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Immunology News

Gender equity post-COVID-19:

coordinating our efforts to preserve diversity

UK Coronavirus Immunology Consortium:
bringing immunology together

The UK Immunological Toolbox:
a hub for veterinary immunological reagents

Our first fully Open Access journal
Immunotherapy Advances

British Society for immunology
www.immunology.org

Welcome to the autumn issue of *Immunology News*. Here, we look back at what we've been doing to continue supporting our members and feeding into public discussion around COVID-19, including our three webinar series and our new infographics on PCR and antibody testing for COVID-19. We also take a look forward at our role in the UK Coronavirus Immunology Consortium, a new and exciting project for the immunology community that will provide an overarching picture of the immunology of COVID-19.

In this issue we're proud to present *Immunotherapy Advances*, our first fully Open Access journal which is now open for submissions. Head to pages 16–19 to meet Professor Tim Elliott, the Founding Editor-in-Chief.

This new issue also features an overview of the impact of COVID-19 on gender inequity. Members from the Australian and New Zealand Society for Immunology provide a perspective from Societies, EMCRs and educators, and how we can plan for the future.

Additionally, we hear from Professor John Hammond and other experts about the UK Immunological Toolbox, a community-driven initiative to facilitate veterinary vaccinology and immunology research. On pages 14–15 he discusses how it can help you in your research, and how it will become an essential resource for researchers, veterinarians and clinicians.

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Contents

10 FEATURES:
UK Coronavirus Immunology Consortium

14 **The UK Immunological Toolbox**

16 **New BSI journal: *Immunotherapy Advances***

21 **Applying the gendered lens to a post-COVID academia**

UK CIC
UK Coronavirus Immunology Consortium

4 Society news
24 Representing immunology
25 Congratulations
26 Future focus
29 BSI Regional & Affinity Groups
30 Journal news

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VIEW FROM …

THE BSI PRESIDENT

Throughout the COVID-19 pandemic, immunologists have been at the forefront of research efforts into COVID-19 and, as BSI President, I am very proud of how our community has stepped up to this challenge. The BSI is there for you every step of the way and, over the last few months, we've been working hard to support our members and the wider immunology discipline, and to make sure that the voice of immunology is prominent in the public arena.

UK Coronavirus Immunology Consortium

The new UK Coronavirus Immunology Consortium (UK-CIC) launched at the end of August. This is an innovative research initiative, funded by UK Research and Innovation (UKRI) and the National Institute for Health Research (NIHR) and supported by the British Society for Immunology. It will bring together 19 UK immunology centres in an unprecedented collaboration to answer key questions around the immune response to COVID-19. It aims to deliver meaningful public health benefit within 12 months to increase our ability to control the COVID-19 pandemic. The BSI exists to promote and support excellence in immunological research and clinical practice. By working with UK-CIC, we aim to support UK immunology as a whole to collaborate at a national level to answer the big outstanding questions around how the immune system interacts with SARS-CoV-2, with a view to improving diagnosis and treatment as well as supporting the quest to find a vaccine. Through supporting this inclusive approach across the whole immunology community, we will aim for a lasting positive legacy, creating a blueprint that could be exploited for future national collaborative efforts within immunology. You can read more details about UK-CIC and the BSI's involvement on pages 10–11. With this significant investment from UKRI and NIHR, immunologists can now work together at a national scale to improve our knowledge of the immunology of COVID-19 – an aspect that is critical for long-term control of this pandemic.

Expert COVID-19 taskforce

Our expert immunology and COVID-19 taskforce continues to work hard to make sure immunology is put firmly centre stage and appropriately recognised in policy discussions and public debates around COVID-19. Our most recent output was a briefing note for policymakers on 'Long-term immunological health consequences of COVID-19', which contained a summary of our knowledge to date and a number of recommendations for future research. This work has been extremely well-received in both policy and patient circles. It has had an impact across the political spectrum and has led to us engaging at a high level with the bodies tasked with responding to the pandemic, such as the Joint Biosecurity Centre. You can read the full briefing note on our website at **www.immunology.org/coronavirus/immunology-and-covid-19**.

I have now handed over the reins of chairing this committee to BSI Trustee, Professor Deborah Dunn-Walters, who will take our work in this area forward. I would like to thank all of the taskforce members for their input to date – it really has made a huge difference in allowing us to engage with Government at the highest levels to ensure that immunology expertise is fed into our country's response to the pandemic.

Here for all our members

The BSI, of course, is here to support all our members in all areas of immunology research, at every career stage and in all sectors. The rest of our large portfolio of work to support you and to represent immunology to the wider world continues unabated. This includes our careers work, our various webinar series and our engagement work. I also look forward to bringing you news shortly of the virtual scientific conference we are planning to bring our community together later in the year. Please do also check out and support our new open access journal, *Immunotherapy Advances*. We're very proud of this new addition to the BSI family – you can find out more and read an interview with Editor-in-Chief Professor Tim Elliott on page 16.

Thank you again to all our members for your ongoing support and, as always, please do not hesitate to get in touch if you have new ideas about how the BSI can support you. Keep up the good work in these difficult times.

With best wishes

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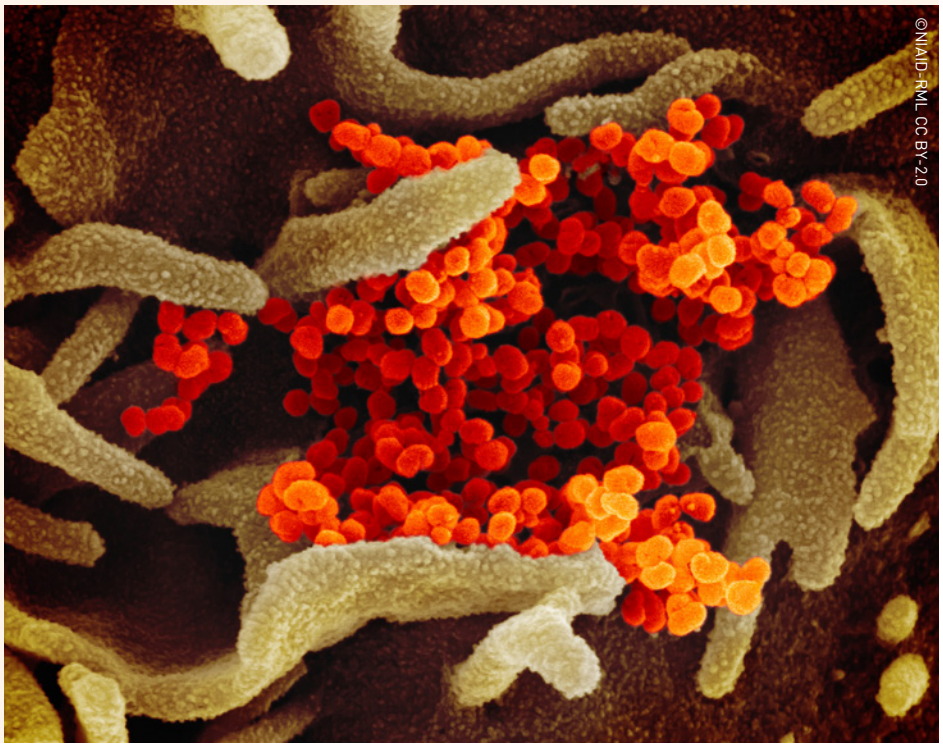

VIEW FROM …

THE CHIEF EXECUTIVE

Welcome to another issue of *Immunology News*! These continue to be challenging times for us all, and I can't emphasise enough that your BSI is here to support you and do everything we can to champion our members and immunology as a whole. It's wonderful to start seeing labs and workplaces open up so that many of you can start to get your important work underway again, but we know that many difficulties still remain. Which is why we will shortly be surveying our membership to be able to get an accurate picture of what things are like on the ground and what more the BSI can do to support you all. I encourage you all to complete the survey as it will help us to better understand the challenges you face and how our Society can support you over the coming months.

Our coronavirus-related work continues apace with all information on our Connect on Coronavirus website hub – please do visit it to see all of the wonderful resources we have pulled together as well as recordings of all of our webinars (page 6). Our webinar programme continues with some great speakers in the programme so please do keep an eye out on our website, emails and social media channels. In this issue we also give our thoughts on how the pandemic is changing the face of public engagement (page 24). As shown on page 10, the BSI is playing a crucial leadership role in the new exciting UK-Coronavirus Immunology Consortium (UK-CIC). This multimillion-pound investment from UKRI will enable our community to develop a much-needed detailed immunological picture of infection and COVID-19 disease in order to aid the development of diagnostic approaches, public health interventions, clinical management, treatment and vaccines. It is hugely ambitious and will need a full community approach, something that the BSI will be instrumental in helping deliver. Please do see how you can get engaged and support this never-before-seen collaborative initiative!

In relation to the pandemic you will all know that we have had to regrettably postpone BSI Congress 2020 to late 2021. It's the right thing to do, but I for one am gutted that we won't be meeting face to face again later this year. Congress 2019 was the best yet, and we promise that Congress 2021 will be even better! In the meantime, we will be delivering a virtual conference in December this year which isn't a replacement for Congress but will provide an online forum for us all to engage in recent immunology research both COVID- and non-COVID-related. More information will follow soon, and it will be great to 'see' you all there!

The BSI has been busy delivering other exciting initiatives, not least our career development webinars which included a brilliant session on equality, diversity and inclusion. In addition, we have a feature piece on pages 21–23 on the impact of COVID-19 in gender inequity. This thought-provoking article focuses on how to plan for the future and what universities, funding bodies and Societies can do to help. The BSI needs to and is committed to doing more on equality, diversity and inclusion. We are working with our Forum and Board of Trustees to develop the action plan and will be letting you all know about what more we will be doing in this space.

And finally, it has been a delight to see our existing journals shine (page 9) and to expand our journal family by launching our first Open Access – *Immunotherapy Advances* (page 16). This is our first journal launch since Neil Armstrong set foot on the moon, so it's a big step forward for the BSI! These journals are core to the mission of the BSI to promote and disseminate high quality immunology research, with the new journal offering a service to the exciting and expanding immunotherapy field. And, as they are also crucial to the financial future of the BSI, we do ask you all to promote the journals and do consider submitting your papers to them!

I hope you enjoy this issue of *Immunology News* and I wish you all the best in your endeavours during this challenging time. As always, please do not hesitate to reach out to me or the BSI team if you have any questions or suggestions.

Doug Brown
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British Society for Immunology
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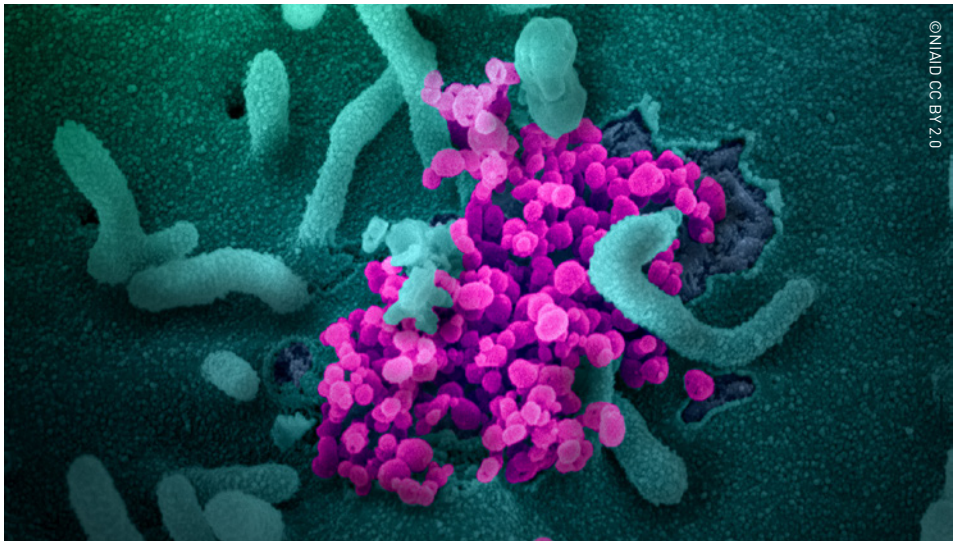
SOCIETY NEWS

Connect on Coronavirus

The BSI is keen to continue to support our membership during the coming months. Do visit our Connect on Coronavirus hub on our website (**www.immunology.org/coronavirus**) to find a range of information and resources to keep you up to date with developments and support you in your work at this time. On these next two pages, we provide you with a brief update on what we've been doing over the past couple of months to represent and support our members and to feed into public discussion around COVID-19.



Policy focus

The BSI continues to work hard to ensure that the views of immunologists are represented to the highest levels of Government. Over the past few months, our joint taskforce with the Academy of Medical Sciences has been providing information to the Government's Scientific Advisory Group for Emergencies (SAGE) on what is and isn't known about the immune system and COVID-19 – the documents we provided have now all been published on the GOV.UK website.

Additionally, we have been working hard to link into Parliamentarians directly. Three of our taskforce members, Arne Akbar, Peter Openshaw and Ultan Power, gave evidence to the House of Lords Science & Technology Select Committee inquiry on 'The science of COVID-19' on the topic of 'Immunity and vaccines' (you can watch the recording at: **https://bit.ly/39glB0c**). This followed previous appearances by taskforce members including Danny Altmann and Adrian Hayday.

We have also responded to requests for input from across the parliamentary spectrum, including from the Parliamentary Office of Science and Technology to ensure scientific accuracy on some of their COVID-19-related briefings. We worked with the Nuffield Council on Bioethics to provide immunological input to their policy briefing on 'COVID-19 antibody testing and "immunity certification"' (**https://bit.ly/3hjXSiA**).

Finally, we have worked hard to make sure that the voice of immunologists is heard clearly in the media. Ensuring that journalists can speak directly with immunologists to put the latest COVID-19 findings into context is one of our key roles at the moment. Over the last couple of months, spokespeople from the BSI have been quoted in many national and international news stories including BBC News, *Daily Mail, Daily Telegraph, The Sun, The Guardian* and *New York Times*.

Webinars

Our webinar series 'Connecting on Coronavirus', which aims to keep you informed with the latest developments on the Coronavirus outbreak by sharing relevant and timely information from expert sources, continues to go from strength to strength. With recent talks on COVID-19 topics such as genomics, animal coronaviruses, and antibodies, it's a fantastic resource to allow you to keep up to date with the latest findings. Check the events section on our website for upcoming sessions. The recordings of all webinars are available on our website and are free for all to view: **https://bit.ly/2BlCsm4**.

Our Careers Development webinar series has now come to an end but the recordings of all webinars are available via the members' section of the BSI website. This series contains a range of highly informative and thought-provoking webinars for those who are looking for guidance in building their careers now and in the future, including topics such as wellbeing, preparing your paper for peer review, and diversity and inclusion. Visit **https://bit.ly/2WUwr7x** to watch the recordings.

Finally, our ongoing Regional and Affinity Group webinar series brings together our Group members so that they can share some of the latest findings in their areas of interest. So far, we've had topics including exploring the potential of cancer-specific T cells and how does immunity at the brain border affect brain health and function, to name but a few. Check out the events section of the BSI website for all upcoming webinars and the recordings are also available via the members' section of our website: **https://bit.ly/2WFPB09**.

Lay summaries

The BSI believes it's important that new research on COVID-19 is accessible to all. As such, we have started a new initiative to produce lay summaries on all COVID-19 research published in our official journals, *Immunology* and *Clinical & Experimental Immunology*. We hope that this will help the public to understand the research published in each paper and to put it in context of the wider field as a whole. The lay summaries can be viewed on the BSI website at: **https://bit.ly/2OIKloE**.

The BSI is working hard to represent and support the immunology community during this time. We hope that you've found our activities so far useful and we welcome feedback on our activities and any other areas you feel we should focus on.

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The BSI coronavirus initiatives are supported by The Lorna and Yuti Chernajovsky Biomedical Research Foundation. Our thanks also go to our following Gold Corporate Members who are supporting our coronavirus work: 10X Genomics, Fluidigm, Miltenyi Biotec and NanoString.

COVID-19 testing explained

One topic high on the media and public agenda in recent months has been testing for COVID-19. Since the science on this has moved forward extremely fast, tracking down reliable, evidence-based and easy-to-understand information for the public on these tests has been difficult. In particular, there seems to have been a lot of confusion about the different types of tests, why they're being performed and what the implications and limitations of their results truly are.

To assist with public understanding on this, the BSI has produced a series of infographics looking at PCR and antibody testing, and a blog to discuss the issue in more detail. The infographics lay out, in an easy-to-digest format, the key points around how each test is administered, what the test can tell us, when it should be used and how accurate it is. These infographics are all free to download from the BSI website and we encourage you to share them with your networks to help improve understanding of the different types of COVID-19 test available.

Find out more:

Download BSI COVID-19 testing infographics: **https://bit.ly/32zVT5K**

Read BSI COVID-19 testing blog: **https://bit.ly/2E2n0MA**

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Testing for COVID-19

What happens when you get infected with the SARS-CoV-2 virus?

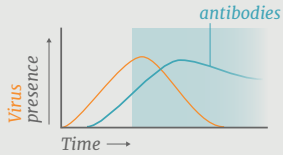
The virus enters the body and infection may result in COVID-19 disease. The person may or may not have symptoms.

The specialised cells of the immune system help fight infection by producing antibodies that precisely match the invading viral antigen, which is a unique feature of the virus.

After the infection is over, protective antibodies can remain in the body to fight future infections with SARS-CoV-2.

How does testing work?

	PCR testing	Antibody testing
The test uses...	Swabs from the nose and throat	Blood sample
The samples are used...	...in a lab test to identify the presence of SARS-CoV-2 genetic material	...to test if there are any antibodies present that match and bind to the viral antigen
The test tells us...	...who **currently** has an infection	...who has **previously** had an infection
The test does NOT tell us...	...about someone's immune response	...whether someone is necessarily protected from future infection
When is the test used?	During an active infection when the virus is in the body even if the person has no symptoms.	From a week to several months after infection.
How accurate is it?	PCR is an established technique providing a very sensitive test with high accuracy. False negative results are possible if the swab doesn't pick up enough virus.	Optimising, evaluating and validating these tests is important. There are two approved lab tests being used in the UK but neither are 100% accurate.



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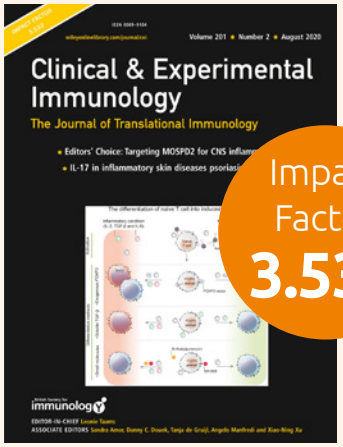
SOCIETY NEWS



New Impact Factors released

We are proud to announce the latest impact factors for our official journals: *Clinical & Experimental Immunology* has achieved an IF of **3.532** and *Immunology* has reached its highest ever IF of **5.016**.

We'd like to take this opportunity to celebrate our journals for building upon their position as highly respected publications within the field of immunology. We'd like to thank our editorial teams, led by Editors-in-Chief Leonie Taams and Simon Milling, for their ongoing commitment to the journals, and everyone who has contributed to the continued success of our journals, including authors, readers, reviewers and editors.

Profits derived from the sale of the journals are invested back into the BSI to benefit our members in the form of grants, our new webinar series, our Regional and Affinity Group activities, our popular annual Congress and other key initiatives. We encourage you to support the BSI by submitting your work.

Recent review series from our journals

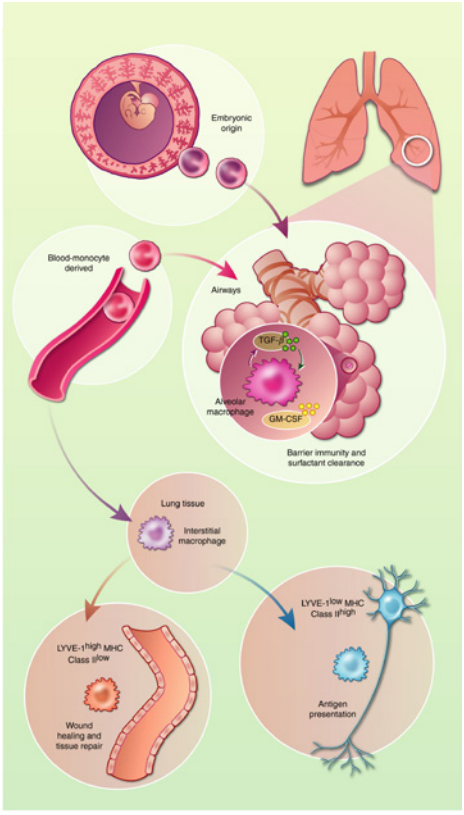
Our official journal *Immunology* released a new review series 'Barrier Immunity', edited by James Harker and Laura Pallett.

Our barrier organs face the formidable immunological challenge of defending us against pathogenic insults and promoting a peaceful co-existence with the local microbiota that inhabit them. This collection showcases novel biological processes identified by state-of-the-art technologies, highlighting how these change as we age.

Our official journal *Clinical & Experimental Immunology* released a new review series 'Innate Immunity in Systemic Sclerosis', edited by Steven O'Reilly.

While the role of the adaptive immune response in systemic sclerosis is already well documented, a renaissance in innate immunity research has taken place in recent years leading to new understanding of disease processes. These advances, along with an increased understanding of the intricate network of cytokines involved in disease pathogenesis, may yield opportunities for therapeutic intervention.

Barrier Immunity: https://bit.ly/3jm0UDc
Innate Immunity in Systemic Sclerosis: https://bit.ly/2CUSzqR



Antibodies Strike Back

Onslaughts of *Salmonella* Typhi
quietly invade
Hidden by Vi capsules
they masquerade
Dodging complement attacks
innate immune cells alike,
the bacterium seeks its goal
in the dead of night

Flagellum propelling
towards intestinal dreams
cytokines, chemokines
starting to stream
But not before our final defence,
leaping from plasma cells
vaccine antibodies commence!
In their various forms
IgG, IgA
They latch onto the capsule
keeping Typhi away

But the bacteria are many
recruitments are needed
The Fc region of antibodies
brings neutrophils nearer
Once bound by antibodies
neutrophils swell and enlarge,
engulfing the bacterium
halting its charge

The oxidative burst begins
free radicals are released,
damaging Typhi DNA
the bacterium's life is ceased
Infection is avoided!
Our host remains safe
Thanks to our Vi-vaccine
typhoid fever's at bay

By Mari Johnson
DPhil Student at the University of Oxford, Oxford Vaccine Group

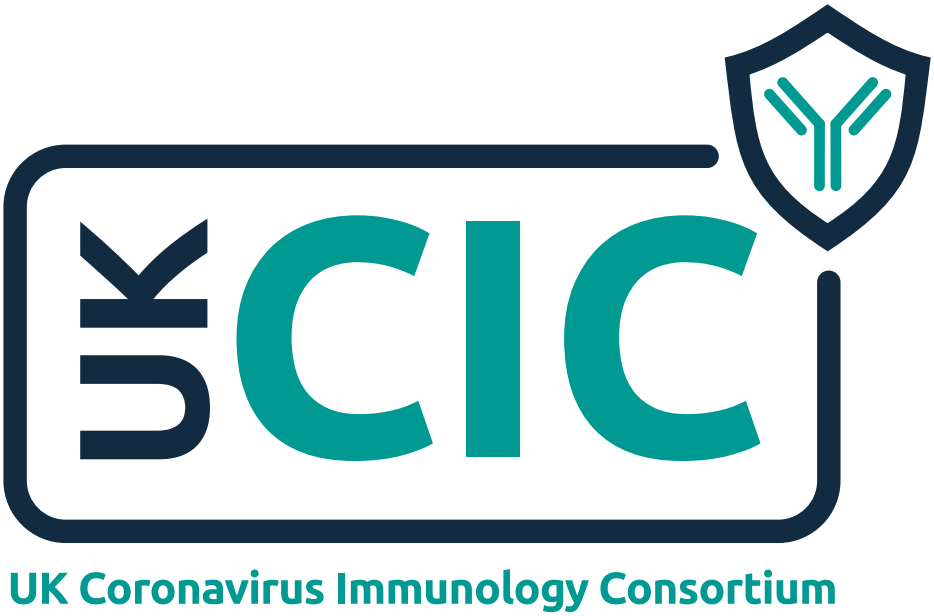
Get creative!

Have you written, drawn or made something about immunology? We would love to see your creations! Let us know by emailing t.prados@immunology.org or tagging @britsocimm on Twitter.

SOCIETY NEWS

UK Coronavirus Immunology Consortium (UK-CIC)

August saw the launch of the UK Coronavirus Immunology Consortium (UK-CIC), an exciting and innovative new immunology research initiative on COVID-19. In this article, we provide an introduction to UK-CIC and what it hopes to achieve.



The UK Coronavirus Immunology Consortium (UK-CIC) is a 12-month project funded by UK Research and Innovation (UKRI) and the National Institute for Health Research (NIHR) and supported by the British Society for Immunology. "This devastating pandemic has highlighted to everyone the critical role of the immune system," says Dr Joanna Jenkinson, Head of Infection & Immunity at the Medical Research Council, UKRI. "All our lives are being impacted by the uncertainties around the nature and duration of immunity to COVID-19, following infection, and how effectively the immune system will respond to the potential vaccines being developed by researchers."

UK-CIC has been designed to bring the UK immunology community together to respond at scale and at speed to this crisis. With £6.5 million funding over 12 months, UK-CIC sees 19 UK centres for immunology research come together in an unprecedented collaboration to answer key questions around the immune system's response to COVID-19. It aims to deliver meaningful public health benefit within 12 months to increase our ability to hasten effective COVID-19 pandemic control, providing vital insights to allow us to improve patient care and develop better diagnostics, therapeutics and vaccines against SARS-CoV-2. As BSI President, Professor Arne Akbar notes, "With this significant investment, our scientists can now work together at a national scale to improve our knowledge of the immunology of COVID-19 – an aspect that is critical for long-term control of this pandemic."

How did UK-CIC come about?

As we have reported previously, throughout the pandemic, the BSI has worked hard to make sure the voices of immunologists are heard at the highest levels of Government. As part of this work, we joined forces with the Academy of Medical Sciences (AMS) to set up an expert taskforce which produced a paper highlighting immunology research priorities for COVID-19 (see **www.immunology.org/coronavirus/immunology-and-covid-19**). This was sent to the Government's Scientific Advisory Group for Emergencies (SAGE) for discussion and through this, plus discussions on our taskforce and with funders, the concept for UK-CIC was born.

What is the structure of UK-CIC?

UK-CIC is led by Professor Paul Moss from the University of Birmingham. "Immunologists are at the forefront of efforts to tackle the coronavirus pandemic," comments Professor Moss. "It's an honour to lead this consortium to deliver a coordinated and agile national research programme to build our knowledge of this disease, which will translate into meaningful benefit for patients. By working together at a national level, we will be able to conduct larger, more robust studies into COVID-19, which will enable us to work quickly to find out how the immune system responds to SARS-CoV-2 at a cellular and molecular level, with a view to hastening effective pandemic control."

It will collaborate closely with ISARIC-4C, an internationally leading project already underway. As such, Professor Peter Openshaw, ISARIC-4C lead and past President of the BSI, will take the position of co-chair on UK-CIC. As Professor Openshaw explains, "ISARIC-4C, an established UK-wide project to study hospitalised patients with COVID-19, has already collected data from almost 80,000 people and collected multiple clinical samples from over 2,400 cases. We can follow this unique cohort over time and, by joining forces with UK-CIC, have a unique opportunity to analyse the immune profiles of COVID-19 patients. This will help us understand how the immune system protects us from, and reacts to, SARS-CoV-2."

UK-CIC's research is divided into five key themes, each of which consists of a question that the consortium aims to answer (see box). Each theme will be overseen by a lead researcher, who will sit on the management committee of UK-CIC. Researchers from multiple institutes will come together in an unparalleled collaboration to contribute to different aspects of each theme. As Theme 1 lead, Professor Tracy Hussell from the University of Manchester notes, "We will work with colleagues around the country to build our understanding of how different

Research institutes involved in UK-CIC

Bradford Institute for Health Research; Francis Crick Institute; University of Birmingham; University of Bristol; University of Cambridge; Cardiff University; University College London; University of Dundee; University of Edinburgh; University of Glasgow; Imperial College London; King's College London; University of Liverpool; University of Manchester; University of Newcastle; University of Oxford; University of Sheffield; University of York; Wellcome Sanger Institute

UK-CIC research

THEME 1
led by Professor Tracy Hussell, University of Manchester
What role does the immune system play in determining variation in susceptibility to primary infection and how does this vary across the life course?

THEME 2
led by Professor Paul Klenerman, Oxford University
How is protective immunity generated, what are its characteristics and duration, and how effectively is protective immunity boosted upon re-exposure to infection?

THEME 3
led by Professor Paul Kaye, University of York
Does the host immune response contribute to pathology and what is the role of immunomodulatory therapies in COVID-19?

THEME 4
led by Professor Mala Maini, University College London
Is there immunological cross-reactivity to other coronaviruses and is it protective or contributes to pathology?

THEME 5
led by Professor Paul Lehner, University of Cambridge
What are the immune evasion strategies of SARS-CoV-2?

people react to COVID-19 with the ultimate aim of improving patient care at all levels."

BSI involvement

The BSI is very excited to be supporting this innovative initiative which brings together the UK immunology community in a high-profile and important collaboration. As BSI President, Professor Arne Akbar observes, "Immunology is one of the core strengths of UK life sciences research. Created based on the report from the AMS and BSI taskforce, UK-CIC is a much-needed response to the ongoing and dynamic challenges produced by the current pandemic. Adopting a national approach is key to the success of this project and the BSI will do all we can to support the immunology community working at this unprecedented scale."
BSI involvement in UK-CIC will take a number of different forms:

- Our President, Professor Arne Akbar, will chair its Advisory Board, which will deliver independent oversight of the consortium, and input to its strategic priorities.
- The BSI will ensure that the views of patients and the public influence the direction of research through running the patient public involvement programme for UK-CIC.
- We will be responsible for carrying out the communications function of the consortium. This includes both keeping the immunology community up to date with UK-CIC and how they can get involved, and communicating progress of the consortium's research to policymakers, the media and the public.
- BSI will run a virtual conference on SARS-CoV-2 immunology for the scientific community in the first half of 2021 – more news on this soon!

The BSI exists to promote and support excellence in immunological research and clinical practice. Immunologists have been at the forefront of research efforts into COVID-19 and we couldn't be prouder of how our community has stepped up to this challenge. By working with UK-CIC, we aim to support UK immunology as a whole to collaborate at a national level to answer the big outstanding questions around how the immune system interacts with SARS-CoV-2, with a view to improving diagnosis and treatment as well as supporting the quest to find a vaccine. Through supporting this inclusive approach across the whole immunology community, we will aim for a lasting positive legacy, creating a blueprint that could be exploited for future national collaborative efforts within immunology.

How you can get involved

As we all know (and the BSI will never tire of reminding you!), the UK leads the world for the quality of our immunology research. "SARS-CoV-2 has changed the world and thrown immunology into the spotlight," says Professor Deborah Dunn-Walters, BSI Trustee and Chair of our Immunology and COVID-19 taskforce. "We all have important questions: Can we get immunity to the virus? Why do some people get sick more than others? What tips the balance between an effective immune response and one that causes illness? The complexity of immunology often means that individual research labs study intricate detail on just one aspect of an immune response."

Although UK-CIC is one of the largest ever collaborations between UK immunologists, the ambitions of the project, for UK-CIC, its funders UKRI and NIHR, and for the BSI, do not stop here. As Joanna Jenkinson from the MRC puts it, "This initiative has been designed to provide a platform to enable further studies of COVID-19 immunology and infection by all UK immunology and virology researchers in order to address key gaps in our understanding of how the immune response relates to clinical outcome."

UK-CIC and its funders are actively open to approaches from researchers who feel they can add to the work of the consortium. Our aim is for UK-CIC to be an inclusive endeavour for the whole UK immunology community. If you have an idea for a research project that could intersect with UK-CIC's work, we encourage you to get in touch with Principal Investigator, Paul Moss, any of the Theme Leads or with the MRC Programme Managers who are overseeing UK-CIC, Claire De-May (**Claire.De-May@mrc.ukri.org**) and Charly Oakley (**Charly.Oakley@mrc.ukri.org**).

Collaboration is key

UK-CIC represents a unique and powerful partnership to address the critical importance of immunity and immunopathology following SARS-CoV-2 infection and is one of the final pillars required to give the UK a world-leading capability within Covid biology. Over the next 12 months, both UK-CIC researchers and the BSI team will expend every effort to move forward our knowledge on how the immune system interacts with SARS-CoV-2 infection and COVID-19 disease.

As BSI President, Arne Akbar summarises, "The coronavirus pandemic has changed all of our lives, but research projects such as the UK-CIC, are a route to better understanding the disease and increasing our ability to improve patient care and develop more effective diagnostics, treatments and vaccines."

Jennie Evans
Head of External Affairs, BSI
Email: j.evans@immunology.org

Find out more about UK-CIC

www.uk-cic.org

@UKCICstudy

Sign up to the UK-CIC mailing list. Email: **uk-cic@immunology.org** to receive regular updates.

SOCIETY NEWS

BSI Forum: here to represent you

The BSI Forum is the place where the voice of our membership is fed into our activities. Chaired by Ann Ager, the 18 elected members come from all sections of our membership. Their role is to act as our 'think tank' on issues relating to education and careers, public engagement, policy and public affairs, as well as communications.

Our recent meeting in June focused on two main topics, the first of which was the Coronavirus pandemic. Discussions were wide-ranging, including on how the BSI can provide ongoing support to different sections of our membership during this difficult time. Forum members shared personal and gathered experiences on the difficulties that many immunologists are currently facing, and all agreed to assist the Society in our ongoing work in this area. Forum also had an in-depth discussion on how the BSI can contribute to public understanding and confidence around the development of a potential vaccine against COVID-19. Building on the success of our Celebrate Vaccines project, Forum discussed particular areas of focus where the BSI is uniquely placed to respond, build understanding and answer questions.

The second topic discussed was diversity and inclusion in immunology. This area has always been of utmost importance to the BSI, but we must make sure that we continually learn, educate and showcase best practice, to ensure that the BSI – and our wider discipline – continues to take steps forward. The Forum discussion was a brainstorming session with many helpful and thoughtful contributions on what actions the BSI can take. The staff team are now going to develop an action plan on the issues and ideas raised on diversity and inclusion activities and present this back to Forum at our next meeting.

Finally, we have a change of committee membership. We send our huge thanks to Helen Collins, Louise Cosby, Fane Mensah, Rebecca Newman and Antony Psarras, who all finished their terms of office at the end of June. We also welcome the following new members to Forum: Lauren Campbell (PhD representative), Karim Dib (Northern Ireland representative), Tomaz Garcez (Clinical representative), Donald Palmer (Education & Careers Secretary), Niamh Richmond (PhD representative) and Louise Topping (Early career representative). These excellent new additions to Forum are all keen to get started representing different sections of our membership!

The BSI Forum and its members are here for you. If you would like to raise any issues for Forum to discuss at an upcoming meeting, please contact your relevant Forum member – you can find a list of your representatives on our website at **www.immunology.org/forum**. Alternatively, you can email our Head of External Affairs, Jennie Evans, at **j.evans@immunology.org** who can pass on the message.

The UK Immunological Toolbox: a community-driven initiative to facilitate veterinary vaccinology and immunology research

Using the best animal models to study immune responses can dramatically accelerate the translation of basic to applied immunology. For any model selection we need the right quality and range of species-specific immunological reagents. To help with this, the UK Immunological Toolbox website has been created as a hub for veterinary immunological reagents. In this article, Professor John Hammond and other experts from The Pirbright Institute and the University of Edinburgh's Roslin Institute, discuss why this initiative was needed, how it can help you in your research, and how it will become an essential resource for researchers, veterinarians and clinicians.

The need for a central hub

A 'One Health' approach to immunology research and the capability to make informed decisions on the choice of biomedical model for translational impact has never been more important. This approach is reliant on a detailed understanding of the fundamental similarities and differences between animal immune systems for the exploitation (and avoidance) of individual models. The ability to determine how immune responses are initiated and regulated, particularly against pathogens with zoonotic potential, has obvious benefits for both animal and human health that have never been more evident than in the current climate.

The lack of reagent availability and reliability/reproducibility has at times limited the interest and application of non-rodent model species in immunology research. This barrier is diminishing through decades of significant international efforts by many institutes and individual laboratories which has resulted in a sizeable veterinary immunological toolbox. These reagents, predominantly monoclonal antibodies (Mabs), have been largely funded through limited-term grant-funded opportunities that have been focused towards farmed animal health. One of the challenges with this funding approach is in collating and sharing all the reagent outputs to avoid duplication, identify critical gaps and promote access that ultimately enables basic and applied research. A key demand on any central hub that collates information on reagents, tools and protocols is longer-term sustainability which goes well beyond the scope of fixed-term grant-funded projects.

To this end, the UK Immunological Toolbox initiative has been established to provide a central international focus for veterinary immune reagents. Led by two research institutes in the UK – The Pirbright Institute and The Roslin Institute – a funding model linked to longer-term strategic funding has been applied to provide a new level of sustainability. The initiative's dedicated website (**www.immunologicaltoolbox.co.uk**) serves as an open access and community-edited central resource of reagents and their uses. In addition, other services can be requested (including the development of new reagents according to wider research community priorities and recombinant antibody technologies) that are all aimed at driving the use of non-biomedical model species for immunological research.

A curated online reagent repository

The website collates and hosts high-quality, manually curated information on as many reagents and associated resources as possible, aiming to provide a single access point to a large knowledge base. This includes basic information about antibodies and target organisms, displayed alongside descriptive data, species cross-reactivity, references and with supporting images on functionality. Information about the owner and/or supplier is shown, including current availability, to simplify reagent accessibility.

This resource is entirely open access and currently describes over 1,600 hybridomas producing well-characterised Mabs and also polyclonal antibodies directed against immunological targets for cattle, chicken, pig, sheep, goat, horse, cat, dog and fish molecules, as well as some directed against key animal pathogens. Both the number of reagents and target species will continue to increase as information continues to be received from around the world from a wide range of international collaborators.

As a community resource, there is very active engagement with the research community. Registered users can easily comment and submit supporting data, references or any

other evidence that increases the understanding and the utility of any reagent listed. As such, an application table is provided for each reagent which enables researchers to easily establish reagents' utility and rate their application in an independent feedback system overseen by species experts.

Monoclonal antibody and novel reagent development

The demand remains for the production of new Mabs and other reagents as gaps in the current portfolio are highlighted and potential markers are identified using genetic methods. The UK Immunological Toolbox activities at The Roslin Institute include tailored projects for the development of Mabs and polyclonal antibodies in rabbits or sheep. Recombinant proteins can be produced as immunogens for antibody production, or for other applications including as growth factors or ELISA assay reagents. The generation of fluorescently tagged recombinant proteins as ligands for use in determining receptor expression can circumvent the requirement for Mab generation.

The UK Immunological Toolbox supports the development and application of reagents for specific purposes including flow cytometry, histology, Western blotting and ELISA. There is also the capability to make or provide tools to validate newly developed and existing reagents for specificity and species cross-reactivity.

Recombinant antibody technologies

The emergence of recombinant antibody technology has tremendously advanced the versatility and utility of Mabs in both basic and applied biomedical research, underpinning major developments in immunotherapy over the past 20 years. The UK Immunological Toolbox at Pirbright has started a project to sequence hybridoma cells producing antibodies for veterinary research in the UK and from international collaborators as requested.

Recombinant antibody production creates a range of possible research advances, the most immediate being to permanently secure important reagents as genetic information while simultaneously reducing storage costs by maintaining fewer hybridoma stocks. Knowing the antibody sequence also mitigates against cell line drift when growing hybridomas, hence ensuring consistent performance over time. Recombinant expression systems also allow flexibility in labelling, production and purification methods. This can drive down cost at different scales and create very simple mechanisms to share reagents and ultimately promote research.

Antibodies are also being engineered to improve their versatility and utility. As well as making Fab fragments without the Fc component to eliminate cellular responses, complete antibodies can be produced as all the mouse Ig subclasses or indeed any other species. Switching host species can remove or reduce unwanted immune responses, making them ideal *in vivo* reagents. The UK Immunological Toolbox has developed expression systems for mouse, cattle and pig IgG subclasses, as well as chicken IgY. These systems also allow the direct cloning of antibodies isolated directly from any of these host species. This opens the opportunity for high-affinity pathogen-specific antibodies in one species to be used for discovery research or immunotherapeutic treatment purposes in other species. This is currently a unique service as such systems and reagents are not generally available from commercial providers.

Engaging and expanding

The UK Immunological Toolbox has been driven and shaped by community consultation. Continued engagement and prioritising the needs of as wide a research base as possible is essential to maximise the benefits. Currently, all reagent development requests are reviewed by a steering committee which prioritises projects with potential to have the highest impact for the wider veterinary immunology and vaccinology research community. Consultations on project requests are offered to discuss the possible cross-reactivity of available reagents but also to propose a tailored service for the delivery of a reagent customised for a specific assay.

A major future focus will be to expand the veterinary reagent portfolio and make these tools available to the wider community. Previous workshops have identified T cell and B cell subset markers as a clear gap; this has been adapted as an early priority. This priority extends to new reagents but also by agreeing with collaborators to highlight their antibodies on the website and help establish mechanisms to provide access, either through commercial licensing or non-commercial distribution. The reagent owner will get all the benefits arising.

It is hoped that the current funding model and continued active engagement with the research community will lead to increased sharing, minimised duplication and increased awareness of available reagents. Ultimately, it is hoped that this will lead to more targeted comparative research projects, which drive our basic and applied knowledge, to reduce the burden of disease in people and animals.

John A Hammond, **The Pirbright Institute**
William Mwangi, Giuseppe Maccari, Elena Lokhman & Sylvia Crossley,
The Pirbright Institute
Jayne C Hope, Gary Entrican & Anna Raper,
The Roslin Institute, University of Edinburgh

Find out more

You can find out more about this initiative in this article published in our official journal *Immunology*: **onlinelibrary.wiley.com/doi/full/10.1111/imm.13227**

Visit the Immunological Toolbox website to learn more, search for available reagents and submit new ones: **www.immunologicaltoolbox.co.uk**.

The UK Immunological Toolbox project at The Pirbright Institute is supported by funding from the the Biotechnology and Biological Sciences Research Council (BBSRC), part of UK Research and Innovation (UKRI) Core Capability Grants BBS/E/I/00007038 and BBS/E/I/00007039.
The Immunological Toolbox project at The Roslin Institute is funded by BBSRC Institute Strategic Program Grant BB/P013740/1.
The development of the website was supported by BBSRC through the Global Challenges Research Fund (GCRF) grant BBS/OS/GC/000015.
The Immunogenetics group at The Pirbright Institute receives funding from the BBSRC (Institute Strategic Program Grant) BBS/E/I/00007030.

New BSI journal: *Immunotherapy Advances*

We're proud to launch *Immunotherapy Advances*, the first fully Open Access journal of the.British Society for Immunology. Our new official journal is now open for submissions! In this article, you will meet Founding Editor-in-Chief, Professor Tim Elliott, who is supported by an Editorial Board of globally renowned experts, and discover the type of papers they're looking for.

Scope and mission

Immunotherapy Advances will publish scientifically rigorous research relating to manipulations of the immune system for the benefit of human and animal health in all disease areas.

Immunotherapy Advances covers the translational pipeline for immunotherapy from discovery research and preclinical animal models through to clinical trials. Experimental medicine and first-in-human clinical studies are encouraged and negative clinical trials are welcomed where they contribute to immune-mechanistic insight. We also recognise the growing importance of interdisciplinary working in this area and encourage studies that are at the interface with engineering, mathematics and computer science, chemistry and the physical sciences.

Topics of interest to the journal include:

- Manipulations of the immune system for the benefit of human and animal health
- Immunotherapeutic interventions (such as small molecules, biotherapeutics and therapeutic vaccines) and their mechanism of action in all disease areas
- Understanding of immunological mechanisms
- Discovery research through to clinical trials
- Interdisciplinary research with physical sciences, maths and engineering.

The BSI family of journals

Immunotherapy Advances will join our two established journals, *Immunology* and *Clinical & Experimental Immunology*, as part of the BSI family of journals. As such, we're proud to offer a 20% discount on publication fees in *Immunotherapy Advances* for BSI members. All BSI members are eligible for a discounted Article Processing Charge (APC) of £1,600. The journal is now open for submissions, with the first articles published in late 2020 and the first volume opening from January 2021. We'd like to encourage BSI members to support your Society's first fully Open Access journal and submit to *Immunotherapy Advances*: **https://mc.manuscriptcentral.com/ita**. We're delighted to partner with Oxford University Press to deliver this publication. Their email alerting service will keep you informed when *Immunotherapy Advances* content publishes, and can be tailored to suit your needs. Keep up to date by signing up to receive email alerts when content is published: **https://academic.oup.com/sign-in**.

'I am particularly interested in papers with evidence from human cohort studies, which might lead to new proof-of-concept preclinical immunotherapy studies, and from human clinical trials.'

Professor Tao Dong,
Regional Editor for Asia

'Immunotherapy Advances *will provide a home for your findings on manipulations and interventions of the immune system. I'd like to encourage my fellow members to explore the scope of the new journal, and to consider submitting your high-quality work'*

Professor Arne Akbar,
BSI President

Immunotherapy ADVANCES

Meet the Editor-in-Chief of *Immunotherapy Advances*: Tim Elliott

We're pleased to formally introduce the Founding Editor-in-Chief of our official journal *Immunotherapy Advances*, Professor Tim Elliott. Read the interview below to find out more about his background, what attracted him to the role and his vision for the journal.

Tell us a bit about your academic and professional background

I graduated with a degree in Biochemistry from the University of Oxford in 1983, which is where I got the bug for research. My basic grounding during my 'part 2' research project with Bob Sim and Rodney Porter in the MRC Immunochemistry Unit served me well during my PhD at the University of Southampton, where I first became exposed to translational research. Following a postdoc at Herman Eisen's lab at MIT, I came back to the UK to join Alain Townsend's lab in 1989 and enjoyed a fantastic decade of discovery for the field of antigen processing and presentation. Moving to Southampton in 2000 as a university professor brought me back to the translational research environment. My time as Research Dean for the Faculty of Medicine exposed me to the best research in the university – I became an advocate of interdisciplinary research and helped set up the Institute for Life Sciences, where I am proud to be Deputy Director; this provided a solid foundation for when I stepped in as interregnum Pro VC for Research in 2016. Recently, I helped lead a philanthropic and successful fundraising campaign for a new Centre for Cancer Immunology – of which I am Director.

How did you first become involved with the BSI?

I gave my first talk at a BSI Congress held in Kensington Town Hall while I was still a PhD student. It was electrifying and the feedback I got from other scientists both encouraged and helped me formulate a forward-looking research plan. The experience helped me build a picture of my wider academic 'family' and I think I have always seen the BSI as the helpful uncle in that process. I like working with the BSI because it continues to focus a lot of its effort on early career researchers and understands what their specific issues are and how to address them. There are a lot of young faces at BSI Congress every year and I feel reassured that UK immunology has a sustainable future.

What makes *Immunotherapy Advances* special?

First, its scope. We will publish research that spans the immunotherapy translational pipeline from discovery research and preclinical animal models through to clinical trials, for the benefit of human and animal health in all disease areas. Second, its global nature. I have appointed six worldwide regional editors who are not only researchers at the top of their fields but also have extensive regional knowledge and will help to ensure that as we grow, our content draws from a wide and diverse pool of scientists and clinicians. Third, its Open Access platform. I hope this will make it easier to bring our global content to a global audience, and not restrict it to a limited number of subscriber institutions as often happens with more traditional journal formats. Last, its interdisciplinarity. Not only will our focus on immunological mechanism bring together immunotherapy communities working in different clinical disciplines, but I hope it will also encourage submissions from research groups that are combining biomedicine with engineering, mathematics and computer science, chemistry and the physical sciences.

Why launch *Immunotherapy Advances* now?

It is now clear that our immune system is involved in pretty much every aspect of our bodily functions and that changes in its regulation underpin the initiation, course and outcome of non-communicable diseases. As research progresses, an explosion of potential targets for immunomodulation, and for passive therapy, in multiple diseases has ensued.

Many of these are in cancer, where there are over 3,000 ongoing clinical trials for about 2,000 new agents. A wealth of new information will emerge from these trials over the next few years; *Immunotherapy Advances* will not only be the ideal repository for these data, but I hope it will also serve to reinforce the importance of interrogating trials data in search of immunological-mechanistic insight by commissioning insightful commentary and informative reviews from field leaders.

New information about the mechanisms of immunotherapy-induced cancer rejection is helping to grow and diversify immunotherapeutic approaches in other non-communicable diseases entering clinical trials – data from which will also find a home in *Immunotherapy Advances*.

Research into vaccines for chronic viral infections has opened doors to understanding the immune response to cancer and this knowledge is fuelling a growing number of new therapeutic cancer vaccines – further data that we would like to capture in the journal.

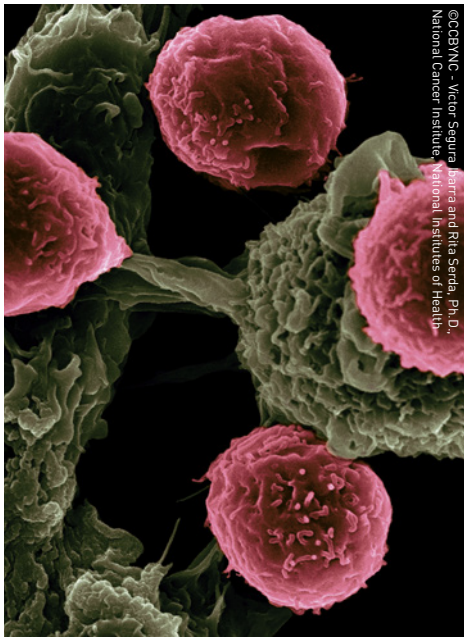
Immunotherapy ADVANCES

As the founding Editor-in-Chief of the journal, what are you most excited about?
I am very excited about launching *Immunotherapy Advances* at a time when the clinical application of immunological knowledge is taking off big-time in the treatment of diverse illnesses – from cancer to migraine. As I've mentioned, there is a lot of preclinical and trials work going on that will need an outlet and I am keen that the journal helps to bring those data to a wide audience in a way that truly advances the field.

I am particularly excited about working closely with the Regional Editors to establish the scope of the new journal and to begin developing its global personality from the outset as we appoint our Editorial Board.

How will *Immunotherapy Advances* fit within the BSI family of journals?
Immunotherapy Advances is the third official journal of the British Society for Immunology and so has an excellent pedigree and I am working closely with Simon Milling (Editor-in-Chief of *Immunology)* and Leonie Taams (Editor-in-Chief of *Clinical & Experimental Immunology*) to ensure that it complements its sister journals. We can see how the triad of journals will synergise: with *Immunology* showcasing the fundamental aspects of the immune system, *Clinical & Experimental Immunology* focusing on clinical research and human disease and *Immunotherapy Advances* concentrating on manipulations and interventions of the immune system for the benefit of human and animal health. All three journals place high value on mechanistic insight and this is where I think we will see greatest added value: for example, by working on joint virtual issues that provide insight into a therapeutic mechanism of action; or a novel immune pathology.

Tell us a bit more about the type of research you would hope to see in *Immunotherapy Advances*.
We will encourage experimental medicine and first-in-human clinical studies and will welcome negative clinical trials where they contribute to immune-mechanistic insight. The curious mind can often gain important mechanistic insight from all points in the pipeline, and can come from combining disciplines, so studies involving engineering, mathematics and computer science, chemistry and the physical sciences, are encouraged. One exciting growth area is the application of artificial intelligence and computational modelling to clinical trial



design – for example to aid dose selection and scheduling. Another is the incorporation of point-of-care biomarker analysis into trials design.

We will complement research articles with commentary and reviews from experts in the field, making these accessible to all levels of readership. This way, I hope to bring some of the best research articles, digestible reviews and insightful commentary to a worldwide audience: to researchers of course, but also to doctors, health professionals, patients and a growing body of interested public and policymakers.

I am delighted that we will have representatives from industry on our Editorial Board as well as clinicians and basic scientists who together will help us evaluate the reach and significance of everything we publish.

What are your plans for the journal and what are you hoping to achieve in the next few years?
I hope that *Immunotherapy Advances* becomes a globally recognised title that both serves the immunotherapy community and exposes new developments in the field to a very wide and diverse readership. I'd like to see *Immunotherapy Advances* become the go-to journal for immunotherapy because of the added value we offer by being a generalist immunotherapy journal rather than disease-specific.

OK so your follow-up question will be 'how will you know if you are successful?' and this inevitably leads to the usual metrics. As my friend, Guy Watson (of Riverford Organic Farmers Co-operative) says, "we should measure what we can, while not kidding ourselves that everything that matters is included...when measurement becomes the goal, it ceases to be useful". So yes, we will be following citations and we are pursuing 'listings', but what I really hope to achieve is to establish a dependable source of important and relevant knowledge.

Why should people submit to the journal?
We will be fiercely safeguarding the high quality of all content, with a team of well-respected Regional Editors and Editorial Board with expertise spanning all immunological disciplines and disease areas: so the top reason to submit to *Immunotherapy Advances* is that your work will be recognised for its quality and will sit alongside other content of equally high quality. We aim to review manuscripts rapidly, and to a high level of competence by relevant experts. To encourage this, we will publish the names of referees at the end of each article. We also strongly support post-publication advocacy of papers using featured articles and social media channels to raise awareness. And of course, this goes hand-in-hand with the Open Access format of the journal where none of its content sits behind a paywall: all of which means that your research will reach a wide and diverse audience, and hopefully citations will follow!

Is there anything else you would like to say to your fellow BSI members?
One criticism that is often levelled at Open Access journals is that, while their content is freely accessible to anyone with an internet connection, for the researcher they are sometimes (not always) more costly to publish in than subscription journals. We recognise this and so we offer Article Processing Charge (APC) discounts, in addition to the APC waivers already in place for authors in some developing countries. It is also worth mentioning that any profits made from APC will be channelled back into the journal, to help it grow and serve the immunotherapy community even better. I hope BSI members will see *Immunotherapy Advances* as a great new opportunity to disseminate their research, and in doing so support the Society.

Interview by Robyn Taylor and Teresa Prados
BSI Journals Manager and Marketing & Communications Manager

Immunotherapy ADVANCES

Meet the Regional Editors

AFRICA:
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University of Cape Town, Cape Town, South Africa

EUROPE:
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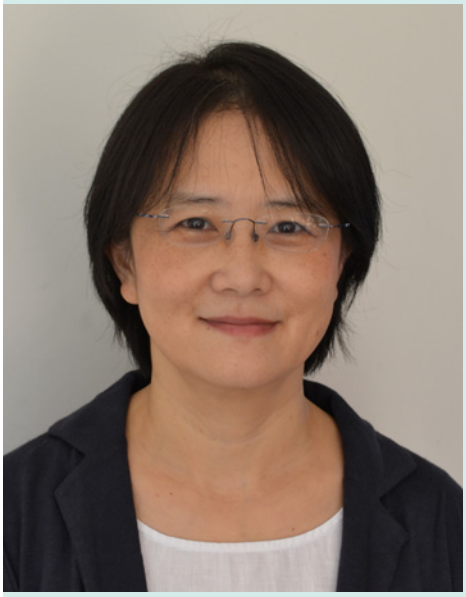
SOUTH AMERICA:
PROFESSOR ADRIANA BONOMO
Oswaldo Cruz Foundation, Rio de Janeiro, Brazil



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Find out more

To find out more about the Editorial Team, please visit **https://academic.oup.com/immunotherapyadv/pages/Editorial_Board**.

To find out more about the Society's official journals, *Immunotherapy Advances*, *Immunology* and *Clinical & Experimental Immunology*, please visit: **www.immunology.org/publications/journals/**.

Thinking about submitting to *Immunotherapy Advances*? Go to **https://academic.oup.com/immunotherapyadv**. Support the BSI, submit your work now!

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Applying the gendered lens to a post-COVID academia: an Australian perspective


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In this moment, the value of immunology research couldn't be more visible as our colleagues work tirelessly to develop a COVID-19 vaccine. Nevertheless, the global academic job market is on the verge of collapse due to the pandemic and we risk reversing the significant gains made towards gender equity in the workplace.

From the start of the crisis in March, job losses and recruitment freezes have been announced at universities across the globe. In Australia, the university sector is struggling in the aftermath of the collapse of a National Tertiary Education Union pay cut deal to save up to 12,000 jobs,[1] the loss of casual positions, and exclusion of all staff from access to a federal government COVID-19 wage support scheme,[2] called JobKeeper. Chronically underfunded Medical Research Institutes (MRIs) also failed to qualify for JobKeeper,[3] underscoring that the Government is not prioritising support for our industry. The impact of continuing job losses stemming from this lack of financial support disproportionately impacts those on short-term or part-time contracts, teaching staff, early career staff and primary caregivers. Women disproportionately fall into all of these categories.

The gender inequity triggered by the current crisis has to be navigated on top of pre-existing biases[4] and structural inequalities for women[5] and other under-represented groups, which are inherently embedded in academia and society in general. The gendered impacts of COVID-19[6] have been identified (Table 1), and will undoubtedly continue to grow and increase the mental load on women in academia.

We must now consider how to dissipate the impact and plan for the future impacts of COVID-19[7] to preserve the diversity of our workforce. This will require coordinated efforts across universities, funding bodies and professional societies.

Table 1. Gendered impact of COVID-19 in academia

Increased carer responsibilities: increased hours spent on active childcare and homeschooling
Increased household duties
Increased job losses: women are over-represented in less secure casualised and part-time positions
Greater mental load
Early-Mid Career Researcher (EMCR) track records and productivity disproportionately impacted: closure of labs, reduced data generation, grant applications, publications, mentoring, supervision
Loss of networking opportunities: conference and meeting attendance, committee participation, networking events
Loss of soft funding creating significant job losses: increased competition for limited jobs and funding

Role for universities

Universities not only educate the next generation of STEM researchers but also employ the majority of researchers. The impact of COVID-19 has been hardest felt in countries where universities rely heavily on tuition fees, particularly from international students, such as Australia and the UK. In the UK, enrolments are projected to drop by 16% for domestic and up to 47%[8] for international students. In Australia, modelling predicts that by 2021 there will be a 40% loss in student enrolments, equating to a loss of $7.6 billion in revenue.[9] This sudden loss of funding severely undermines the medical research and education capacity of these countries, to the detriment of scientific innovation. Currently every $1 invested in medical research in Australia yields a $3.20 return[10] and every £1 of public money spent in the UK returns 25 pence[11] in health gains. Hence, the economic downturn that the universities and general public face will be even more far reaching.

To counterbalance the loss of soft money support to researchers and the

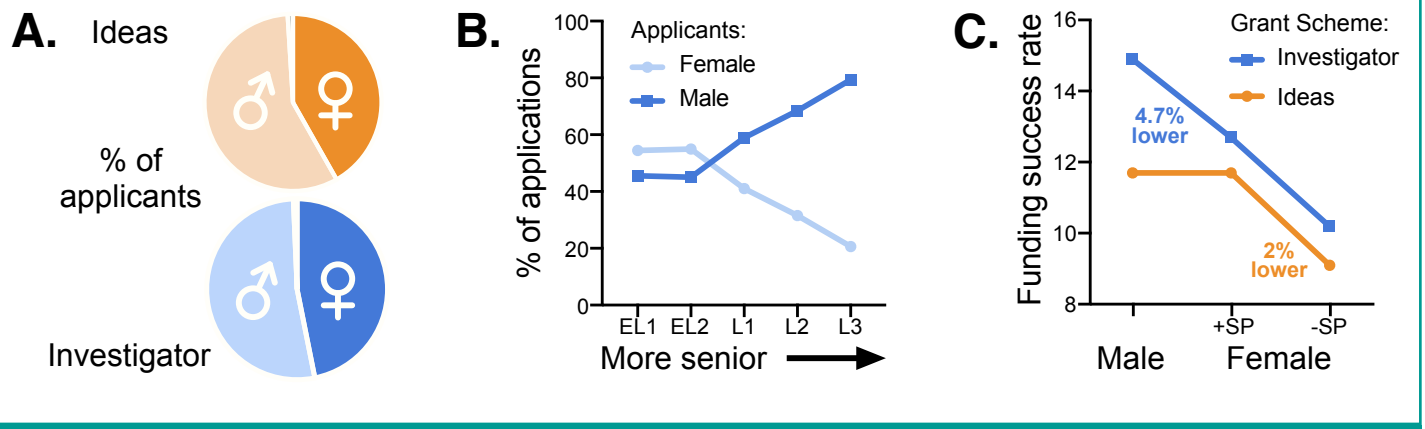

Figure 1. Gendered trends in application and funding rates for two major Australian NHMRC schemes, Ideas and Investigator grants, for 2020. A) The number of applications from females is consistently lower for both schemes; B) the proportion of applications from females at each stage for the Investigator grants drops substantially from mid-career onwards; and C) the proportion of applications deemed fundable after removal of the structural priority (SP) scheme is markedly lower for female as compared with male applicants in both schemes. (See 'Outcomes of funding rounds' at **https://bit.ly/3kzxvH8**)

immense overload placed on educators to move online, universities and medical research institutes (MRIs) must look for innovative and compassionate solutions to place staff first. As an example, Newcastle University introduced a four-day week without lowering salary[12] to ease pressure on staff, particularly those caring for children. Support for remote working, due to social distancing measures, also removes pressure on staff and has had the unexpected benefit of reducing lost time in commuting and reducing infrastructure costs. These benefits long-term will enable researchers to maintain a work/life balance conducive to care giving, with professional benefits including remote access to international conferences.

Now is the time to welcome change and even out the gendered playing field. It is also a chance for academia to move to a more modern workforce model that values domestic students and embraces remote working and online education, conferences and meetings (Table 2).

Table 2. University landscape post-COVID-19

Increased domestic student access to affordable education
Increased enrolment and training of Government-funded domestic PhDs students
Increased availability and access to higher education via online education
Reduced on-campus costs due to online teaching and redirection of savings to support research staff and facilities
Uneconomic university/ group/facility mergers
Remote working: increasing ability to attend meetings and global conferences, reduced time lost due to work commute

Role for funding bodies

Prior to the COVID crisis, the annual gross domestic product for R&D in both Australia and the UK was already well below the 2.36% average across advanced economies at 1.81%[13] and 1.7%[14] respectively. Consequently, academia not only faces a devastating loss from tuition funding streams drying up, but also from a decline in R&D funding, with an estimated loss of $3.5 billion from this sector in Australia this year. Researchers have also experienced a range of career disruptions from limited or no access to laboratories, delayed laboratory consumable deliveries and increased prices, to loss of international postgraduate students.

In an effort that should be applauded, UK Research and Innovation announced the COVID-19 grant extension allocation;[15] £180 million that will be provided as part of a wider package to retain the UK's research talent via salary and facility cost support. In Australia, the National Health and Medical Research Council (NHMRC) has acknowledged the impact of COVID-19 disruptions on particular groups[16] and is investigating potential initiatives, including similar grant extensions. However, as any potential re-allocation of money would disadvantage researchers with no current funding, including disproportionately EMCRs and women (Figure 1), in a system where grant scheme success rates are a dismal 11–13%, this idea may not be supported.

Central to the NHMRC's current efforts to support women, has been the introduction of structural priority funding that utilises residual allocated money to fund competitive female-led grants. Superficially, this initiative appears to be working based on recent outcomes; with almost equivalent funding rates for both major NHMRC funding schemes (Figure 1). However, women still receive only ~40% of the total budget and removing structural priority data reveals that actual funding rates for women were ~2–4% lower than those for men. Regardless of funding rates, the number of grant applications from women at mid-career levels onwards is still dwarfed by their male colleagues, despite equity initiatives being adopted by the research sector (Figure 1).

> 'We must now consider how to dissipate the impact and plan for the future impacts of COVID-19 to preserve the diversity of our workforce.'

Together, this drives a continued loss of female leaders[17] starting at the grassroots level with EMCRs struggling to establish independent research programmes while juggling young families and carer duties. In the wake of the COVID-19 pandemic these statistics will only worsen for women, as well as for struggling EMCRs, without an injection of funds and restructuring of the grant system. To address this, the Association of Australian Medical Research Institutes (AARMI) recently called for 300 new Government-funded fellowships each year for the next three years, equating to a $543 million investment.[18] This is laudable but it is unclear how this would address the amplified impact of COVID-19 on specific demographics without applying a gendered lens.

Governments and funding bodies need to act now to mitigate the potential brain drain from this vital sector both during and

post COVID-19. A number of strategies (see Table 3), including the logical approach of Government block-funding, could circumvent the predicted loss of 21,000 academic and 7,000 research jobs that will undoubtedly include an over-representation of EMCRs and women.

Table 3. Funding strategies to mitigate the Australian brain drain

Short-term strategies
Additional Government financial support to key funding bodies and universities
Universities/MRIs provide COVID-19 bridging funding to support researchers until outcomes announced for the current grant rounds
Extensions for fellowships and grants by funding bodies dipping into future funding rounds or divert funds from the long-term MRFF body
Block-funding awarded to universities and MRIs in future rounds
Introduce a cap on funding dollars to increase the number of grants in the system
Structural priority funding for male and female EMCRs, as well as senior-level female scientists to maintain a generation of mentors for up-and-coming leaders
Long-term strategies
Increase the GDP expenditure on education and academic research
Quotas for career stage to ensure EMCRs have access to funding
Equal quotas and funding amounts for female- and male-led grants
Incorporate EMCR and female career development scores to mark leadership performance in grants
Clearer guidelines to document and evaluate career disruptions and relative to opportunity in grants
Routine unconscious bias training to implement fairer grant reviews

Role for societies

Given the disruption to many institutions, professional societies must take a leading role in cushioning the impact of the pandemic, especially on women and under-represented groups.

Professional societies provide a sense of community for researchers that can transcend institutions, career stages and geographical distances. This sense of community takes on enhanced value during a pandemic, when we are socially distancing and travel is limited. We can use these societies to bolster job satisfaction, career progression and mental health. Support for members could include:

- dyad mentoring to generate connections and foster career progression
- peer mentoring through small virtual coffee catch-ups to share experiences
- virtual conferences or seminar series to share work, populate CVs with speaker/chairing positions, and maintain academic and social dialogue
- virtual workshops to discuss career development or techniques for supporting mental health
- jobs boards to increase awareness of employment opportunities
- listings of upcoming grant/philanthropic/commercial opportunities.

Societies can be a platform to make our work visible to the Government and to the public. Research societies and our members have engaged with governments around the world to develop evidence-based COVID-19 policies. Research societies in Australia, such as the Australian Society for Medical Research (ASMR) and AARMI, have been advocating for changes to Government funding to ensure the recovery of the sector and preserve opportunities for EMCRs and women. However, Government appetite to fund our work is tied to public perceptions and appreciation for the value of our work. To gain and maintain public appreciation, we have to continually communicate our work in a manner that is accessible, authentic and accurate. This is why outreach initiatives like the International Day of Immunology,[19] Australia and New Zealand Society for Immunology's 'Fireside chats'[20] and BSI's 'Celebrate Vaccines'[21] campaign are absolutely essential. However, to increase public trust in our sector, we must ensure that the voices amplified are diverse and truly representative of our community.

One of the most impactful interventions that financially resilient societies could consider is to provide financial support. Many of the usual high-cost activities that a society might engage in are not viable during the pandemic; funding annual meetings, seminars and in-person events, supporting conference attendees via travel awards and childcare. Societies could redistribute this funding to carers that have been inundated with additional care and home-schooling as well as their full-time jobs, casualised educators that are in precarious work, and disadvantaged EMCRs. Funding could support:

- childcare to allow carers to maintain workloads or purchase additional leave
- EMCRs by covering costs previously covered by discretionary funding (registration for virtual meetings, computers, preliminary datasets).

Societies can't help everyone but supporting individuals could make all the difference.

Finally, to ensure that helpful interventions are identified by societies, we must ensure equal representation of men and women at all career and family stages, and inclusion of under-represented groups on committees. We are beginning to see a shift in attitudes with all-male expert panels, colloquially referred to as manels, being viewed as unacceptable. We need to see similar attitudes to all committees and decision-making groups. Ultimately, to be aware and respond to what people urgently need during a pandemic; those people need to be part of the conversation to communicate their needs.

Dr Jessica Borger,
Lecturer and Graduate Course Coordinator, Central Clinical School, Monash University

Dr Kate Lawlor,
Lab Head of the Cell Death and Inflammatory Signalling Group, Centre for Innate Immunity and Infectious Diseases, Hudson Institute of Medical Research, Monash University

Dr Kylie Quinn,
Lab Head of the Ageing and Immunotherapies Group in the School of Health and Biomedical Sciences, RMIT University

LINKS

1. https://bit.ly/3227NDB
2. https://bit.ly/2Y8lNdO
3. https://bit.ly/3kQf55S
4. https://bit.ly/2E6kmpc
5. https://bit.ly/3g2UuaQ
6. https://bit.ly/348wbGm
7. Majowicz 2020 *Epidemiol Infect* **148** e92 https://bit.ly/2Y9b4jh
8. Woolston 2020 *Nature* **582** 449–450 https://go.nature.com/3iNYttQ
9. https://bit.ly/31YCObl
10. https://bit.ly/3kQcgBV
11. https://bit.ly/2Yp5rxJ
12. https://bit.ly/3auzFnH
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18. https://bit.ly/3iKCFPC
19. https://bit.ly/2FxcayU
20. https://bit.ly/312B29V
21. https://bit.ly/3fYi4Wg

The jump to virtual public engagement

From strict lockdown restrictions to social distancing measures that help us return to a 'new normal', public engagement as we know it has had to pivot rapidly into the virtual world. We must look for alternatives to maintain inspiring and vital interactions with the public about immunology while keeping everyone safe. With science – and especially immunology – prominently in the public eye, there's a captive audience for your public engagement. Now is the time to embrace technology and extend our online reach. Here, our Public Engagement Manager, Erika Aquino, tells us about how the public engagement landscape has transformed, ways for you to continue engaging with the public online, and how we're supporting our members.

A shift to online engagement

Organisations and events, such as science festivals, are adjusting to new ways of delivering science to the public through digital platforms. It's now time to reimagine public engagement and find a sustainable way to interact with the public in this new environment of restricted face to face interactions.

Moving engagement online presents both advantages and challenges, as with any form of engagement. Engaging the public online is cheaper and quicker than bringing people face-to-face, can be more inclusive, and can reach a wider audience over a larger geographical area. For people who can't travel, online involvement may be a preferred option. However, for some groups, digital engagement is extremely hard, for example, due to limited access to connected devices or lack of skills and confidence online. With some creativity and versatility, some organisations have done this successfully.

The Australian and New Zealand Society for Immunology has developed 'Fireside Chats' (**https://bit.ly/2OTXg7r**) a regular free live Q&A session for the public to get their questions answered by immunologists. The Francis Crick Institute has made their 'Meet a Scientist' events virtual (**https://bit.ly/30wqkHg**), running the Q&A on Instagram reaching a younger audience. The Lambeth Country Show (**https://bit.ly/2OJ6Vh0**) has moved to a virtual event across their website and social media channels, allowing families flexibility to get involved as and when suits them.

How can you adapt?

There are many resources available to start you thinking about how to engage online. As a starting point, BSI members can watch our career development webinar 'An introduction to public engagement in the time of COVID-19' (**https://bit.ly/2ODXxex**) for free. The webinar discusses developing public engagement activities, and techniques for effective and productive online interactions. The National Co-ordinating Centre for Public Engagement (NCCPE) has put together a guide for running online meaningful engagement events (**https://bit.ly/2Co9RNw**), which focuses on practical tips for design and delivery.

As with all public engagement, planning and organising your virtual event is key to success. Understanding your audience's needs, the purpose of the activity and what you're trying to achieve will help inform which platform to use. There are many different digital platforms with extensive pros and cons, for example Zoom and Google Hangouts. Make sure you explore options and test the platforms to ensure they work for your audience. It's also important to adjust rather than just transfer an activity to online, which means it's your chance to get creative! Many platforms have innovative and different tools for interacting and engaging, for example chats, breakout rooms, polls, quizzes and online whiteboards. An article by Sessionlab (**https://bit.ly/2ODOAli**) has a great list of 25 free online tools to discover. If you want to take your engagement to social media, think about the format of the content you're sharing and consider making it fun, accessible and creative. A great example comes from BSI Trustee, Matthias Eberl from Cardiff University, who created videos for TikTok (**https://bit.ly/3jkzShb**) explaining how vaccines prevent diseases


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from spreading. Additionally, the NCCPE has a useful guide (**https://bit.ly/2ZLU17W**) for using social media with research engagement.

Virtual public engagement is a chance to build new relationships with different audiences and reach out to new communities, or even transform how you involve existing groups.

The BSI continues to support our members

The BSI is here to support our members. Our Communicating Immunology grant scheme – of up to £1,000 – is still open for applications. Now, more than ever, we're here to help you to develop and deliver in a digital world. If you have an existing project that can move online, we'd love to hear about it and work with you to modify it. If you have an idea but you're unsure how it will work virtually, we can help develop it into a feasible project. Don't hesitate to contact me for guidance and advice.

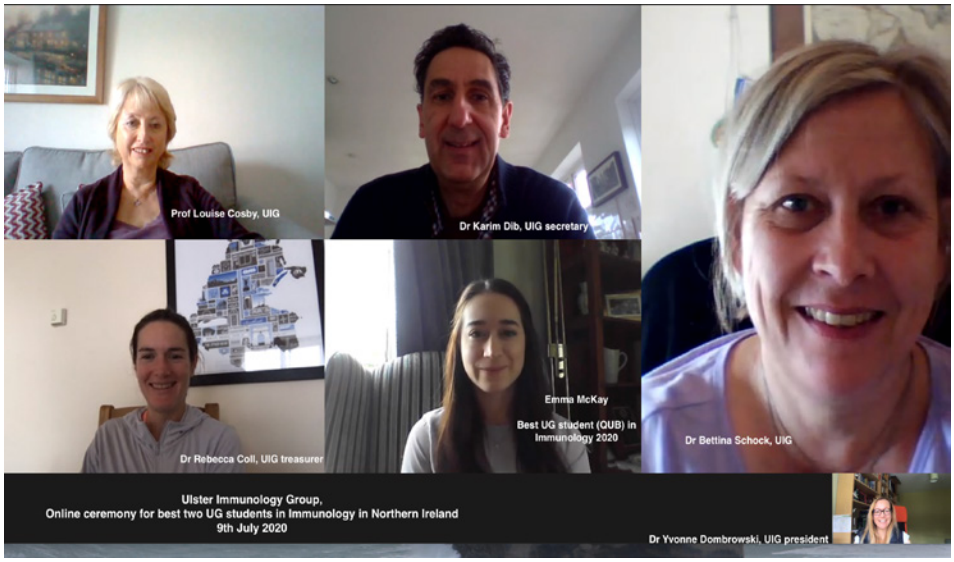
The immunology community is greatly needed at the forefront of public discussions. With COVID-19, we're presented with a unique opportunity to capture public curiosity in immunology and represent the voice of immunologists. It's vital to strengthen public understanding of all aspects of immunology to help society make informed decisions about their health. Crucially, it's now a time to build public trust and confidence in science.

Erika Aquino
Public Engagement Manager, BSI
Email: e.aquino@immunology.org

Congratulations

This is the section of the magazine where we celebrate the achievements of our members. Our congratulations to all who are mentioned here.

Best Immunology Undergraduate Student Award



The BSI Ulster Immunology Group award for the best two undergraduate students in immunology in Northern Ireland has been awarded to **Emma McKay** (Queen's University Belfast) and **Antonio Singco, Jr** (Ulster University). The virtual ceremony took place on 9 July 2020.

The Group aims to provide a forum for scientists in Northern Ireland to foster common interests in the broad area of immunology. You can find out more about their monthly seminar series and other activities at **www.immunology.org/ulster-immunology-group**.

Communicating Immunology Grants

The BSI is delighted to fund the following project.

Lucia Martin-Gutierrez and colleagues from University College London have been awarded funding to develop their 'Raising awareness of immunological and inflammatory condition through public engagement' online project. They will host six virtual events over the next year for patients and public affected by autoimmune diseases to remain engaged with immunology research. They will be exploring online Zoom and sli.do platforms to interact with participants.

The next application deadline for this grant scheme is 1 October 2020 and we welcome virtual project ideas. We're particularly keen to hear of projects for engaging the public about COVID-19 in digital or online formats. Please get in touch with Erika Aquino at **e.aquino@immunology.org** for guidance or with any questions. For more details, visit **www.immunology.org/grants-and-prizes/communicating-immunology.**

2020 Tang Prize in Biopharmaceutical Science

BSI member **Sir Marc Feldmann**, Emeritus Professor at the Kennedy Institute of Rheumatology, University of Oxford has been awarded the 2020 Tang Prize in Biopharmaceutical Science. He was announced as joint winner alongside **Charles Dinarello** (US) and **Tadamitsu Kishimoto** (Japan) for the development of cytokine-targeting biological therapies for treatment of inflammatory diseases. Recognised for the part he played in the discovery of anti-TNF therapy, Professor Feldmann is now exploring whether the antibody can be effective for COVID-19.

Established by Taiwanese entrepreneur Dr Samuel Yin, the biannual Tang Prize awards up to three recipients in each of four categories. It aims to promote the interaction and cooperation between culture and technology so as to find a 21st century path to the sustainable development of the world.

We would love to hear from you about your achievements. Have you or a colleague recently received grant funding, passed your PhD viva or accepted a new appointment? If so, let us know by emailing **media@immunology.org.**

FUTURE FOCUS

BSI Undergraduate Prize 2020

Each year, the BSI's Immunology Undergraduate Prize scheme aims to promote excellence in the study of immunology at undergraduate level, and encourage gifted students to pursue further postgraduate study, or a career in the discipline. Here's a selection of the 2020 winners.

You can find out more about the BSI Immunology Undergraduate Prize scheme and how your department can apply for funding at **www.immunology.org/grants-and-prizes/immunology-undergraduate-prizes.**

BEN GEORGE
University of Oxford

My interest in immunology began during the second year at Oxford and is owed in part, to the tutorship and encouragement of the fellows at Corpus Christi College. When the time came to seek out a research project topic, it was the ground-breaking work of Professor Rowland-Jones and the members of her group that piqued my interest. The project offered the prospect of integrating work in immunology, virology and epidemiology and, as an undergraduate, to get involved in a dynamic area of research.

GRACE ERSKINE
Newcastle University

I have just graduated from Newcastle University after studying Biomedical Science. My dissertation title was 'Immune reconstitution following haematopoietic stem cell transplantation'. My favourite modules at university were immunology of health and disease, cancer biology and therapy, and business enterprise for the bioscientist. I have just started a job working for Illumina as a Business Development Analyst.

ANTONN CHEESEMAN
University of Bristol

When I started my degree at the University of Bristol in Cancer Biology and Immunology, I had no defined plan for post-graduation. By the end of my first year, my lecture units in infection, immunity and oncology had convinced me of the centrality of the immune system in health and disease, as well as the vast scope for further discovery. After graduation, I have secured PhD study at The University of Manchester investigating CD4+ T-cell responses to malaria, supervised by Dr Kevin Couper and Professor Andrew MacDonald.

GEORGE BIBBY
Liverpool John Moores University

Throughout my Biomedical Science course, I gained a deep insight into various areas of immunology, developing a keen interest in immunotherapy and immunological research techniques. In my dissertation, I researched the effects of microRNA on keratinocyte migration, which is vital for wound repair and infection prevention. I'm excited to expand my immunological knowledge in the medical field and experience the diagnostics and treatments.

HANNAH DAWE
King's College London

I studied BSc Biomedical Science at King's College London. During my final year, I completed a research project in infection and immunity, entitled 'Transcriptional regulation of AhR in HaCaT keratinocytes' with a focus on its benefit or complications in inflammatory skin diseases such as psoriasis. I was given a mark of 93% for this project for which this prize is awarded. I am planning to continue these research activities with my project supervisor, Dr Paola Dimeglio, in the forthcoming year before applying to medical school the following year.

LEILA MOTEDAYEN-AVAL
Imperial College London

I am a fifth-year medical student at Imperial College London. I have recently completed my BSc in Immunity and Infection which was undoubtedly one of my favourite years at medical school so far. In particular, my research interests lie in the development of novel anti-cancer therapeutics to broaden the reach of cancer immunotherapy. I am eager to graduate and continue to grow my interests within the immunology field in order to integrate this within my clinical practice and ultimately pursue my aspiration of becoming a clinician.

IONA ALLAN
University of Edinburgh

I am a fourth year veterinary student at the University of Edinburgh. I recently completed an intercalated year studying Immunology and I am extremely happy to have received the BSI Undergraduate Prize for my dissertation project investigating the effects of mating on immunity in female *Drosophila melanogaster*. Next year I will return to studying veterinary medicine but I would like to do some more research after graduation.

RACHEL BUTLER
Aston University

I have recently graduated from Aston University with a First-class (Hons) Biological Sciences with Placement Year BSc. Throughout my degree, I've become deeply interested in immunology; in particular, the coordination and resolution of inflammation. Having recently accepted a PhD position in Professor Andrew Devitt's lab, I will spend the next four years researching the role of extracellular vesicles in apoptotic cell clearance. I'm very excited to start this next chapter of my life as a doctoral researcher.

BETHAN WILLIAMS
Durham University

I'm a Biological Sciences undergraduate at Durham University. During my time at Durham I have thoroughly enjoyed studying immunology, including exploring the role of interferon-producing cells in presenting antigens in the immune response, and undertaking techniques such as ELISA and antibody analysis. I plan to use my immunological knowledge during the final year of my degree, and thereafter in either further academic study or wider career options.

JAKE ROULSTONE
University of Aberdeen

I'm currently entering my fourth year of a medical degree at the University of Aberdeen, and last year I had the opportunity to intercalate in a range of degrees. I chose immunology as I've always been interested in it and I believe it is one of the most exciting specialties to be a part of. My goal is to become a haematologist following my foundation years, where I'm sure my immunological background will benefit me hugely. I'd love to stay involved in this field as the breakthroughs always excite me and I'd love to one day be a part of this.

SOPHIA IJAZ
Aston University

Graduating from Aston University with a First-class (Hons) in Biomedical Science, and being selected for this award is such an honour. I come from a background where neither of my parents attended university, but I did not let this hold me back. My academic achievements are due to their constant love and support. Upon completing my degree, I have developed a deep interest in the medical diagnostic field and understanding how the immune system functions. I look forward to pursuing a career involving immunodiagnostics where I hope to help other individuals.

BSI South Wales Immunology Group

The South Wales Immunology Group is a Regional Group of the British Society for Immunology. It was established in 1997 to provide a forum for scientists to promote active discussions, enhance collaborations and foster common immunological interests in the south of Wales and further afield. Here, members of the group tell us more about their activities, including public engagement events, and how they have adapted to a new virtual reality of scientific gatherings.

Successful online seminars

The BSI's South Wales Group connects postgraduate students, postdoctoral researchers, academic staff and clinicians from different institutes in the region. As one of the most vibrant research networks in Wales, we invite eminent local, national and international scientists to give inspiring seminars to our researchers and students, which promote discussions and have led to novel ideas and collaborations.

As the COVID-19 pandemic expanded globally, we transformed our face-to-face seminars into an online seminar series. We have had very good attendance rates and active discussion sessions during the virtual seminars, some of which have been recorded for members with childcare responsibilities. During lockdown, a journal club to review the literature around SARS-CoV-2/COVID-19 was convened by Awen Gallimore and compiled by Oliver Scourfield. A group of academic staff, postdoctoral researchers and PhD students select and review papers to produce a weekly digest, being read by scientists and clinicians in Cardiff and further afield (**https://bit.ly/20JtrpX**).

Jonathan Boulter Memorial Lecture

The Jonathan Boulter Memorial Lecture is an annual public lecture arranged by Andy Sewell and the group in memory of their friend and colleague, Jonathan Boulter. Jonathan was a promising young immunologist with a particular interest in the bioengineering of high affinity T cell receptors, who tragically lost his brave fight with brain cancer in 2008. The lecture is delivered by outstanding, world-leading scientists to both South Wales BSI members and A-level students from local schools.

In the past three years, the lectures have been delivered by Nancy Ruddle (Yale School of Medicine), known for her discovery of lymphotoxin; Bent Jakobsen (CSO and co-founder of Immunocore, who Jonathan worked with), expert in T-cell receptor function; and Gwendalyn J Randolph (Washington University, pictured), who is known for her seminal work on dendritic cell migration and assessing lymphatic vasculature as a regulator of inflammation.

Prof Gwendalyn J Randolph (left) receiving the J. Boulter memorial plaque from her host Prof Ann Ager (right) in 2019.

Focusing on careers

Our early career representatives are keen to provide support regarding career prospects of fellow researchers. In 2018, Wiola Zelek and Ariadni Kouzeli organised a careers workshop, inviting speakers from different sectors to share their career progress following completion of their PhD. Following the BSI Careers Report in Immunology 2017, it was deemed vital to continue the conversation regarding careers in immunology inside and outside academia, and the challenges facing researchers. Our medical student representatives, Timothy Woo and Khalid Osman, organised a careers evening at the medical school. During the event, Paul Morgan and Tariq El-Shanawany shared their successful career journeys on clinical investigation and immunology research, which received extremely positive feedback from medical students.

Science festivals

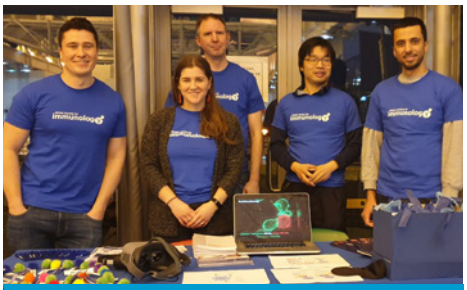
The BSI South Wales Group also funds several public outreach events to highlight the importance of immunology research in day-to-day life. We have funded the 'Our Body' theme of the Pint of Science festival in Cardiff for two consecutive years attracting audiences of 100 over the three days. During intermissions between talks, our regional group provides information on the importance of herd immunity through vaccination, childhood vaccination and the principles of immunology.

We have taken this information to multiple events aimed at different audiences, such as 'Techniquest: After Hours', an event centred around providing science education to adults through fun activities. Superbugs, organised by Matthias Eberl and Jonathan Tyrell, also became a two-week pop-up science event in the heart of Wales' busiest shopping centre, hosting 6,566 visitors (**https://bit.ly/2CPdAU0**).

Schools outreach

Members of the Group are also involved in engagement activities with schools. These range from visits to schools in Cardiff and the Vale of Glamorgan area to talk about the immune response to infections to the Science in Health Live open day (**https://bit.ly/30vjx0v**) at Cardiff University; and also the Life Sciences Challenge quiz, where schools in Wales compete against each other, organised by James Matthews.

Adriadni Kouzeli, Owen Moon, Ceri Fielding and **You Zhou,** Division of Infection and Immunity and Systems Immunity University Research Institute, Cardiff University


Part of the BSI South Wales team at 'Techniquest: After Hours Rogue Cells 2019'. From left to right, Owen Moon, Ariadni Kouzeli, Ceri Fielding, You Zhou and Abdullah Alanazi.

Find out more

To join the Group and take part in upcoming activities: **www.immunology.org/south-wales-immunology-group**.

@ImmunoSW

www.facebook.com/BSIsouthwales

Immune Update

The BSI journals

A round-up of new research published in the British Society for Immunology's official journals *Immunology* and *Clinical & Experimental Immunology*. Members can access these journals free of charge at **www.immunology.org/journals**.

Immunology

Immunopathological characteristics of COVID-2019 cases in Guangzhou, China

COVID-19 is a respiratory disorder caused by the highly contagious SARS-CoV-2, and reported cases range from mild to severe and sometimes critical. Tan *et al.* investigated the immunopathological characteristics of patients with COVID-19 by analysing the blood of patients.

They found that severe COVID-19 patients exhibited a decline in lymphocytes including $CD4^+$ and $CD8^+$ T cells, B cells and natural killer cells, along with the up-regulation of IL-6, IL-10 and C-reactive protein. In patients with mild COVID-19 immunosuppressive regulatory T cells moderately increased.

These results suggest that decreased lymphocytes and elevated IL-6, IL-10 and CRP are reliable indicators of severe COVID-19.

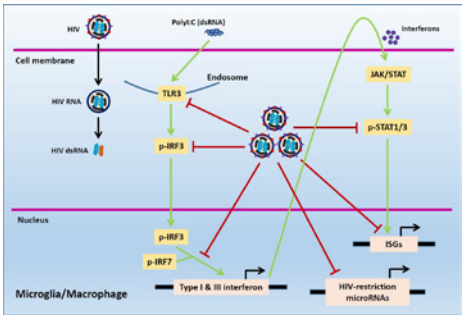
Tan *et al.* 2020 *Immunology* **160** 261–268 **https://bit.ly/3hqzHz6**

HIV infection suppresses antiviral immunity in microglia and macrophages

Microglia and macrophages are key components in the CNS innate immunity against viral infections, including HIV. However, these cells also serve as the major targets and reservoirs for HIV in the CNS.

Here, Lui *et al.* demonstrate how HIV evades the host cell-mediated immune responses by inhibiting the expression of Toll-like receptor 3 (TLR3) and interferons (IFNs) in macrophages and microglial cells *in vitro*. Mechanistically, HIV infection inhibited the phosphorylation of IFN regulatory factors (IRF3 and IRF7) and signal transducer and activator of transcription proteins (STAT1 and STAT3) in both HIV latently infected microglia and acutely infected macrophages.

These findings provide novel mechanisms for HIV infection and persistence in primary target and reservoir cells in the brain.



Liu *et al.* 2020 *Immunology* **160** 269–279 **https://bit.ly/3fUb6T3**

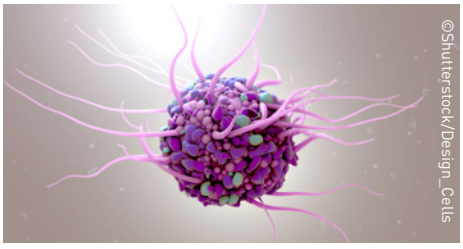
Clinical & Experimental Immunology

Altered phenotype and function of dendritic cells in patients with familial Mediterranean fever

As the most potent professional antigen-presenting cells, dendritic cells (DCs) have the unique capacity to initiate and maintain primary immune responses. Through pattern recognition receptors, DCs sense molecules that are associated with infection or tissue damage, triggering the formation of inflammasomes upon intracellular stimulation.

The inherited autoinflammatory disease, familial Mediterranean fever (FMF) is associated with deregulated activity of the pyrin inflammasome leading to acute inflammatory episodes. However, differentiation and function of DCs in FMF are still unclear.

Funk *et al.* examined the phenotype and function of mature and immature monocyte-derived DCs (imMo-DCs and mMo-DCs) in patients and found imMo-DCs showed elevated expression of maturation markers CD83, CD86 and HLA-DR, while down-regulating CD206, CD209 and glycoprotein NMB. ImMo-DCs also presented a higher capacity to migrate and stimulate the proliferation of unmatched allogeneic T cells, indicating that blood DCs in FMF are intrinsically activated and



display a transition towards a more mature phenotype.

Funk *et al.* 2020 *Clinical & Experimental Immunology* **201** 1–11 **https://bit.ly/3hu2LG1**

MOSPD2 is a therapeutic target for the treatment of CNS inflammation

In multiple sclerosis and experimental autoimmune encephalomyelitis (EAE), myeloid cells comprise a major part of inflammatory infiltrates in the central nervous system (CNS). Myeloid cells express motile sperm domain-containing protein 2 (MOSPD2) and are involved in the regulation of monocyte migration.

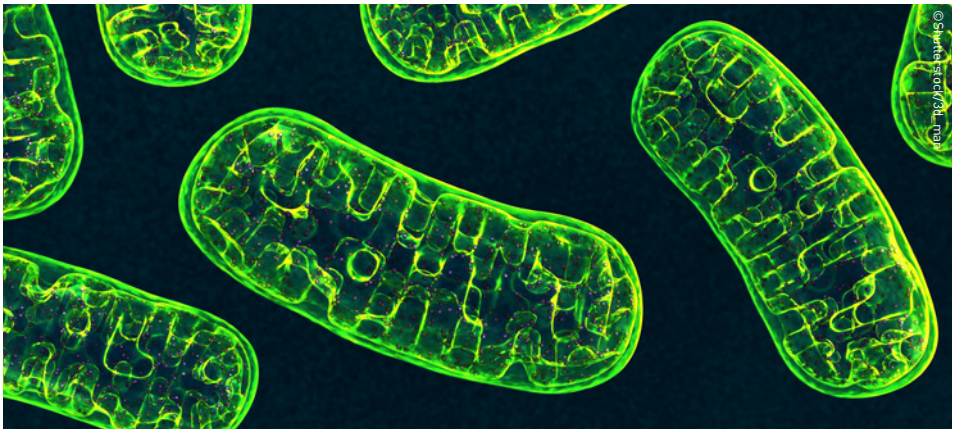
Yacov *et al.* investigated the role of MOSPD2 using knock-out mice and found this led to a reduction in inflammatory monocytes in the blood, and the development of EAE was significantly supressed. Moreover, monoclonal antibodies generated to target MOSPD2 halted EAE development and reduced severity.

This indicates that MOSPD2 is key in regulating the migration of inflammatory monocytes and provides a new therapeutic target in the treatment of CNS inflammatory diseases.

Yacov *et al.* 2020 *Clinical & Experimental Immunology* **201** 105–120 **https://bit.ly/3jwRLcO**

Around the journals

A summary of some of the latest papers from the world of immunology.
Written by Edd James, Louisa James, Donald Palmer and Mihil Patel.



T cells with dysfunctional mitochondria induce multimorbidity and premature senescence

Age-related deterioration through a decline in mitochondrial function increases susceptibility to disease. This decline has been observed in many different cells and tissues. However, in what way changes in immunometabolism, in particular in T cells, contributes to this susceptibility is unknown.

Here, Desdin-Micó *et al.* mimic mitochondrial loss in T cells through knockout of mitochondrial transcription factor A (TFAM). They observed that T cells lacking TFAM exhibit characteristics such as skewing to a Th1 phenotype and increased secretion of inflammatory type 1 cytokines IFN-g and TNF-α. This resulted in a number of age-related features such as increased circulating cytokines resulting in chronic inflammation, a characteristic of 'inflammaging', which induced senescence in several different tissues in mice.

Therefore, this study indicates that metabolic changes in T cells can promote the ageing process in tissues and may be involved in age-related diseases.

Desdin-Micó *et al.* 2020 *Science* **368** 1371–1376

Bacterial immunotherapy for cancer induces T cell-dependent immunity

The Bacillus Calmette–Guérin (BCG) vaccine for bladder cancer is the only bacteria immunotherapy approved for cancer use, though the mechanism has remained unclear.

Using a murine MB49 orthotopic model for bladder cancer, BCG was found to induce activation of tumour-infiltrating lymphocytes, which displayed increased proliferation and differentiation markers, and reduced exhaustion markers. The presence of BCG antigen-specific T cell responses did not determine the anti-tumour effect of BCG. The transfer of T cells from mice treated with BCG and MB49, but not BCG alone, resulted in improved survival in recipient mice. Functional studies showed that the production of IFNg was one mechanism by which BCG-specific T cells exert and effect.

Use of MB49IFNGRKO tumour line revealed a crucial role for interferon signalling in tumour clearance.

Antonelli *et al.* 2020 *PNAS* **117** 18627–18637

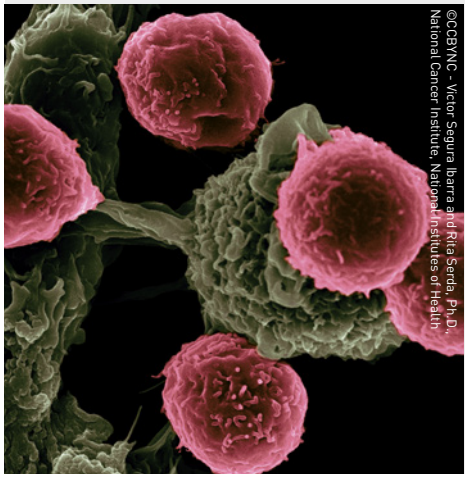
Structural cells are key regulators of organ-specific immune responses

Throughout the body, non-haematopoietic structural cells create physical barriers that provide a first line of defence against potential pathogens. In this study, Krausgruber *et al.* examine the mechanisms by which these cells make an additional active contribution to host immunity.

Using multi-omics profiling of epithelial, endothelial and stromal cells across 12 different tissues in mice they found widespread expression of immune regulatory genes in both a cell-type specific and a site-specific manner. Analysis of cell–cell interaction networks predicted extensive crosstalk between immune cells and tissue-specific structural cells during both homeostasis and an active immune response. The authors found that epigenetic modulation of gene expression across different microenvironments primes tissue to provide site-specific regulation of immune-related genes.

This important study provides a key resource for investigating the critical function that structural cells serve in regulating immunity.

Krausgruber *et al.* 2020 *Nature* **583** 296–302



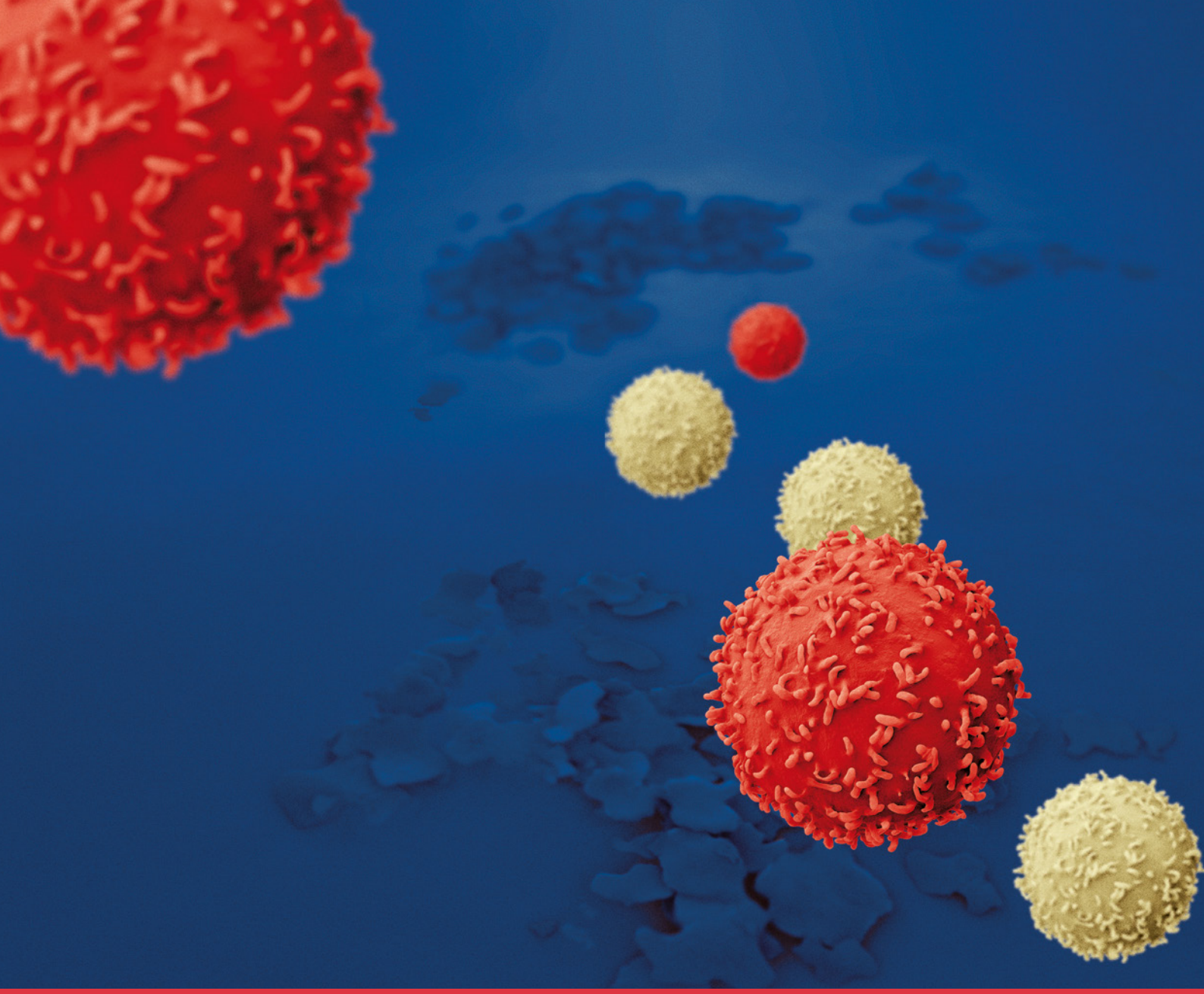
Dynamics in protein translation sustaining T cell preparedness

The transition of naïve T cells to an activated status requires significant cellular remodelling to look closely at this process. Wolf *et al.* examine the dynamics of protein synthesis of human naïve and memory cells employing isotope labelling of amino acids. Interestingly, they observe that naïve T cells undergo a high turnover of protein synthesis, indicating that the maintenance of the quiescence state is an active process.

Proteins such as MHC class I and the transcription factor ETS were shown to be continuously degraded and replaced. Moreover, following activation, these proteins are rapidly downregulated, which appears to be regulated by mTOR signalling pathways. Additionally, the authors observed that naïve T cells contain large pools of glycolytic enzymes, which, following T cell activation, their activity and turnover markedly increase.

Overall, these studies highlight the preparedness of naïve T cells to become activated and perhaps challenge our notion on what is defined as 'resting' T cells.

Wolf *et al.* 2020 *Nature Immunology* **21** 927–937



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