COVID-19 vaccine against hospitalisation

AvonCAP (community-acquired pneumonia), an ongoing surveillance project funded by Pfizer Inc., records detailed information on every adult patient admitted to Bristol's two NHS hospitals with symptoms, signs and/or X-ray evidence of acute disease in the lungs. The study identified 466 cases from 18 December 2020 (ten days after the UK's COVID-19 vaccine programme began) to 26 February 2021 and who were eligible for vaccination due to being at least 80 years of age by the end of

March 2021. By taking the acute respiratory disease cases who had a positive test for SARS-CoV-2 on hospital admission and those whose test was negative and comparing the immunisation rates in the two groups, the effectiveness of one dose of the vaccines was estimated. One dose of the Pfizer-BioNTech vaccine, which began to be used on 8 December 2020, was shown to be 71.4% effective from 14 days after one dose at preventing symptomatic illness severe enough to result in

hospitalisation. One dose of the Oxford-AstraZeneca vaccine, which began to be used on 4 January 2021, was shown to be 80.4% effective from 14 days after one dose at preventing symptomatic illness severe enough to result in hospitalisation.

Hyams C *et al.* (2021). [Assessing the effectiveness of BNT162b2 and ChAdOx1nCoV-19 COVID-19 vaccination in prevention of hospitalisations in elderly and frail adults: a single centre test negative case-control study](#). *The Lancet*

Do portable air filters reduce incidence of infection?

There is an important absence of evidence regarding the effectiveness of a potentially cost-efficient intervention to prevent indoor transmission of respiratory infections, including COVID-19. Respiratory infections are common in all age groups, and can be either viral or bacterial. Bacteria and viruses can become airborne via talking, coughing or sneezing. The current global coronavirus pandemic is also spread primarily by airborne

droplets. Controlling how we acquire and transmit respiratory infections is of huge importance, particularly within indoor environments such as care homes, households, schools/day care, office buildings and hospitals where people are in close contact. A team from the University of Bristol reviewed previous studies to investigate whether portable air filters used in any indoor setting can reduce incidence of respiratory infections and thus, whether

there is any evidence to recommend their use in these to reduce their spread. The researchers found no studies investigating the effects of portable, commercially available air filters on the incidence of respiratory infections in any indoor community setting.

Hammond A *et al.* (2021). [Should homes and workplaces purchase portable air filters... A systematic review.](#) *PLoS One*.

Dental procedures low risk in aerosol spread of COVID-19

COVID-19 has required additional precautions in dental practices to protect patients and staff, including the use of FFP3 masks and extra time between patients to allow aerosol to disperse. These measures only apply to dental aerosol generating procedures and have led to a dramatic reduction in dental services. The research, part of the AERosolisation And Transmission Of SARS-CoV-2 in Healthcare Settings (AERATOR) study, set out to measure the amount of aerosol produced from a wide range of dental procedures carried out on patients. Where aerosol was detected in patient procedures, the re-

search team compared the size distributions of this aerosol to the aerosol produced from the dental instrument itself when used in a (non-patient) phantom head con-



trol. The study found the ultrasonic instrument, commonly used for dental scaling, produced much lower aerosol concentrations than the high-speed dental drill despite the two instruments currently re-

quiring the same precautions. Also, aerosol produced during the ultrasonic scaling procedure was consistent with the clean aerosol produced from the instrument itself and did not show additional aerosol is produced that could potentially spread COVID-19. The study confirms much of the guidance around dental procedures deemed as low risk of spreading COVID-19 is correct, but suggests that the ultrasonic instrument could be seen as lower risk than it currently is.

Dudding T *et al.* (preprint). [A clinical observational analysis of aerosol emissions from dental procedures.](#) *medRxiv*.

Four repurposed antiviral drugs and COVID-19

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 interim findings from the [WHO Solidarity trial](#) followed 11,266 adults at 405 hospitals in 30 countries. The study 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 addi-

tion 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 randomization system during March 2020.



Patients were aged over-18, with 2,750 randomly allocated to Remdesivir, 954 to hydroxychloroquine, 1,411 lopinavir, 651 interferon plus lopinavir, 1,412 only interferon, and 4,088 no study drug. None of the study's four repurposed antiviral drugs sub-

stantially reduced mortality (in unventilated patients or any other subgroup) or delayed the need for ventilation.

It's disappointing the four treatments evaluated in the Solidarity trial did not substantially reduce mortality. But it is encouraging that the trial will continue to evaluate promising new treatment options.

Prof [Jonathan Sterne](#)

Deputy Director, NIHR Biomedical Research Centre

WHO Solidarity Trial Consortium (2021). [Repurposed antiviral drugs for Covid-19 - interim WHO solidarity trial results](#). *New England Journal of Medicine*.

Pressures on anaesthesia and workforce and surgery

Research shows the huge pressure anaesthesia and critical care staff in the UK have been under throughout the winter wave of COVID-19, as the number of newly admitted infected patients surged and most planned surgeries, including a substantial number of critical cancer operations, were cancelled.

Between October 2020 and January 2021 a team conducted three national surveys to track anaesthetic, surgical and critical care activity during the second COVID-19 pandemic

wave in the UK – the first round as the November 2020 lockdown was being implemented, the second in December 2020 as restrictions were lifted, and the final survey in February 2021 just after the peak of the new year surge caused by the Alpha variant of SARS-CoV-2. They surveyed all NHS hospitals where surgery is undertaken. The surveys showed increasing systemic pressure on anaesthetic and peri-operative services due to the need to support critical care pandemic

demands. There was evidence of significant stress in the system in October and this increased in December 2020 including redeployment of one in six doctors from anaesthesia to critical care, and by December approximately half of critical care units were expanded so much that planned surgery could not be safely undertaken.

Kursumovic E *et al.* (2021). [The impact of COVID-19 on anaesthesia and critical care services in the UK: a serial service evaluation](#). *Anaesthesia*.

Longest known SARS-CoV-2 infection treated

An immunocompromised individual with the longest known PCR confirmed case of SARS-CoV-2 infection, lasting more than 290 days, has been successfully treated with two investigational monoclonal antibodies (laboratory engineered antibodies). Clinicians and researchers from the University of Bristol and North Bristol NHS Trust (NBT) worked closely to assess and treat



the infection and want to highlight the urgent need for improved access to treatments for such people with persistent SARS-CoV-2 infection. The team were able to finally treat the individual successfully with a mixture of two monoclonal antibodies, casirivimab and imdevimab, supplied on a compassionate use basis by Regeneron. The researchers found that the virus evolved during the infection, ac-

quiring mutations that are present in SARS-CoV-2 variants of concern. The study shows the success of a specific treatment regime which is not yet clinically approved for use in the UK.

Williamson MK *et al.* (preprint). [Chronic SARS-CoV-2 infection and viral evolution in a hypogammaglobulinaemic individual](#). *medRxiv*.

Image: Mr Smith, the patient with the longest known SARS-CoV-2 infection (as of 24 June 2021)

Evidence that informed UK Gov's response to COVID-19

Scientific evidence that was used to inform the UK government's key policies impacting millions of people during the first wave of COVID-19 including the rule of six and the first national stay-at-home order was published on 31 May 2021 in the journal of the Royal Society. The Special Theme issue was compiled and guest edited by SPI-M scientists including infectious disease modellers Drs [Ellen Brooks Pollock](#) and [Leon Danon](#) at the University of Bristol. The issue contains modelling work that was presented to the Scien-



tific Advisory Group for Emergencies ([SAGE](#)) modelling subgroup, known as SPI-M (Scientific Pandemic Influenza Group on Modelling) between January and July 2020 to help predict COVID-19 spread, hospitalisations and mortality rates. Mathematical modelling studies detailed in this Special Theme issue were produced in response to policy questions and the rapidly changing epidemiological situation with new evidence continually emerging around infection patterns, variants and asymptomatic transmis-

sion. The issue provides insight into the knowns, unknowns and often complex trade-offs involved in understanding and controlling an infectious disease including some of the first estimates of the reproduction number, determining whether a new variant is causing more hospitalisations or deaths and the effectiveness of different testing strategies on virus transmission and suppression.

Ellen Brooks-Pollock, Leon Danon, Thibaut Jombart and Lorenzo Pellis (2021). [Modelling that shaped the early COVID-19 pandemic response in the UK](#). *The Philosophical Transactions of the Royal Society B*.

ELIZABETH BLACKWELL FUNDING

Nurturing
Research.
Improving
Health.



EBI Support for researchers applying 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. Applications accepted on a **rolling** basis.

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. This scheme is currently closed to submissions for any projects focusing on face to face engagement.

If you would like to apply for funding to support an engagement activity which adheres to social distancing guidance relating to coronavirus, please get in touch to discuss this in more detail. Applications accepted on a **rolling** basis.

EBI Workshop Support

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

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). Applications **reviewed all year**.

FUNDING OPPORTUNITIES

Research Professional provides access to an extensive database of funding opportunities. 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 any device. You can search for funding information by discipline, sponsor, database searches, by recent calls or by upcoming deadlines. If you register for the site and log in, you'll be able to:

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

For further information on Research Professional, go to the [RED website](#).

*Research Professional

British Society for Immunology

[Travel awards](#)

Closing date: 1 August 2021

Award amount: £1,000

These enable members to attend scientific meetings or visit laboratories for specific short-term activities, such as collaborative research or to learn new techniques. Members of the society of at least 12 months' standing may apply.

Healthcare Infection Society

[Small research grants](#)

Closing date: 1 September 2021

Award amount: £10,000

These support small-scale research projects within the scope of infection prevention and control and nosocomial infections, or possibly the costs associated with the visit of an overseas research fellow. The scheme may be used for the following:

- small research projects to answer well-defined and concise IPC or healthcare associated infection questions;
- create proof of principle data to underpin external applications for additional funding;
- build new collaborations between clinicians and researchers;
- provide access to funds for further hypothesis testing;
- encourage innovative and interdisciplinary research in IPC;
- build consortia for specific funding calls.

Medical Research Council[Research grants - infections and immunity](#)

Closing date: 8 September 2021

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.

Medical Research Council[New investigator research grant - infections and immunity](#)

Closing date: 8 September 2021

Award amount: £ unspecified

This supports researchers who are capable of becoming independent PIs and who are ready to take the next step towards that goal within the areas of infections and immunity. Applicants are expected to combine their time with a portfolio of other activities.

National Institute of Allergy and Infectious Diseases, US[Systems approach to understand mechanisms of heterogeneous response to influenza \(R01 clinical trial not allowed\)](#)

Closing date: 8 September 2021

Award amount: USD unspecified

This supports the identification of mechanisms behind heterogeneous responses in the population to influenza infection or vaccination through development and application of computational tools. This initiative will support:

- identification of the mechanisms regulating the effects of host factors
- identification of markers of severe outcome to infection
- identification of markers of response or nonresponse to seasonal influenza vaccine

Horizon Europe[HORIZON-HLTH-2021- DISEASE-04 – tackling diseases](#)

Closing date: 21 September 2021

Award amount: €25 million

This supports projects that set out a credible pathway to contributing tackling diseases and reducing disease burden.

National Science Foundation[Ecology and evolution of infectious diseases](#)

Closing date: 17 November 2021

Award amount: USD 2.5 million

Supports collaborative research on the ecological, evolutionary and social drivers that influence the transmission dynamics of infectious diseases.

THIS ISSUE'S FEATURED ARTICLE

Climate and the seasonal abundance of the tick *Dermacentor reticulatus*

Sands BO, Bryer KE and Wall R. *Medical and Veterinary Entomology*. First published 4 May 2021.

Dermacentor reticulatus (Ixodida: Ixodidae, Fabricius 1794) is one of the most widely distributed and abundant tick species in central Europe and is a vector for a range of pathogens. Nevertheless, many aspects of its ecology and distribution remain poorly understood. To quantify the seasonal abundance of this species in the U.K. and the environmental factors that determine this, weekly sampling at sites throughout Wales and southern England was undertaken for 12 months. This



showed that the activity of adult *D. reticulatus* peaked February and March and that no individuals were collected between May and mid-October; no questing tick activity was observed when the 5-day average temperature was greater than 15 °C. A single nymph was collected by dragging, confirming speculation over the nidicolous status of larval and nymphal stadia. Laboratory analysis found that *D. reticulatus* were able survive cold shock and the lower lethal temperature was estimated to be between -18 and -20 °C. Habitat was significantly associated with

tick activity, with higher numbers of ticks collected from low lying vegetation in marsh environments than from exposed grassland or woodland. A strong association was observed between activity and saturation deficit suggesting that the seasonal pattern of activity seen in the field, within the sites where it was abundant, is more strongly determined by temperature than humidity. Range expansion within the U.K. should be expected, bringing with it an elevated disease risk for animal and human hosts.

The University of Bristol hosts an online resource for the identification of ticks of veterinary importance, called [Tick ID](#). *Dermacentor reticulatus*, also known as the ornate dog tick or meadow tick, uses most medium-sized mammals, including sheep, cattle, dog, horse pig and human as hosts and is widespread across western Europe where it is mainly found in wooded areas. It is also largely found in coastal areas in west Wales and southwestern England. Pathogens and diseases associated with the tick include:

- *Babesia canis*
- *Babesia ovis*
- *Theileria ovis*
- *Coxiella burnetti* (Q fever)
- *Anaplasma ovis*
- *Infectious encephalomyelitis*
- *Francisella tularensis*
- *Brucella*
- *Rickettsia conorii* (Boutonneuse fever)
- *Theileria equi*
- *Babesia caballi*

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The content of this newsletter is not the intellectual property of the Network, but rather an amalgamation of information obtained through a variety of sources including our [community members](#); research groups such as [Bristol AMR](#) and [Infection, Inflammation and Immunotherapy](#); and University of Bristol [school bulletins](#) and [press releases](#).

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

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