

# INFECTION AND IMMUNITY THEME NEWSLETTER



University of  
**BRISTOL**  
Elizabeth Blackwell Institut  
for Health Research

**JULY - AUGUST 2016**

## AMR Innovation Grants

Two grants have recently been awarded in response to a focussed *AMR Theme 2: Accelerating Therapeutic and Diagnostics Development* call. Innovation Grants support untested, high risk/high reward research that will provide new insights, be transformative and stimulate creative thinking.

Dr [Matthew Avison](#)'s project aims to develop a new rapid diagnostic test that can predict which antibiotics might be used to treat an infection. Such a test would help doctors prescribe effective antibiotics first time and make them less reliant on the latest,

strongest antibiotics, holding them back for when their use is really necessary.

The test would identify the bacterial enzymes present in an infection allowing doctors to use those antibiotics that would not be destroyed by them.

Prof [Bo Su](#)'s award will allow him to generate novel nano-patterned surfaces on clinically relevant materials that are able to kill a wide range of bacteria, including antimicrobial-resistant pathogens. Biomaterials-associated infection is one of the dominant causes of implant failure. Currently, anti-

microbial biomaterials are largely reliant upon antibiotics and antimicrobial agents; however, they are transient. Over a period of time, the reservoir of leaching antimicrobial agent is limited and subject to depletion. Inspired by nanostructured surfaces found on insect wings, which kill bacteria through physical rupture of their cell walls, the team hope to develop such novel antimicrobial surfaces that will be used for next-generation biomedical devices and implants.

*A micrograph of a biomaterial specially designed to trap and kill bacteria. © Prof Bo Su*

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## UoBRISTOL EVENTS



### **Beyond Star Trek: Synthetic biology and NASA's missions: Colston Research Society Annual Public Lecture**

7 September 2016, 18.30 - 19.30. Prof Lynn Rothschild (Ames Research Center), Wills Memorial Building

### **Engage 2016: Building Connections, Sharing Ideas**

15 September 2016, 9.00 - 14.00. Richmond Building, Queens Road

### **Brigstow ideas lunches - Ethics and Practices**

3 October 2016, 12.00 - 14.00. Verdon-Smith Room, Royal Fort House



### **8th Annual 'Research, Audit & Quality Improvement' Day**

18 November 2016, 9.00 - 17.00. Engineers' House, Clifton

### **Elizabeth Blackwell Institute Biomedical and Health Research Industry Day**

24 November 2016, 9.00 - 16.00. Wills Memorial Building

### **Skeletal systems mechanobiology and personalized medicine**

23 May 2017, 13.00 - 14.00. Ralph Müller (ETH Zürich), seminar rooms A&B, Level I Learning & Research, Southmead Hospital



## OTHER EVENTS

### **Enhancing Facilitation Workshop**

6 September 2016, 8.45 - 13.00. The Dartington Suite, UWE, Frenchay Campus, Coldharbour Lane

### **Past, Present and Future of Medicine**

12 September 2016, 9.30 - 17.00. Edinburgh International Conference Centre

### **2nd International Antibody Validation Meeting**

15 September 2016, 9.00 - 16 September 2016, 13.00. Chancellors' Building, University of Bath, Claverton Down, BA2 7AY

### **Building Research Partnerships Workshop**

19 October 2016, 9.30 - 16.30.

### **British Society for Immunology Annual Congress**

6 December 2016, 9.30 - 17.30. Arena Conference Centre, Liverpool

Top: Lynn Rothschild, NASA. Middle: Ralph Müller, ETH Zürich. Bottom: the British Society of Immunology's annual congress takes place in December 2016

## NEWS

### Bio-ink for 3D Printing with Stem Cells

A new stem cell-containing bio-ink allows 3D printing of living tissue. The ink contains two different polymer components: a natural polymer extracted from seaweed, and a sacrificial synthetic polymer used in the medical industry. The latter causes the bio-ink to change from liquid to solid when under raised temperatures; the former provides structural support when cell nutrients are introduced.

Lead researcher Dr Adam Perriman explained the challenges in designing the bio-ink, which went through sev-

eral iterations before being finalised:

*You need a material that is printable, strong enough to maintain its shape when immersed in nutrients, and that is not harmful to the cells. The special bio-ink formulation was extruded from a retrofitted benchtop 3D printer, as a liquid that transformed to a gel at 37°C, which allowed construction of complex living 3D architectures.*

The team were able to differentiate the stem cells into osteoblasts and chondrocytes to engineer 3D printed tissue structures over five weeks,

including a full-size tracheal cartilage ring.

*What was really astonishing was when the cell nutrients were introduced, the synthetic polymer was completely expelled from the 3D structure, leaving only the stem cells and the natural seaweed polymer. This, in turn, created microscopic pores in the structure, which provided more effective nutrient access for the stem cells.*

Armstrong JP et al. (2016). **3D Bioprinting Using a Templated Porous Bioink**. *Advanced Healthcare Materials*. Published online 22 Jun 16

Artist's impression of bioprinting in action.

### West of England Genomic Medicine Centre



A partnership made up of NHS provider organisations in Bristol, Bath, Cheltenham and Gloucestershire, universities, the West of England Academic Health Science Network, Health Education South West and NHS commissioners has been designated the **West of England NHS Genomic Medicine Centre** (WEGMC).

The centre is part of a three year project to transform diagnosis and

treatment for patients with cancer and rare diseases. This involves collecting and decoding 100,000 human genomes that will enable researchers to understand more about specific conditions and could allow personalisation of drugs and other treatments to specific genetic variants. Eligible patients will take part in a test to be processed at Southmead before being sent nationally for sequencing. Some patients could benefit

from a quicker conclusive diagnosis for a rare and inherited disease or cancer as treatment may be targeted at a particular genetic change.

Prof Ruth Newbury-Ecob, based in the Clinical Genetics Service at University Hospitals Bristol, specialises in rare diseases and is working to develop new genetic testing, translating research findings into NHS services for patients across the UK.

## Retinal Outreach, Integration and Research HIT

The RENOIR Health Integration Team begun in Dec 2012 was a strategic ambition to embed translational and clinical research into service delivery. Building on the work of the Retinal Treatment and Research Centre, the HIT has achieved its objectives.

Expanding their services through a modernised system using outreach clinics has allowed the NHS to deliver evidence-based services to more people closer to home, improving patient choice and delivering research

that brings new drugs and treatments to people who might not otherwise have access to them.

They have responded to the increased prevalence of retinal conditions by designing and delivering optimal and cost efficient care. They have enhanced their services through the use of modern imaging developments and IT, and extending their team's skills. They have already recruited, trained and extended the role of optometrists, technical staff and nurses, leading to a more

cost-effective delivery of services, a reduction in tariffs for this pathway of care, and enhanced research delivery.

Their outreach programme now provides high quality, modern services, treating patients closer to home to the

same standards as the Bristol Eye Hospital (BEH).

Director of RENOIR Prof [Andrew Dick](#) (pictured below) confirmed that the HIT's aims are now embedded in BEH's day to day operational activities.



## New Enterprise Competition

The competition is the University's flagship business idea challenge which is open to students, staff, and recent graduates. Whilst there are different stages to the competition, all you really need is an original idea for a self-sustaining business. It's open to both commercial and social enterprises, and

includes everything from simple conceptual ideas through to businesses in their first year of trading. Throughout the competition participants are provided with educational events, opportunities to get feedback and support, and the chance to meet all kinds of useful contacts. Each year the total

prize pot is around £35,000, all kindly donated by sponsors. This includes cash prizes, packages of legal support, and business acceleration services.

The deadline for applications is 1 September 2016. Details on how to apply are on the [website](#).





## Diels-Alderase Existence Proven

The Diels-Alder reaction is used extensively to synthesise antibiotics and anti-cancer drugs, amongst other things. Much debate exists on whether the reaction is present in nature, and if so, which enzymes are involved.

A team at [BrisSynBio](#) have conclusively shown that a true Diels-Alder enzyme exists, and have established in atomic detail how it catalyses the reaction.

Dr [Paul Race](#) confirmed that the enzyme, called AbyU, was found in bacterium *Verrucosipora maris* (pictured in the background) which lives on the Pacific seabed. It uses AbyU to biosynthesise molecule abyssomicin C, which has potent antibiotic properties.

The team determined the structure of the enzyme and then simulated its reaction using quantum mechan-

ics methods. Once the mechanism for how *V. Maris* was able to make natural antibiotic, they could demonstrate that it could also perform the Diels-Alder reaction on other molecules that are difficult to transform using synthetic chemistry.

The team are now investigating ways of using the enzyme to make molecules similar to abyssomisin C, in the hope that antibiotics are found that

are even more effective than the natural molecule. The work opens up a raft of possibilities for making new useful molecules that could, for example, form the basis of new medicines, materials, or commodity chemicals.

Race P et al. (2016). [The catalytic mechanism of a natural Diels-Alderase revealed in molecular detail](#). *Journal of the American Chemical Society*. 138 (19), pp 6095–6098

## £1.5M for Drug-Resistant Infections

PI Dr [Matthew Avison](#) has received a joint award from NERC, BBSRC and MRC under the *AMR in the Real World* call. A major aim is to test whether AMR bacteria from cattle cause drug resistant infections in humans.

AMR bacteria lodge in the gut after ingestion, causing little harm. Occasionally they migrate to other places, e.g. the urinary tract, creating symptoms that are treated with antibiotics. Tens of thousands of these

AMR infections occur every year, causing longer and more severe illnesses than would otherwise be anticipated.

Overuse of antibiotics in farm animals and pets increases the number of AMR bacteria in those animals. There is evidence that AMR bacteria in farm animals spread to humans with close physical contact, but debate exists in the extent that they can spread more widely, i.e. when people eat food contaminated

with bacteria from animals or interact with environments contaminated with animal wastes.

The project will sample 500,000 people in the Bristol area over a year to determine how many urine infections are caused by AMR bacteria that are also found in dairy cows. It will also explore means of reducing AMR levels in bacteria in animals, and examine how the wider population is exposed to bacteria from dairy cattle

through *Generation Pup*, which will monitor levels of AMR bacteria in puppies' faeces before outside exposure and after several months of walks along public footpaths which cross farmlands.

Finally, the project will put animal-human AMR transmission into context by determining the effect of antibiotic use in humans by GPs on the levels of AMR bacteria in people, and what happens when that antibiotic use is reduced.

## NIHR Awards: Outstanding Contributions

Senior Investigators are the NIHR's preeminent researchers and represent the country's most outstanding leaders of clinical and applied health and social care research. They are fundamental to the formation of the [NIHR Faculty](#), through:

- Providing research leadership to the NIHR Faculty, promoting clinical and applied research in health and social care

- Hosting visiting fellows and mentor trainees
- Constituting a network of experts, able to provide advice to the Department of Health's Director General for Research and Development

Thirty-four new **Senior Investigators** were appointed, including:

- Prof [Ashley Blom](#), Orthopaedics
- Prof [Rona Campbell](#), Preventive Medicine

- Prof [Matthew Hickman](#), Epidemiology
- Prof [Christopher Salisbury](#), Primary Health Care

In addition, four **Emeritus Senior Investigators** were appointed:

- Prof [Gianni Angelini](#), Cardiac & Cardiovascular Systems
- Prof [Jenny Donovan](#), Public Health
- Prof [David Gunnell](#), Epidemiology & Prevention of Chronic Disease

- Prof [Tim Peters](#), Economics, Statistics & Biostatistics

It is a considerable achievement to attain Emeritus status, holders having succeeded twice in open competition and completed two terms as a Senior Investigator. Criteria include quality and volume of internationally excellent research, relevance to patients and the public, and impact on improvements in healthcare.

[More info...](#)

## Hep C Treatment to Prevent Transmission?

A team comprising researchers in the UK, San Diego and Australia has explored the potential impact of new drugs for hepatitis C virus (HCV), a known cause of liver cancer which is transmitted through blood to blood contact.

People who inject drugs (PWID) and men who have sex with men (MSM), who are also infected with HIV, are key risk groups for HCV infection in UK. New HCV treatments are highly effective, with cure rates often better than 90%, but treatment is expensive and patients with severe liver disease are being prioritised by NHS England.

A series of studies have been published assessing the potential of HCV treatment in preventing HCV transmission, as well as future liver disease. In a study looking specifically at HCV infection rates in HIV-positive gay men, the researchers found the proportion of HIV+ gay men with HCV increased slightly from 2004 to 2011, and that current treatment rates were unlikely to reduce HCV transmission over time.

Prof [Peter Vickerman](#) used an economic model which suggests that the most cost-effective group to treat early were people who inject drugs with moderate or mild disease, due to the prevention benefit of reducing onward infection. They also studied the cost-effectiveness of HCV case finding among prisoners, which suggested that increasing testing could be cost-effective with shorter duration HCV treatments, especially if HCV treatment rates were increased. [More info...](#)

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The **Elizabeth Blackwell Institute's Clinical Primers** are aimed at Medical & Veterinary clinical graduates and are designed to give outstanding early career clinicians the chance to experience a world-class research environment for the first time. Congratulations are extended to Georgina Newman (pictured) who will

research *Diabetic Nephropathy*. UoB and the Student Union announced nominations for the **2016 Bristol Teaching Awards** earlier this year. These recognise staff who have made an outstanding contribution to teaching, the provision of support for students and education more generally. Nominees

## Interesting Tidbits

included: Students' Award for Outstanding Teaching (Biomedical Sciences)- Dr [Matthew Avison](#) University Award for Education (Health Sciences)- Dr [Kristen Reyher](#) Students' Award for Outstanding Teaching (Science)- Prof [Gary Foster](#)

Following its first funding call, **Brigstow** has formed

a number of **Experimental Partnerships**; among them is **Poo Patrol** which brings together veterinary scientists [Eric Morgan](#) and [Katy Turner](#) and social scientist [Debby Watson](#) with community-based projects in Bristol and Ireland to develop a toolkit that enables communities to create, implement and evaluate anti-dog fouling measures.

## Meeting Demand in Bacterial Factories

Work conducted by [BrisSynBio](#) describes a new way to model productivity in bacteria used as mini-factories to produce biological components. With no extra resources supplied, these bacterial 'factories' have to decide between making a new protein or making proteins for their own survival. Dr [Thomas Gorochofski](#) and colleagues have created a mathematical model which predicts this conflict over resources and advises protein designers

how to make these micro-factories produce more efficiently. Synthetic biology is an emerging discipline which uses natural building blocks found in cells to design new biological structures. The drain on bacterial resources challenges their capability to grow and function. Bioengineering exploits the native machinery of cells to produce biological products and materials in a clean and sustainable way. However, ensuring we understand the addi-

tional burden of these demands is crucial to ensure maximum efficiency. Thomas' new model highlights the conflict faced by bacteria producing this extra material, providing solutions to the problem and enabling more efficient production of synthetic proteins. Previous models are loaded with complex factors, but this new approach makes it easier for precise predictions to be made from a few easy-to-measure parameters. The model

will help designers of synthetic constructs take into account the battle for resources, leading to designs which reduce the burden on bacterial factories.

Gorochofski I *et al.* (2016). [A minimal model of ribosome allocation dynamics captures trade-offs in expression between endogenous and synthetic genes](#). *ACS Synthetic Biology*. 5 (7), pp 710–720

Image © Thomas Gorochofski



## Amber Study

Prof Tony Killard, Head of Biomedical Sciences at(UWE), has created a mass producible sensor which can detect ammonia levels in breath - named AmBeR. The technology will allow patients to test their ammonia levels painlessly with greater accuracy, on a more fre-

quent basis and even while at home when a self-testing version of the device is developed.

Prof Killard (pictured) has formed a company called **BreathDX** to market his innovation. Prof **Julian Hamilton Shield** will be working with Tony in a study evaluating and



validating the breath ammonia measurement technology for

the improved management of patients with urea cycle defects.

## Young Investigator of the Year Award

Dr **Adam Perriman**, Senior Research Fellow in the School of Cellular and Molecular Medicine, has won the **British Biophysical Society's Young Investigator of the Year** award and medal.

The award was introduced in 2002 to celebrate an outstanding contribution in any area of biophysics

made by a young researcher in the UK and Ireland and is presented every two years to those within 10 years of completion of their PhD. The winner receives a cheque for £1000 and a medal to commemorate the event.

Adam's research focuses on the construction and study of novel hybrid biomolecular systems using advanced physical techniques. His research spans the fields of nanotechnology, biophysical



chemistry, and tissue engineering.



He will receive his prize at the Society's 2016 meeting in July at the University of Liverpool., where he will also deliver a plenary lecture.

## Journal of Immunology Highlight

An article published in the 15 June 2016 issue of *The Journal of Immunology* is being featured by the *In This Issue* section. The section highlights articles considered to be among the top 10% of articles published in the journal.

Morgan SB, Hemmink JD, Porter E, Harley R, Shelton H, Aramouni M, Everett HE, Brookes SM, Bailey M, Townsend AM, Charleston B and Tchilian E. **Aerosol Delivery of a Candidate Universal Influen-**

**za Vaccine Reduces Viral Load in Pigs Challenged with Pandemic H1N1 Virus.** *The Journal of Immunology.* 196(12), pp5014-5023

*We conclude that local cellular immune responses are important*

*for protection against influenza A virus infection, that these can be most efficiently induced by aerosol immunization targeting the lower respiratory tract, and that S-FLU is a promising universal influenza vaccine candidate.*

## Public Engagement

The Public Engagement team supports and promotes engagement beyond academia at UoB. They offer the following:

- Advice on developing engagement activities
- Help with funding applications for engagement, including as a route to impact in research grants
- Delivering teaching and training on engagement and impact
- Enabling sharing of

good practice internally through an engagers' network and our annual Engage conference, as well as externally with other universities and engagement practitioners

- Co-ordinating a programme of grant-funded innovative engagement activities
- Ensuring engagement and impact are recognised and embedded in University structures and processes

Public engagement is an exciting and rewarding part of research, working out how best to communicate the ideas from research to stakeholders, in ways that will help change lives for the better. The team is available to help researchers disseminate their work to the wider community, assist in finding partners in industry, policy, healthcare etc., and

provide support in achieving greater impact, both at grant application and reporting stages.

The **Public Engagement office** publishes a bi-monthly **Engagers' Digest** - register by emailing [cpe-info@bristol.ac.uk](mailto:cpe-info@bristol.ac.uk)



Following the result of the referendum on 23 June 2016, The [International Team in Research Development](#) wish to confirm that there will be no immediate impact with regards to [Horizon 2020 funding](#). All existing grants will continue to run as normal and anything currently under submission or in the granting process will also continue as normal. As many of you will have read, we will continue to be an EU member state for two more years at least and during this time

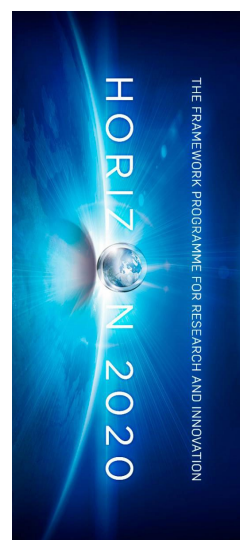
we will be eligible to apply to each and every call under Horizon 2020.

If the UK does eventually withdraw from the EU then there is a possibility that we will have negotiated [associated status](#) to H2020, like other countries such as Norway and Israel. [Universities UK](#) will be leading discussions around this with the government, and Bristol will be fully engaged with this process as well as via the [Russell Group](#). If no agreement can be

reached then this would likely mean the UK could no longer access H2020 funding but this would not come into effect until October 2018 at the earliest, based on current predictions.

In summary, in the short term it is very much business as usual and we would encourage everyone to continue to apply. If anyone has any concerns or questions, please do contact the [EU and overseas team](#)

## Horizon 2020 Funding



## Africa and Development Network (AND)

The International Unit has established the Africa and Development Network

(ADN), a functional community within which members can learn more about op-

portunities for HE and research engagement in sub-Saharan Africa and in the internation-

al development space. Please direct any questions to [Mostafa Al-Mossallami](#).

## UK Collaborative on Development Sciences

The UKCDS has recently launched new webpages dedicated to the rise of development-related funding

opportunities (e.g. Newton, Global Challenges, Ross Fund). The pages include a hub of all [funding op-](#)

[portunities](#) in this area, impact case studies as well as other tips and tools helpful for navigating the global

development research opportunities.



## GW4 Successes

[GW4](#) has invested an additional £350k into its [Building Communities programme](#), funding 11 new research communities. The programme aims to establish new, high-quality research com-

munities and to help existing collaborations build on their work and secure long-term sustainable funding. Funding from the latest round include:

- Adrian Porch (Cardiff

lead), *Towards a rapid, hand-held, biosensor-based detector for Clostridium difficile*, with [Martin Cryan](#), Electrical and Electronic Engineering

- Paul Morgan (Cardiff

lead), *Building an interactive immunology community across the GW4 collaboration*, with [Lindsay Nicholson](#), Cellular & Molecular Medicine.



## 100th Oxford Ophthalmological Congress

The [100th Oxford Ophthalmological Congress](#) was held 3 - 6 July 2016 in Oxford. Prof [Andrew Dick](#) (pictured) delivered The Doyne Memorial Lecture entitled *Intraocular Heath and the many faces of inflammation*. The annual Doyne Memorial Lecture was inaugurated in 1917, making it the oldest invited

named ophthalmic lecture in the UK. It is named after Robert Doyne, founder of the Oxford Eye Hospital, former President of the Section Ophthalmology of the British Medical Association and founder of the Congress. Dr [Sofia Theodoropolou](#) received the Founder's Cup of the best Basic Science research pre-

sented at the congress for *Interleukin33 attenuates experimental choroidal neovascularization: a potential therapy*

for wet age-related macular degeneration.



## Support and Treatment After Replacement

Many knee replacement operations take place because of the pain caused by osteoarthritis. Around 20% of people will suffer moderate or severe long-term pain after their operation. Thus roughly 15,000 people in the UK every year will have long-term pain after surgery.

The STAR Programme began in Sept 2015 and has six parts:

- A systematic review to work out what happens after surgery that might indicate whether someone will get long-term pain afterwards
- Cohort study and database analysis to determine what happens to people living with long-term pain and the costs involved
- Finalising best ways to care for people with long-term pain
- Randomised control trials to test most effective ways to provide care for people with long-term pain
- A qualitative study to determine why some people do not use healthcare services for their long-term pain after knee replacement
- Implement findings into practice

The study was developed in collaboration with the [Musculoskeletal Research Unit's](#) patient involvement group and in collabo-

ration with [Arthritis Care](#).

STAR are the winners of the NIHR New Media Competition 2016. Their [short film](#) won a special prize for demonstrating "the positive impact of embedding patient and public involvement into a research project".



## Find a Clinical Research Study App

The Clinical Research Network Business Intelligence team has launched a new version of the public Open Data Platform *Find a Clinical Research Study* app.

The purpose of this app is to provide a tool for clinical research professionals to search for CRN Portfolio studies using specific parameters, such as specialty or study design. The search results then enable the user to view a publicly available, one-page sum-

mary of information about each study. [The app can be downloaded online.](#)

The UK Clinical Trials Gateway remains the chosen NIHR platform for providing patients and the public with information about clinical research studies taking place in the UK.

In the new *Find a Clinical Research Study* app, you can search by:

- CPMS Study ID, IRAS ID, MRec, EUDraCT

- Study title or short name
- Research summary or inclusion/exclusion criteria keywords

Other search values include:

- Study design
- Open to new sites
- Eligibility
- Study Status
- Phase
- Specialties/subspecialties

The major difference between *Find a Study* v2 and its predecessor is that this ver-

sion no longer features a "map search" function. This will be re-established at a later date, with other enhancements where appropriate.

If you have any questions or suggestions concerning the new app, contact [ODP@nhr.ac.uk](mailto:ODP@nhr.ac.uk).

## Immune Cells Remember First Meal

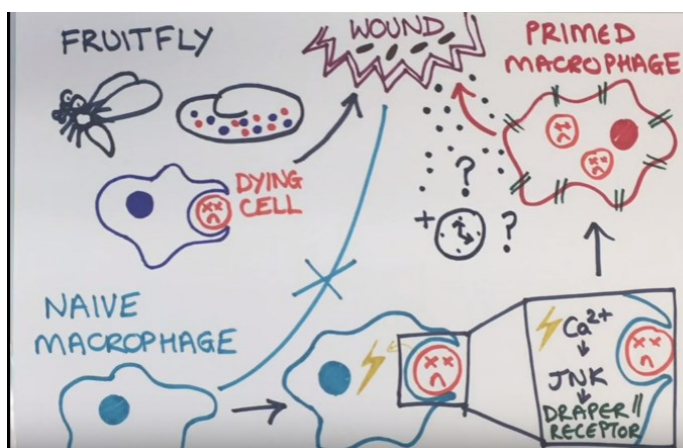
Whilst an inflammatory response is beneficial for human health, many human diseases (including atherosclerosis, cancer and arthritis) are caused or aggravated by an overzealous immune response. A greater understanding of what activates the immune response will help design novel therapies to treat these inflammatory disorders.

A study lead by Dr [Helen Weavers](#) found that immune cells must first become activated by eating a dying neighbouring cell before they are able to respond to wounds

or infection. In this way, immune cells build a molecular memory of this meal, which shapes their inflammatory behaviour. The team dissected the mechanism by which the memory is generated and found that ingestion of the dying cell activates signalling via a calcium

flash, which leads to an increase in the amount of damage receptor Draper. High levels of this receptor enable the primed immune cell to sense the damage signals that entice them towards a wound during inflammation. Without this priming, the cells are blind.

Understanding how one signal (in this case a dying cell) can influence the ability of an immune cell to respond to a subsequent signal is a major step towards finding novel ways to clinically manipulate immune cells away from sites of the body where they are causing the most damage.



Weaver H et al. (2016). [Corpse Engulfment Generates a Molecular Memory that Primes the Macrophage Inflammatory Response](#). *Cell*. 165(7), pp1658-1671

## Microscopy Facilities Opened

A new purpose-built microscopy suite to accommodate expansion of the Wolfson Bioimaging Facility was officially opened by Paul Ramsbottom, Chief Executive of the Wolfson Foundation, on 8 July 2016. Currently housing 22 imaging systems covering a broad range of advanced fluorescence and electron

microscopy techniques, the Facility has a growing reputation within the UK and across Europe. The arrival of new systems including multiphoton, super-resolution and fluorescence lifetime imaging alongside expansion of confocal and widefield microscopy meant that the expanded facility could no longer be housed within existing

space.

A donation of £1M by the Wolfson Foundation was vital in helping to create six purpose-built microscope rooms to accommodate new equipment. The new imaging suite is situated adjacent to existing microscope rooms and provides the controlled and stable environment required for high-

resolution microscopy. The facility has also recently increased the level of support it offers for image processing and analysis to equip its users with the expertise to fully quantify and interpret microscopy data.

Details of the facilities are available on the [website](#).

## Sexually Transmitted Infections Pitch

Emer Brangan gave a three minute 'elevator pitch' presentation at the [Society for Academic Primary Care \(SAPC\) conference](#) on the CLAHRC West project looking at telephone-based management of sexually transmitted in-

fections in primary care.

This study aims to evaluate centralised telephone-based management of chlamydia and gonorrhoea that is diagnosed in the community. It looks at health care practitioner and patient experiences,

and whether this telephone-based approach is acceptable and feasible in the treatment of index cases diagnosed in primary care and the tracing and treatment of partners.

The SAPC Conference took place on 6-



8 July 2016 in Dublin.

## New Mechanism for Protein Secretion

Proteins made inside the cell often need to be exported in order to do their job. A team comprised of researchers at UoB and Leeds looked at the transport motor that sits within the membrane, known as 'Sec' (for secretary). Sec recognises the proteins that need to be exported via a molecular address tag and pushes them across the membrane.

The team used a com-

ination of classical biochemical and biophysical technologies exploring the bulk system of many billions of molecules together with large scale simulations of the protein complex, and ground breaking methodologies capable of observing single molecules.

The current theory is that Sec grabs hold of a part of the protein and pushes it through a gate, then lets go and goes back to grab

and push the next bit. This study shows that the biggest movement is in the membrane gate itself, which opens and closes. This suggests Sec acts more like a turnstile-proteins can move freely one way across the membrane (out) but are prevented from moving back in. This model provides a solution to an outstanding problem in the protein transport field, which might be

relevant in many other systems that transport proteins and nucleic acids elsewhere in the cell.

The discovery is being used towards the development of new drugs that specifically block bacterial secretion without affecting humans.

*Diagram shows proposed model for ATP-driven protein transport through the SecYEG-SecA complex*

## Royal Society Summer Science Exhibition

Each year over 10,000 members of the public and 2,000 school students visit the Summer Science Exhibition.

The exhibition provides a unique oppor-

tunity to raise the profile of your research and institution with key influencers, including potential funders, government and the public.

The next exhibition is

taking place 3-9 July 2017, and the call for proposals is now open. Closing date is 26 September 2016.

Find out more about [what the exhib-](#)

[itor does](#), [what the Royal Society does](#), [the selection process](#) and [making a proposal](#), or submit your proposal [via the website](#) now.

## Respiratory Infections HIT review of 2015-16

Respiratory tract infections (RTIs) place considerable pressure on health care services, particularly in the winter. Children play a major role in spreading these infections. However, parents often don't have the information to know when and how best to access health services for common illnesses. A vicious cycle is created of increasing patient demand, higher antibiotic use and a reduction in antibiotic effectiveness. The [Respiratory Infections Health Integration Team](#) (RuBICoN HIT) aims to reduce the burden

of respiratory infections on both the NHS and the community.

In March 2016, the TARGET programme concluded. This research was carried out by the [Centre for Academic Primary Care](#) and involved several members of the HIT. TARGET helped uncover why clinicians prescribe antibiotics, what parents want from a GP consultation and what interventions would help improve antibiotic use in primary care. We shared our findings at an implementation event in London in

February 2016; attendees included national policy-makers, GPs and journalists. Videos are [viewable online](#).

The study also produced a [website](#) for parents about caring for children with respiratory tract infection and cough, developed with parents to provide a trusted repository of information about when to see the doctor, common symptoms, going to school or nursery, types of illness and caring for your child. We have developed a short document for GPs of tips to reduce

antibiotic prescriptions; it gives information about what patients want to know, and five suggestions of how doctors can help patients and carers manage common infections.

The bronchiectasis HOT clinic at North Bristol NHS Trust has continued to help patients get fast access to specialist care, and were run as part of the ACCORD study. We are now analysing the data to ensure it helped achieve the aim of providing faster, more appropriate care that reduces hospital admissions.

## Prisoners and HIV Infection Rates

A UoB team including Prof [Peter Vickerman](#) contributed to a study looking specifically at the 15 UNAIDS-designated countries of Eastern Europe and Central Asia (EECA) that gained independence from the Soviet Union in 1991. This is the only region which bucks global reductions in HIV incidence and mortality;

HIV transmission in EECA is fuelled primarily by injection of opioids, with harsh criminalisation of drug use that has resulted in extraordinarily high levels of incarceration. Consequently, people who inject drugs, including those with HIV, hepatitis C and tuberculosis are concentrated within prisons.

Mathematical modelling for Ukraine suggests high levels of incarceration in EECA countries facilitate HIV transmission among people who inject drugs, with 28-55 per cent of all new HIV infections over the next 15 years predicted to be attributable to heightened HIV transmission risk among currently or

previously incarcerated people who inject drugs.

The study argues boosting opioid agonist therapies in prisons, and maintaining treatment after release, would give the greatest HIV transmission reduction in people who inject drugs.

## ELIZABETH BLACKWELL FUNDING

### [EBI Workshops Funding](#)

Support for interdisciplinary workshops in health research at a new or emerging interface between two or more disciplines. Applications are reviewed on a rolling basis.

### [EBI Catalyst Fund](#)

Pump priming awards can support the most promising and ambitious ideas across the widest interdisciplinary boundaries. These projects will be identified largely through the running of [workshops](#) to explore new possibilities and identify the big questions. Applications are reviewed on a rolling basis.

### [Returning Carers Scheme](#)

UoB has introduced a Returning Carers' Scheme (RCS) 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 - such as maternity leave, adoption leave, additional paternity leave, or leave to care for a dependant.

Closing date: 30-Apr & 31-Oct each year.

### [EBI MRC Confidence in Concept Scheme \(CiC\)](#)

With support from the MRC, the University has funding available to support health related translational projects. Funding is available to support projects which are at the stage of proof of concept.

Closing date: 23-Sep-16

## FUNDING OPPORTUNITIES

Set up via Research Professional (RP), a full calendar of funding opportunities for Infection and Immunity Research is [available online](#). Subscribing to a calendar will place the entries in your own calendar, which will automatically update according to pre-specified search criteria. Staff and students have FREE access to Research Professional online from all computers on the University network. You can create your own personalised funding opportunity e-mail alerts by registering with RP. Find out all about it on the [RED website](#).



**Wellcome Trust**[Four-year PhD studentships in science](#)**wellcome**trust

Closing date: none

Award amount: unspecified

Enable students to undertake in-depth postgraduate training at centres of excellence throughout the UK in the following biomedical research and public health research areas including immunology and infectious disease.

**Research Councils UK**[Research Council Policy Internships Scheme](#)RESEARCH  
COUNCILS UK

Closing date: 01-Sep-16

Award amount: not specified

For current RCUK-funded PhD students to work at partner host organisations on one or more policy topics relevant to both the student and the host. The student will be expected to produce at least one briefing paper, participate in a policy inquiry and/or organise a policy event.

**European Molecular Biology Laboratory**[EI3POD postdoctoral fellowship programme](#)

Closing Date: 05-Sep-16

Award amount: unspecified

Enables researchers to take part in international and interinstitutional collaborations, or an inter-sectional experience, whilst carrying out interdisciplinary research. The programme includes mandatory training modules in intellectual property, entrepreneurship in life sciences, research ethics, career development, gender dimension in science and outreach, public management and dissemination of knowledge on scientific progress.

**National Institute of Allergy and Infectious Diseases**[Mechanisms of mycobacterial-induced immunity in HIV-infected and uninfected individuals to inform innovative tuberculosis vaccine design \(R01\)](#)

Closing Date: 06-Sep-16

Award amount: unlimited

Encourages innovative, high risk, high impact research to investigate the innate and adaptive immune responses induced by mycobacterial infections, bacillus Calmette-Guérin vaccine and candidate mycobacterium tuberculosis vaccines in HIV-infected or uninfected individuals.

**Economic and Social Research Council**[Tackling antimicrobial resistance: behaviour within and beyond the healthcare setting: collaborative grants](#)

Closing date: 08-Sep-16

Award amount: £2M

Behaviour within and beyond the health care setting. To understand how the behaviour of public, professionals and organisations impacts on AMR: how it can enhance or control the spread of AMR; how it is affected by social, psychological and organisational context, cultures and history; and how it can be influenced to create different future scenarios.

### **Consumers, Health, Agriculture and Food Executive Agency**

[Two studies on vaccination in the EU members states](#)

Closing date: 13-Sep-16

Award amount: €220,000



The tenderer will deliver one study on the added value of the strategic and life-course approach to vaccination and another study on shortcomings related to low vaccination coverage in health care workers.

### **Medical Research Council**

[MRC/DFID African research leader scheme](#)

Closing Date: 14-Sep-16

Award amount: £750,000

To strengthen research leadership across sub-Saharan Africa by attracting and retaining researchers of high ability to lead research programmes on key global health issues pertinent to the region.

### **Health Technology Assessment (HTA) Programme**

[Commissioned call: 16/24 Biological response modifier drugs for rare autoimmune diseases](#)

Closing date: 15-Sep-16

Award amount: unspecified

For research that is immediately useful to patients, clinical practice, and policy or decision makers. To establish the clinical and cost-effectiveness for the NHS in comparison with the current best alternative(s). A study may also investigate uncertainty around a technology's place in the existing care pathway.

### **David Telling Trust**

Within UHBristol and NBT

Closing date: 16-Sep-16



#### *a) Clinical research fellow awards sessional awards*

To allow introductory research time to generate the initial data and expertise needed for a larger research grant application to fund a higher degree

#### *b) David Telling Research Fellowship Award*

For a medical/surgical trainee wishing to take time out of clinical practice to undertake research

## c) £25000 Pump-priming Grants

To get new researchers of all professions started

## d) £175000 Infrastructure Grants

To support more established clinical researchers to develop a co-ordinated programme in a novel area of clinical research by infrastructure funding

Initial application no more than two pages A4. Proposals are open to non-clinicians but animal or non-clinical laboratory-based research is not supported by the Trust and there must be clear patient benefit. Send to [Stephen.falk@UHBristol.nhs.uk](mailto:Stephen.falk@UHBristol.nhs.uk).

**British Council – Newton Fund**  
UK-China PhD Placement Programme



Closing date: 20-Sep-16

Award amount: unspecified

Offers sponsorships for UK and Chinese PhD students and their supervisors to spend a period of time at HEIs in China or the UK. Must be ODA compliant. Focus includes health and life sciences.

**Medical Research Council**  
Programme grants – infections and immunity



Closing date: 21-Sep-16

Award amount: unspecified

Provide large and long-term renewable funding for projects related to infections and immunity. Grants may include a portion of the salaries of the PI and co-investigators, equipment, travel costs, data management and dissemination costs, consumables, and support for additional research and technical posts.

**Medical Research Council**  
Research grants – infections and immunity

Closing date: 21-Sep-16

Award amount: £1M

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.

**Arthritis UK**  
PhD Scholarships



Closing date: 21-Sep-16

Award amount: unspecified

For a research career in any discipline with relevance to arthritis and related musculoskeletal diseases especially if this involves developing ambitious, interdisciplinary and innovative ap-

proaches to health and biomedical research. Wards include a tax-free incremental stipend, UK tuition fees and enhanced running costs.

#### **GW4**

MRC funded GW4 BioMed Doctoral Partnership



Closing date: 22-Sep-16

Award amount: unspecified

Not limited to biomedical academics; supervisory teams from a range of disciplines, especially those at the interface of biomedical research and/or with strong quantitative elements are welcome.

#### **European and Developing Countries Clinical Trials Partnership**

Research and clinical management of patients in poverty related diseases epidemics in sub-Saharan Africa

Closing Date: 29-Sep-16

Award amount: €10M

Supports the establishment of a multidisciplinary consortium able to provide accelerated evidence for the optimal clinical management of patients and for guiding the public health response to any severe infectious outbreak caused by pathogens within the scope of the EDCTP programme with pandemic potential or that may cause significant damage to health and socio-economics in Africa, including antimicrobial-resistant pathogens.

#### **University of Bristol**

International Strategic Fund



Closing date: 29-Sep-16

Award amount: unspecified

Invests in new and nascent collaborations between UoB and international partners. Aims to help establish or develop sustainable research partnerships across all faculties, supporting activities which may also provide opportunities for postgraduates and researchers to develop their skills and international profile. The awards should be viewed as part of the first phase of funding that will enable longer-term collaborations.

#### **National Institute of Allergy and Infectious Diseases**

Partnerships for structure-based design of novel immunogens for vaccine development (R01)

Closing Date: 03-Oct-16

Award amount: US\$1.5M

For milestone-driven research projects that utilise novel, structure-based vaccine design approaches to generate candidate vaccine immunogens against infectious disease pathogens of clinical concern with the goal of generating candidate vaccines with demonstrated efficacy in appropriate models that are suitable for transition to the product development pathway.

**National Institute of Allergy and Infectious Diseases**

[Novel approaches to understanding, preventing and treating Lyme disease and tick-borne coinfections \(R01\)](#)

Closing Date: 05-Oct-16

Award amount: unlimited

For research that will contribute to the overall understanding of Lyme disease and co-infections transmitted by *Ixodes* ticks.

**European Society of Clinical Microbiology and Infectious Diseases**

[Research grants](#)



Closing Date: 13-Oct-16

Award amount: €50,000

Enable young investigators to conduct research in the fields of fungal, viral and parasitic infections and diseases.

**European and Developing Countries Clinical Trials Partnership**

[Strategic actions supporting large-scale clinical trials](#)



Closing Date: 13-Oct-16

Award amount: €15M

Letters of intent for strategically important, large-scale clinical trials with the potential to achieve rapid advances in the field of poverty-related diseases which focus poverty-related diseases in sub-Saharan Africa. They may address: HIV/Aids, malaria, tuberculosis, dengue, rabies, human African trypanosomiasis, Leishmaniases etc. Ebola is excluded.

**European and Developing Countries Clinical Trials Partnership**

[Support for the development of vaccines for poverty-related diseases](#)

Closing Date: 13-Oct-16

Award amount: €15M

Supports large-scale collaborative projects which include one or more clinical trials aiming to accelerate the clinical development of new vaccines, preventive or therapeutic, against one of the PRDs. At least one clinical trial should be carried out in sub-Saharan Africa to test the safety, immunogenicity and efficacy of the vaccine.

**World Health Organization**

[Polio eradication plan](#)



Closing Date: 14-Oct-16

Award amount: unspecified

Priority is given to projects targeting detection and interruption of all poliovirus transmission & strengthening of immunisation systems and withdrawal of oral polio vaccine.

**European Federation of Immunological Societies**

**Meeting support grants**

Closing Date: 14-Oct-16

Award amount: €5,000

Support meetings, workshops and schools that enhance interaction between young scientists and established immunologists. Can be traditional meeting support (offering travel bursaries to young scientists to attend immunology events throughout Europe,) or a support scheme for PhD courses, retreats and events.

**Kay Kendall Leukaemia Fund**

**Junior research fellowships**

Closing Date: 21-Oct-16

Award amount: unspecified

Support individuals wanting to pursue research into haematological malignancies.

**European Society for Immunodeficiencies**

**Summer school for primary immunodeficiency diseases**



Closing date: 03-Nov-16

Award amount: unspecified

Allows junior ESID members to the summer school to be held in Calambrone, Italy from 24 to 28 May 2017, providing the opportunity for them to update their knowledge, hear about the latest diagnostic tools, and learn from leaders in the field. Between 30 and 35 places are available. Funding covers accommodation and meals for the duration of the meeting.

**BrightFocus Foundation**

**National Glaucoma Research Program - Standard Awards**



Closing date: 16-Nov-16

Award amount: US \$150,000

For researchers who have already generated some amount of preliminary data, but are often required to demonstrate additional, significant progress before they can apply to governmental or industrial funding agencies.

**European Society for Paediatric Infectious Diseases**

**Fellowship awards**



Closing Date: 01-Dec-16

Award amount: €100,000

Support basic or clinical research that utilises advanced techniques and methods to improve the health of children through the prevention or management of infectious diseases. Applications with emphasis on prevention will receive high priority.

**European Academy of Allergy and Clinical Immunology****Clinical fellowships**

Closing Date: 31-Dec-16

Award amount: €3,000

Enable specialists within the field of allergy and clinical immunology to conduct research in a foreign European hospital.

**National Institute of Allergy and Infectious Diseases****Mechanisms of mycobacterial-induced immunity in HIV-infected and uninfected individuals to inform innovative tuberculosis vaccine design (R01)**

Closing Date: 11-Jan-17

Award amount: unlimited

Encourages innovative, high risk, high impact research to investigate the innate and adaptive immune responses induced by mycobacterial infections, bacillus Calmette-Guérin vaccine and candidate mycobacterium tuberculosis vaccines in HIV-infected or uninfected individuals.

**European Federation of Immunological Societies****World fellowship**

Closing Date: 28-Feb-17

Award amount: €12,000

Supports scientific collaboration, advanced training, learning techniques or methods not available in the applicant's current place of work. The main goal is to build a strong international network of immunological research, and fellowships may therefore be held anywhere in the world.

Each applicant must be under 35 years of age and a member of a society affiliated with EFIS. They must hold at least a master's degree. Applications are also open to applicants from European countries without a national society.

## THIS ISSUE'S FEATURED ARTICLE

### A faster inoculation assay for *Armillaria* using herbaceous plants

Ford KL, Henricot B, Baumgartner K, Bailey AM & Foster GD. Journal of Horticultural Science and Biotechnology. In press.

*Armillaria* (honey fungus-right) is a virulent necrotrophic pathogen that causes *Armillaria* root disease (bottom left). Conventional *Armillaria* inoculation assays use young saplings as hosts and consequently are cumbersome, frequently conducted outdoors and take many years from establishment to analysis of infection. We have developed and evaluated a faster inoculation assay for *Armillaria* that uses herbaceous plants as hosts, is carried out in controlled conditions and reduces experimental durations to three months.



Plant species of known susceptibility to *Armillaria* and comparisons between virulent *A. mellea* and opportunistic *A. gallica* were used to validate the assay. Mortality and diagnostic symptoms of *Armillaria* root disease such as epiphytic rhizomorphs and mycelial fans were used to assess levels of infection. We also attempted to reduce assay preparation time by substituting woody inocula with agar inocula, but typical symptoms of *Armillaria* root disease were only observed on plants infected with woody inocula. Through our assay, we identified five new potential herbaceous hosts of *Armillaria*: *Kniphofia hirsute* (bottom middle), *Hordeum vulgare*, *Lobelia cardinalis* (bottom right), *Nicotiana tabacum* and *Helenium hoopesii* – further expanding the extensive list of plants with susceptibility to *Armillaria* and suggesting infection of herbaceous species may be more widespread than currently acknowledged.





## CONTACT INFORMATION

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

Co-Chair: [Lindsay Nicholson](#)

Reader in Research



Co-Chair: [Adam Finn](#)

Prof of Paediatrics



- [Anders Johanson](#) - Senior Lecturer in Systems Engineering
- [Alastair Hay](#) - Professor of Primary Care
- [Andrew Davidson](#) - Senior Lecturer in Virology
- [Angela Nobbs](#) - Lecturer in Oral Microbiology
- [Catherine Brown](#) - Administrator for the Theme (Research Development)
- [Collette Sheahan](#) - Research Development Theme Facilitator
- [David Morgan](#) - Reader in Immunology
- [Kathleen Gillespie](#) - Reader in Molecular Medicine
- [Katy Turner](#) - Senior Lecturer in Veterinary Infectious Diseases
- [Linda Woolridge](#) - Chair in Translational Immunology
- [Mark Jepson](#) - Reader in Cell Biology
- [Neil Williams](#) - Professor of Immunology
- [Peter Muir](#) - Clinical Virology
- [Peter Vickerman](#) - Professor of Infectious Disease Modelling
- [Victoria Davenport](#) - Senior Lecturer in Immunology (UWE)
- [Wendy Gibson](#) - Professor of Protozoology

e: [infection-immunity@bristol.ac.uk](mailto:infection-immunity@bristol.ac.uk)

t: 0117 931 7610

w: <http://www.bristol.ac.uk/infection-immunity/>