Immunology News

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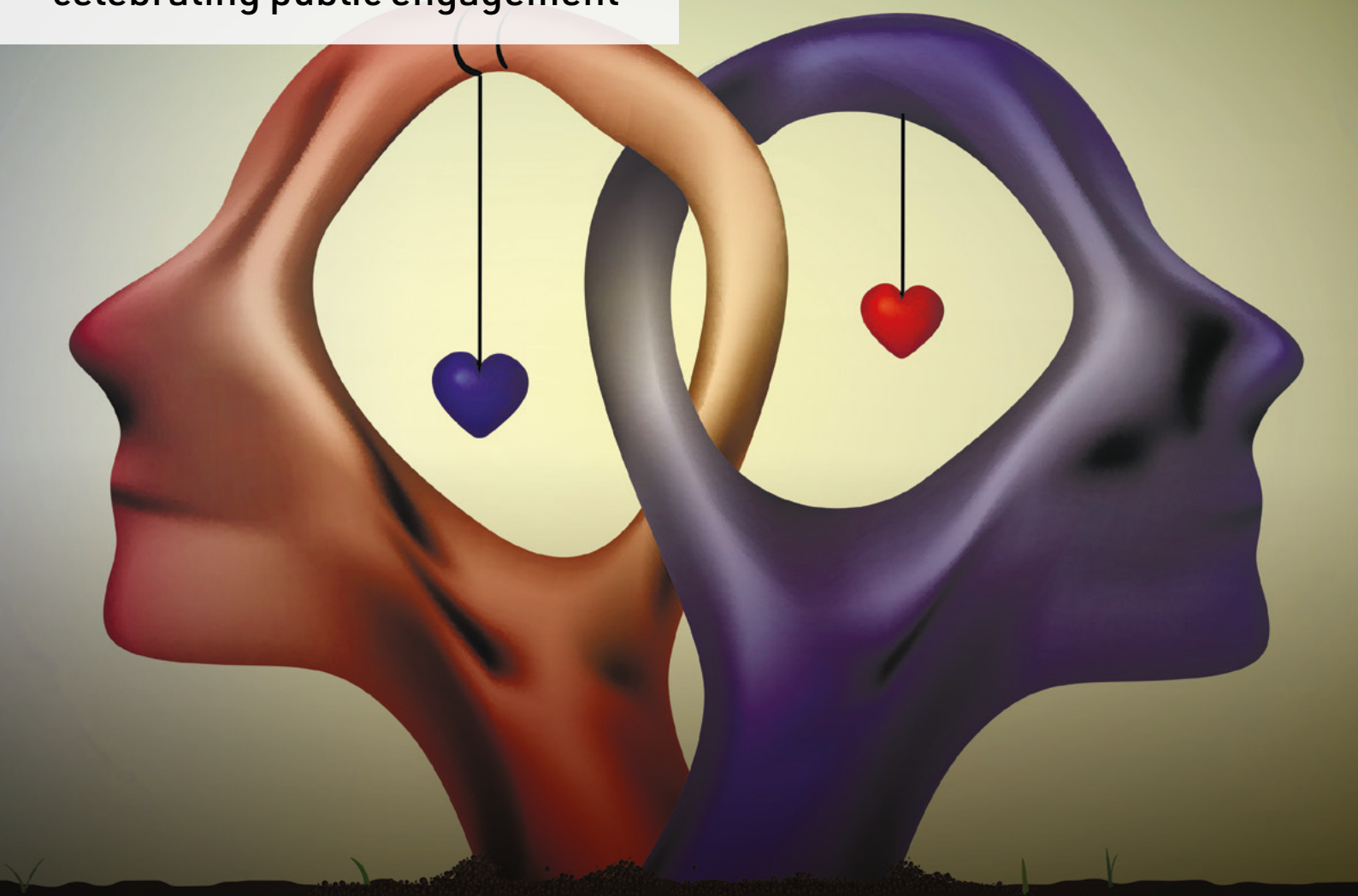
Engaging minds and hearts:

celebrating public engagement



Sparking creativity: with BSI grants

Getting to grips with omics: training

BSI Public Engagement Award: interview

British Society for immunology

www.immunology.org

Welcome to the summer edition of your membership magazine.

In this issue of *Immunology News*, we're celebrating public engagement in all its various forms. We hear from a team in Cambridge who got creative to bring immunology to life for people who are blind or have low vision, and on page 21 we touch on the differences between engagement and involvement, and how the BSI can support you to do both. On page 14, Professor Sheena Cruickshank reflects on how attitudes towards engagement in science have changed over the years, and what it meant to win the inaugural BSI Public Engagement Award.

Our groups have been busy too. We hear from the BSI Oxford Immunology Group about the possible future impact of AI in immunology, and how it might help us to develop a deeper understanding of biological systems. And in a feature on page 18, our Comparative and Veterinary Immunology Group discusses the potential applications of knowledge gained by bringing together human and animal health.

We are always eager to know what you'd like to see covered in the magazine, so if there is a topic that matters to you, please don't hesitate to get in touch.

Amy Edmunds
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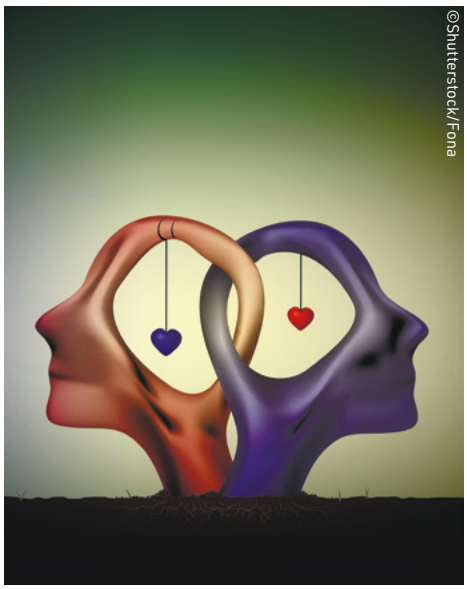

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VIEW FROM … THE BSI PRESIDENT

One thing I am frequently impressed by is the capacity for the BSI to add immense value to large initiatives involving numerous teams and organisations. Supporting such initiatives is something we are doing more and more of, and this reflects an increased appreciation in our sector of the benefits of partnership and collaboration.

As an example, the BSI played a crucial supportive role in the MRC-funded UK Coronavirus Immunology Consortium (UK-CIC), which drew together expertise from across the UK to deliver real-time information on COVID-19, including developments in our understanding of the virus, responses to treatment, correlates of protection induced by vaccines, and much more.

This has now extended to project management of two major consortia that are transforming our understanding of important areas of immunology. Firstly, we are supporting the CARINA (CAtalyst Reducing ImmuNe Ageing) Network, which brings together more than 90 researchers from a wide range of disciplines and career stages to identify the priority areas for a better understanding of immunity and ageing. Secondly, IMMPROVE (Immune Memory and Mechanisms of Protection from Vaccines) is a global collaborative project to further our understanding of how vaccines keep people safe, and why some people get infected even after vaccination. By supporting with management of areas such as communications, events, career activities, and patient and public involvement, the BSI delivers a vital function that means these initiatives can run smoothly and effectively.

In addition, the BSI is currently supporting several preliminary applications for MRC Centre of Research Excellence (MRC CoRE) funding, which is awarded to tackle complex and interdisciplinary health challenges. This highlights the capacity of the BSI to respond flexibly to the needs of its membership, and I am excited to see even more examples of this in future.

Tracy Hussell
President,
British Society for Immunology
Email: president@immunology.org

VIEW FROM … THE CHIEF EXECUTIVE

Welcome to another bumper issue of *Immunology News*. There are so many wonderful and exciting things to read about this quarter, and public engagement is a big theme. We have an interview with Professor Sheena Cruickshank, who won our BSI Public Engagement Award last year, in which she talks about her inspirational work involving the public in her research (p14). We also have an article from PhD student Stavroula Piliou, who was part of a team in Cambridge that ran an incredible project to communicate the role of the immune system to people who are blind or have low vision (p20). And if all of that inspires you to think about taking on some public engagement work yourselves, we have an article that showcases the free tools and support the BSI can offer you to help out (p21).

In other work, our Career Enhancing Grants continue to be hugely popular. We have a feature on p12 from Dr Damián Pérez-Mazliah, who talks about how the grant he received helped accelerate progress towards setting up his own lab to explore how pathogens cause autoimmunity.

We also recently hit a major milestone with our youngest journal *Discovery Immunology*. Do turn to p9 to find out more, and for information about all our journals.

Last but by no means least, I would like to give a huge shout out to everyone nominated for our committee positions – we were overwhelmed by the incredible support and interest from our membership. I would like to say a massive welcome to all our new trustees, secretaries and other committee members, who you can find out more about on p5–7.

I hope you enjoy this issue and, as always, please do not hesitate to reach out to me with any questions, ideas or feedback – it's always a pleasure hearing from you!

Doug Brown
Chief Executive,
British Society for Immunology
Email: d.brown@immunology.org

SOCIETY NEWS

New BSI committee members

Following our recent call for nominations and elections for upcoming vacancies across our various committees, we are pleased to announce the following appointments. The turnout for these elections was almost 14% of the BSI membership and we would like to thank everyone who voted, alongside all the other fantastic candidates who stood for election.

Board of Trustees

DR LEE BOOTY
Industry Trustee

Scientific Investigator, GSK

Dr Booty will commence his new term in January 2025.

DR CAROLYN NIELSEN
Early Career Trustee

Senior Immunologist, University of Oxford

Dr Nielsen will commence her new term in July 2024.

Secretaries

PROFESSOR CECILIA JOHANSSON
Congress Secretary

Professor of Mucosal Immunology, Imperial College London

Professor Johansson will commence her new term in January 2026 but will act as Congress Secretary-Elect from July 2024.

Member Representative Forum

All terms to start in July 2024

DR CANDICE QUIN
Groups Secretary

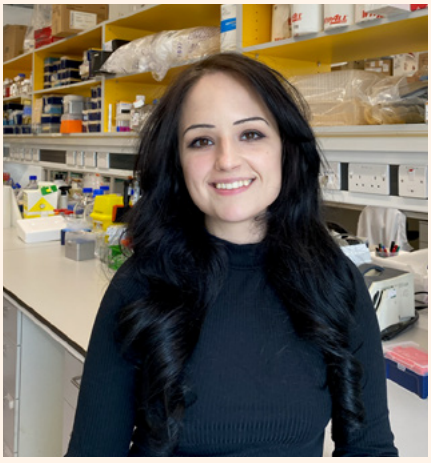
Lecturer in Immunology, University of Aberdeen

Dr Quin will commence her new term in January 2025.

DR SOPHIE RUTSCHMANN
Careers & Education Secretary

Reader in Immunology, Imperial College London

Dr Rutschmann will commence her new term in July 2024.



DR HANNAH BRADFORD
Early Career Representative

Postdoctoral Researcher, University College London

SOCIETY NEWS

Member Representative Forum (cont.) *All terms to start in July 2024*

DR WINNIE IP
Clinical Representative

Consultant & Specialty Lead in Paediatric Immunology, Great Ormond Street Hospital

DR DESSI MALINOVA
Northern Ireland Representative

Lecturer, Queen's University Belfast

CHIDI UBACHUKWU
PhD Representative

PhD student, The Pirbright Institute

Congress Committee *All terms to start in January 2025*

DR LEO CARLIN
General Member

Research Lead, CRUK Scotland Institute

DR YVONNE DOMBROWSKI
General Member

Senior Lecturer & PI, Queen's University Belfast

PROFESSOR JAYNE HOPE
General Member

Professor of Immunology, University of Edinburgh

SOCIETY NEWS

BSI Clinical Immunology Professional Network Steering Group *All terms to start in July 2024*

DR JOANNE KONKEL
General Member

Senior Wellcome Trust Fellow, University of Manchester

DR MAHIMA SWAMY
General Member

Senior Lecturer and Sir Henry Dale Fellow, University of Dundee

DR EMMA CALLERY
Healthcare Scientist Representative

Consultant Clinical Scientist, Lancashire Teaching Hospitals NHS Foundation Trust

DR LEMAN MUTLU
Patient Group Liaison

Consultant Immunologist & Allergist, East Kent Hospitals University NHS Foundation Trust

DR JAMES THAVENTHIRAN
Conference Programme Lead

Programme Leader, University of Cambridge MRC Toxicology Unit

Find out more

You can read each candidate's statement in the members' section of our website at **www.immunology.org/new-bsi-committee-members-2024**. We welcome each of them to the BSI and look forward to working with them to create a strong voice for immunology.

The British Society for Immunology is here to represent all immunologists working in science, healthcare and industry. Our committees are vital in leading our work, making numerous decisions about how the Society is run, what activities we focus on and what support we provide to members.

Find out more about our committees here: **www.immunology.org/about-us/our-people/governance.**

SOCIETY NEWS

BSI-CIPN Clinical Guidelines Special Interest Group

Over the last few months, the BSI-CIPN Steering Group has been focusing efforts on strategic planning and setting a clear direction for the network. A number of priority areas and ambitious new potential projects have been identified.

One clear priority that has come to the fore is to take forward the work of a newly established Clinical Guidelines Group. Clinical guidelines are core to standardising and improving quality, supporting the translation of research advances into clinical practice, and ensuring clinicians can access the latest expert consensus on diagnostics, treatment and care.

The group will convene BSI-CIPN members and others working in clinical immunology to understand areas of need for new or improved guidance, and to create patient-centred, evidence-based guidelines to improve the standard and consistency of clinical care.

So far, we have advertised and recruited to the group, and have recently held the first meeting to get this exciting work underway. Thank you to all those who applied to be part of this work.

The group is chaired by BSI-CIPN Steering Group member, Alex Richter, Professor of Clinical Immunology and Director of the Clinical Immunology Service at the University of Birmingham. Other members have a wide range of expertise, from paediatric immunology to infectious disease, in addition to roles representing pharmacy, healthcare science, nursing and patients.

Key priorities

The first meeting took place in April, and the group agreed some core areas for their work, including:

- Assessing existing clinical guidelines relevant to clinical immunology
- Identifying where the BSI-CIPN can endorse existing guidelines, or those currently in development
- Carrying out a gap analysis to understand where new guidance is needed
- Working with other organisations on developing new guidelines where needed

The group will look to do this by:

- Working with NICE, the Medical Royal Colleges, and other key national stakeholders
- Working with colleagues nationally and internationally where appropriate

The group will report into the BSI-CIPN Steering Group, and we will keep the wider membership updated as the work gets underway. If you would like to know more, please contact Rosanna Flury, at r.flury@immunology.org.

Allergy UK open letter to political party leaders for Allergy Awareness Week

The BSI-CIPN Steering Group put their name to a letter convened by Allergy UK, which was sent to political party leaders during Allergy Awareness Week (22-28 April). The open letter urgently calls upon our leaders to address the allergy crisis, emphasising the need for decisive action to prevent the escalation of allergic conditions. You can read and add your signature to the letter here: **www.allergyuk.org/allergy-awareness-week-2024/what-can-you-do/open-letter**

Supporting vaccine engagement

As part of our ongoing vaccine engagement work, we have updated our engagement toolkit and created a new infographic for members to use when engaging the public.

Our new measles infographic has been developed in response to the recent increase in cases of measles, caused by the decline in take-up of the MMR vaccine. It addresses the dangers of measles, who should get the vaccine and possible side effects. It also answers common questions about the MMR vaccine. It is available for download from our library of infographics and guides, which also includes a guide on childhood vaccinations, another for over 65s, and infographics on flu, COVID-19 and general vaccine information. Many of these have also been translated into other languages.

Our revamped engagement toolkit is designed to support you with planning, preparing, delivering and reflecting on engagement activities, with helpful tips and advice. From guidance on identifying your audience or choosing a venue, to the types of activities you could do, and advice on how to have constructive conversations with the public on tricky topics such as vaccines, it should help you to create successful and high impact engagement activities.

Find out more by visiting: **www.immunology.org/public-information**

SOCIETY NEWS

Major milestone for *Discovery Immunology*

We are thrilled to announce that *Discovery Immunology*, our broad-scope Open Access journal for new discoveries in cellular and molecular immunology, is now indexed in PubMed Central. This is a significant development for the BSI family of journals, which also includes *Clinical & Experimental Immunology* and *Immunotherapy Advances*. All are key journals for immunologists.

A vision realised

Discovery Immunology is the newest journal in the BSI publishing portfolio, and its indexing in PubMed Central – one of the largest and most widely used repositories for biomedical and life sciences articles – is a crucial step forward in its development. All articles published since the journal's launch in 2022 are now fully searchable and accessible to all, meaning they will reach an even wider audience.

With this achievement, our vision for *Discovery Immunology* as an invaluable resource providing the global immunology community with trusted new insights into the workings of the immune system, is becoming a reality.

We would like to thank the brilliant editorial team led by Founding Editor-in-Chief Professor Simon Milling for their hard work and commitment to building strong foundations for the journal. Huge thanks are also due to the authors, reviewers and readers for their incredible support. Our next objective is to achieve indexing in all widely used services, including Scopus and the Web of Science.

Your support is invaluable

We would like to use this opportunity to encourage our members and the wider immunology community to continue supporting *Discovery Immunology* while we grow our international visibility by submitting your latest research. Thank you to all of those who have already published their work – your contributions are essential. You can also contribute to the growth of the journal by reading, sharing and citing our articles where appropriate, to help our content reach the widest possible audience.

Discovery Immunology publishes high-quality original research, reviews and short reports describing novel mechanisms controlling the immune response. We offer a quick turnaround from our supportive editorial team and, when accepted, your article will appear in PubMed Central very soon after entering production.

BSI member benefits

We'd like to invite all our members to explore the journals and encourage you to consider contributing to them. The income generated from our journals provides major financial support for all the BSI's activities so, by submitting your work, you're supporting your Society. As a BSI member, you can benefit from reduced Open Access fees to publish your work.

We offer all BSI members a 20% discount on publication fees for *Discovery Immunology*. You may also be able to publish your paper using funds available through Read and Publish deals with organisations from our publisher, Oxford University Press.

When you publish in our official journals, the profits are reinvested back into the BSI membership and our immunology community through the BSI grants, support of Regional and Affinity Group activities, travel awards, the BSI Congress and much more.

Find out more

You can access *Discovery Immunology*'s dedicated page on PubMed Central here: **www.ncbi.nlm.nih.gov/pmc/journals/4563/**

Visit the *Discovery Immunology* website: **https://academic.oup.com/discovimmunology**

Join the conversation online by following **@discovimmunol** on X

SOCIETY NEWS

Voice of the Future

The BSI put in a strong showing at the recent Voice of the Future event run by the Royal Society of Biology.

This event reverses the format of a Parliamentary Select Committee, giving a panel of early career scientists the opportunity to question senior figures from Parliament and Government on issues that matter to them. The event is also an opportunity for those researchers to find out more about how policy discussions take place and why it's important for researchers to engage in the political sphere.

On 12 March, we invited a delegation of early career researchers from the BSI's London Immunology Group (George Finney, Katie Flaherty, Stephanie Kucykowicz, Ricardo Sainz and Will Traves) to join us at the Houses of Parliament to represent the BSI at the event. Our delegates addressed important issues with panel members including Chi Onwurah MP (Shadow Minister for Science, Research and Innovation), members of the House of Commons Science, Innovation and Technology Select Committee (Katherine Fletcher MP, Stephen Metcalfe MP and Carol Monaghan MP) and members of the House of Lords Science and Technology Select Committee (Viscount Stansgate and Lord Drayson). Among the topics discussed were how to increase vaccine uptake and public trust in science, how to ensure a secure pipeline of postdoctoral researchers in academia and how to attract and retain international researchers to work in the UK.

A huge thank you to the policymakers for attending, the Royal Society of Biology for organising and the BSI London Immunology Group members for representing the immunology community so well.

BSI Member Representative Forum: here to represent you

The BSI Member Representative Forum is where the voice of our membership is fed into our activities. Chaired by Professor Jim Brewer, the 18 elected members come from all sections of the Society's membership. Their role is to act as our 'think tank' on issues relating to education and careers, public engagement, policy and public affairs, and communications.

This April we met for another productive and useful meeting on a range of topics to help us continue to implement our strategic plan and other activities with crucial input from our members.

Firstly, we looked at our growing training programme, created to enable current and future generations of immunologists to build essential skills and advance in their career. Members shared their support for the current courses – such as our popular bioinformatics sessions for either beginners or more advanced wet-lab immunologists – as well as their valuable ideas and views for the development of new training initiatives. They showed lots of enthusiasm for this area of work as well as for courses recently launched such as 'Immunotherapy in clinical practice: understanding the science for better patient care'.

We then delved into our partnership work, which spans an array of activities with different organisations and individuals, and which has greatly expanded in the last few years. After discussing some of the fruitful partnerships developed to support national research consortia, research networks and particular areas within immunology, members shared their views on future work to explore, and the numerous benefits to our membership.

Finally, we provided an overview of recent external affairs and outreach activities that the BSI has undertaken to communicate the voice of our immunology community to the wider world.

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If you would like to raise any issues for your Member Representative Forum to discuss at an upcoming meeting, please contact your relevant representative – you can find a list on our website at **www.immunology.org/forum**. Alternatively, you can email our Director of External Affairs, Jennie Evans, at **j.evans@immunology.org**, who can pass the message on.

Immune-altering pathogens:

understanding autoreactive B cells in infectious heart disease

Our Career Enhancing Grants provide early career immunologists with flexible financial support to tackle challenges and move their career forward. In this article, BSI member Dr Damián Pérez-Mazliah explains how his grant helped him to unearth the extraordinary mechanisms by which pathogens alter our immune system to cause autoimmunity.

Dr Pérez-Mazliah and colleague Sukhveer Kaur Mann in the Bioscience Technology Facility, Hull York Medical School, University of York

Investigating infection-driven autoimmunity

We all know our B cells as the white blood cells that produce antibodies to protect us from pathogens. But on rare occasions, some B cells – which we call autoreactive B cells – begin to produce antibodies that, instead of fighting infections, attack the body's own tissues. This leads to autoimmune diseases that can affect a variety of vital organs, with well-known examples including type 1 diabetes, rheumatoid arthritis, psoriasis and multiple sclerosis. It is estimated that one in ten people in the UK has an autoimmune condition, which equates to 6.7 million people.

Although the triggers for autoimmune disorders are diverse and, in many cases, unknown, we do know that some pathogens have the extraordinary capacity to alter our immune system, leading to malfunctioning and autoimmunity. Quite how they do this is still unclear. Funded by a Royal Society University Research Fellowship, my laboratory, based at the University of York and forming part of Hull York Medical School, is currently exploring the mechanisms that regulate infection-driven autoimmunity, with a particular focus on infection-driven heart disease.

> ‘My lab’s goal is to better understand how some B cells develop into the type that fight infections, while others become the type that attack the heart. In addition, we want to identify the cellular and molecular mechanisms through which autoreactive B cells contribute to heart tissue damage.’

Cardiovascular diseases are the leading cause of death globally. The immune system plays a key role in cardiac development, composition and function. Under certain circumstances, particularly in response to infection, immune cells can infiltrate the heart in large numbers to remove dying tissue, scavenge pathogens and promote healing. If left uncontrolled, these immune cells can go on to cause collateral tissue damage, leading to heart dysfunction and failure. Moreover, the heart can be directly affected by autoreactive B cells, resulting in damage to its structures.

My lab’s goal is to better understand how some B cells develop into the type that fight infections, while others become the type that attack the heart. In addition, we want to identify the cellular and molecular mechanisms through which autoreactive B cells contribute to heart tissue damage. In order to do so, we are currently using *Trypanosoma cruzi* as an infection model. *T. cruzi* is the protozoan parasite that causes Chagas disease (American trypanosomiasis),

'While I had raised much of the cost for this study from internal sources and through in-kind contributions, there remained a shortfall associated with next-generation sequencing costs (very expensive at that time), which were eventually covered by the BSI Career Enhancing Grant.'

a major cause of infectious heart disease worldwide and the highest-impact parasitic disease in the western hemisphere. In response to *T. cruzi* infection/Chagas disease, and driven by triggers that remain poorly understood, the immune system produces both antibodies against the parasite and against the heart. Using a combination of cutting-edge molecular and cellular techniques, we have been able to establish that chronic *T. cruzi* infection leads to a large and very unusual accumulation of B cells in the heart.

Across the globe

My journey here has seen me take up roles with a number of key research institutes, and has brought me halfway across the globe. After completing my PhD on immunity to *T. cruzi*/Chagas disease, I relocated from Argentina, where I was born and educated, to the MRC National Institute for Medical Research in London. There I studied B cell immunity to the malaria-causing *Plasmodium* parasites in rodent models. Then, after completing my postdoc in 2018, I joined the flow cytometry science technology platform at the Francis Crick Institute, after which I moved to *The Lancet* to work as an editor for the journal *eBioMedicine*, part of *The Lancet Discovery Science*. It was in 2019 that I moved to the University of York, funded by Hull York Medical School, with the goal of starting my independent research programme and laboratory.

No mean feat

The transition from postdoctorate to independent group leader comes with a number of major challenges, to which I was not 'immune'. You must demonstrate the capacity to lead a team and produce good quality research, while also carving out an innovative research niche, and this is no mean feat. I had joined the British Society for Immunology soon after moving to the UK, on the recommendation of my mentor Jean Langhorne, and the Society quickly became an important source of support for me. Perhaps the most critical support I have received from the BSI to date has been my Career Enhancing Grant. This was awarded during my recent endeavours to become an independent researcher, and allowed me to complement the funding provided by Hull York Medical School and complete a very costly proof-of-concept single-cell RNA sequencing (scRNA-seq) dataset.

Embracing single-cell RNA sequencing

scRNA-seq is a powerful genomic approach for detection and quantification of protein-encoding messenger RNA molecules on vast numbers of individual, isolated cells using next-generation sequencing. When I moved to York in 2019, scRNA-seq studies were expensive and had been conducted mostly by specialist research groups. Still, immunologists were already demonstrating the enormous potential of scRNA-seq for studying cellular diversity of immune responses, suggesting the technology was well on the way to becoming an essential tool for immunology research labs. Nonetheless, given the relative novelty and high costs of the approach, I needed to demonstrate to external funders that I was able to successfully apply this technology to answer my own research questions. While I had raised much of the cost for this study from internal sources and through in-kind contributions, there remained a shortfall associated with next-generation sequencing costs (very expensive at that time), which were eventually covered by the BSI Career Enhancing Grant.

Using scRNA-seq, we observed that development of Chagas heart disease was accompanied by a large accumulation of B cells with an unusual phenotype, both in secondary lymphoid organs as well as in the heart itself. These preliminary data prompted additional and extensive research, greatly strengthening my case for support, and were ultimately key to securing a University Research Fellowship from the Royal Society. This was the big step I needed to achieve my goal of starting my independent research programme.

Team goals

For the next five years, I will be leading a small and international team of three young researchers: Shazia Ashraf, Aleksandra Dąbek and Muhammad Asad Kamran. Our focus will be to study the nature of heart-resident B cells, how they interact with other types of heart-resident cells (fibroblasts, cardiomyocytes) and ultimately, whether and how they contribute to the development of heart fibrosis and dilated cardiomyopathy. We are motivated by the hope that our research may help to improve the quality of life of people affected by neglected tropical diseases and autoimmunity.

Dr Pérez-Mazliah with his team in the lab at Hull York Medical School, University of York

Dr Damián Pérez-Mazliah,
Hull York Medical School, University of York

Find out more

Find out how to apply for a Career Enhancing Grant by visiting: **www.immunology.org/membership/grants-prizes/bsi-career-enhancing-grants**

BSI Public Engagement Award:

interview with Professor Sheena Cruickshank

The BSI Immunology Awards recognise those who make an outstanding contribution to advancing the field and enabling immunology to thrive. Professor Sheena Cruickshank won our inaugural Public Engagement Award, and we caught up with her to find out what it means to be recognised in this way, and why public engagement is so important in our field.

When did you begin engaging with the public about your work? Was it something you were doing from the very beginning?

I have always been of the mindset that we learn a lot from involving the public in research, but it was when I became a lecturer that it really took off for me. When I came to Manchester, we had something called the New Academics Programme, which included learning about public engagement. The university was also a Beacon for Public Engagement, and things like the Research Excellence Framework (REF) were beginning to mean public engagement was taken into account when assessing a university's performance. There was a clear message that it was something that was valued and encouraged, and that in turn created the opportunities and culture necessary for us to really think about the impact of our research, and how to engage people with it. I very quickly began to explore and expand what I was doing in this area, and have continued that process through to today. It's something you work at through your whole career, and that's one of the wonderful things about it.

Do you think public engagement is becoming more integral to the scientist's role and how can researchers be supported to engage more with public audiences?

Change can take a long time in the university sector, but I think we are beginning to see the effect of the changes that have been put in place in recent years. The pandemic also demonstrated just how vital it is that we involve the public in our work, and ensure our conversations with broader audiences shape our research. Research funders, the REF and the Knowledge Exchange Framework, as well as increased emphasis on service-learning and engaged teaching, are all important for encouraging people to think about the wider community. The BSI has played a key role too, supporting really meaningful engagement and involvement. I can think of so many great young immunologists doing incredible work, and it's so inspiring. My great hope is that all this means it will naturally become part and parcel of what we do as researchers.

> 'Social media has been helpful in teaching us how to cut down our core messages and say things very concisely. I have also found that my teaching is a great help, because you have to boil a concept down to its essence, and you can only really do that if you truly understand it.'

With immunology being an incredibly complex area of science, what are some of the challenges when engaging with people with no prior knowledge of it?

It can be a challenge, but I honestly believe that you can explain anything in simple terms. It's often about looking for commonality and appreciating what people already know. The pandemic really brought immunology into the limelight, and basic concepts – antibodies, T cells – became more and more part of people's everyday dialogue. Language is so important, as is understanding how much detail someone needs to grasp a concept. Social media has been helpful in teaching us how to cut down our core messages and say things very concisely. I have also found that my teaching is a great help, because you have to boil a concept down to its essence, and you can only really do that if you truly understand it. I've also worked with people who don't speak English as their first language, which teaches you to use really accessible language. Images can be very powerful too – there's a lot you can convey with an image and almost no words.

What would you say to a scientist making the first steps to engage with the public about their work?

It's good to begin by doing it in a safe space, with something that feels manageable. Confidence is very important, and this has to be built up over time. I'd also encourage people to think early on about who they want to reach with their message, and what platform is best for that. In the case of social media, this is evolving all the time, and the various platforms have quite different groups using them. Choose the one that is most relevant to your target audience.

I would also recommend being prepared and having a strategy in case things get tricky, particularly if you are tackling a controversial topic on social media. Who will be your allies and how will you respond if you come up against resistance? I have a rule that if someone asks a question, I may choose to reply, but if they are in any way disrespectful, I don't engage. More recently, I've restricted which replies I see. I also have 'social media holidays' where I stay away from it for a time.

But there are so many ways of engaging besides social media. I have done a lot of writing since the pandemic. Editors can be incredible in helping shape a piece and improve my writing, which in turn is useful for grants and research papers. Some people might want to make videos, or hold focus groups – there are lots of different options. Apart from that, it's just so much fun. You get so much out of it, and you meet such wonderful, interesting people.

You have previously expressed a belief that public engagement can influence and improve research. Can you give an example of how this has happened with your own work?

When I first started as a lecturer, I was working on infection responses, particularly with parasitic worms. This kind of infection is quite rare these days in the UK, so I set out to connect with communities from other countries, who were more likely to have first-hand experience. Their feedback was hugely thought-provoking, and one question that kept coming up was about new allergies they were experiencing now they lived in the UK. I didn't specialise in allergies, but this question seemed really important, so we looked at how we might generate data that would shed light on this. We decided to take a citizen's science approach and developed a programme called Britain Breathing, for which the BSI has been a hugely supportive partner.

It turned into a huge research partnership drawing on a range of disciplines. Ten years ago, I would never have thought I would be working on how pollution and our environment affects our immune system. It's sent me in a whole new direction, discovering new funders and new wonderful collaborations across several disciplines, and I'm still thinking about how we can bring that research back into the community. It's a constant loop of questions and exploration.

Professor Cruickshank with local school children and Councillor Amna Abdullatif at a public engagement activity.

What do you think the future holds for public engagement in science?

One thing that's very important to me is that the engagement we do is purposeful. What I mean by that is that we think hard about who should be involved, and what everyone taking part hopes to achieve with it. We must also evaluate the project throughout its lifecycle. That's what I'd like us to be thinking about more as a sector. We are getting there, but there is a lot more work to be done, and barriers to be overcome.

If we are able to articulate the concrete outcomes of engaging the public, how it has fed back into our research and teaching, then we are properly equipped to demonstrate its value and encourage more people to do it.

What did it mean to you to win the BSI Public Engagement Award?

It really did mean a lot. I've been a member of the BSI ever since I was a PhD student so to be recognised by the Society is very special. I feel really proud and very honoured.

BSI Immunology Awards

You can read more about all the winners of the inaugural BSI Immunology Awards at **https://bit.ly/410IfTy**. Nominations for the next round of awards will open later in the year – keep an eye on the website.

Turn to page 21 to read more about how we can support you to engage the public in your work.

Harnessing the power of patient expertise:

lessons from hereditary angioedema

In this article, we hear from Angela Metcalfe, CEO of HAE UK, about the challenges faced by people living with the rare inherited condition, hereditary angioedema, and the importance of shared decision-making between patients and those treating them.

What is hereditary angioedema?

Imagine the scenario: you're seven years old and excited about appearing in the school nativity play, but instead you have to stay home in bed with excruciating stomach ache, vomiting and diarrhoea. As a hormonal teenager, you face bullying because of the swellings in your face and hands, and are hit with an attack the night before an important exam. In adulthood, you struggle with decisions around family planning, knowing the hormonal changes of a pregnancy or simply the stress of being a new parent could trigger an attack. Then there's work stresses, relationships, travel: all of life's important events are overshadowed by the threat of a debilitating attack.

This is the daily reality for many people living with hereditary angioedema (HAE), a rare but potentially life-threatening inherited condition. It is one of a number of illnesses that is usually treated by a clinical immunologist. Symptoms of HAE include episodes of oedema (swelling) in various body parts including the hands, feet, face and airway. People with the condition may also experience abdominal pain, nausea and vomiting which is caused by swelling in the intestinal wall. They face unpredictable and painful attacks, which can prove fatal if swelling reaches the larynx. It's an illness that impacts physical health, emotional wellbeing and overall quality of life, interfering with activities such as work, study and travel.

Patient-centred care

While the cause of an HAE attack is not always known, stress, anxiety, infection, trauma and hormonal changes are all known triggers. In addition, the frequency and severity of symptoms is liable to change according to physiological and external factors. Flexible management of the condition, as well as tailored treatment and care, are therefore vital.

Historically, treatment options for HAE have been limited, leaving many patients on a sub-optimal plan for years. This has all changed in the last decade, however, with several new treatments becoming available. Perhaps most importantly, there has been a shift towards prioritising patient choice. The National Institute for Health and Care Excellence (NICE) recommends that shared decision-making, where healthcare professionals work with patients to reach a joint decision about care, should be an integral part of any consultation. This is particularly important in rare diseases like HAE, as the patient often knows their own condition and its impact better than those treating them.

Shared decision-making in practice

As CEO of HAE UK, it's my job to ensure that people living with HAE and their families have access to the best treatment and support. We often hear from people living with HAE that they do not feel sufficiently involved in decisions around their care. Many remain for long periods on sub-optimal treatments, or feeling that their preferences are not important. In some cases, they are told that new treatments are too expensive, or that they aren't 'sick enough' to warrant them. Following the publication of updated guidelines in 2021, we partnered with BioCryst UK Ltd to carry out research into

'NICE recommends that shared decision-making, where healthcare professionals work with patients to reach a joint decision about care, should be an integral part of any consultation. This is particularly important in rare diseases like HAE, as the patient often knows their own condition and its impact better than those treating them.'

> ‘The importance of the relationship between patient and healthcare professional emerged as a key theme, as did the the role of clinicians in helping people to be confident in expressing their needs and preferences.’

shared decision-making in HAE. Through qualitative interviews with patients and healthcare professionals, a patient survey and workshops, we set out to find out what was really happening on the ground.

We found that that 36% of people with HAE felt the shared decision-making process was not properly followed when determining treatment options; 26% were unfamiliar with the concept at all. In addition, 32% listed unpredictability of attacks as the biggest challenge of living with HAE, while 26% felt coping with everyday life was a challenge.

There are many reasons why shared decision-making may not be optimally implemented. Someone with HAE might be anxious about starting a new treatment with potential side effects, or they may not be as engaged with their care if they are not currently experiencing challenges. They may feel their disease isn’t well understood by the people treating them, and that they have to start from scratch each time they see a new member of the healthcare team.

Our research showed that healthcare professionals feel there is a lack of guidance and training in shared decision-making, and that workload pressures can make it difficult to develop the trusting relationship that is so crucial for open dialogue. Communication with non-specialist clinicians can be particularly challenging, and can mean people with HAE are left unduly distressed in an emergency situation.

We did, however, unearth some promising examples of best practice, and both patients and healthcare professionals spoke about the transformative role shared decision-making can have on care and quality of life. The importance of the relationship between patient and healthcare professional emerged as a key theme, as did the the role of clinicians in helping people to be confident in expressing their needs and preferences.

Healthcare professionals must be willing to listen, to consider a person’s unique and often changing circumstances, and to integrate their preferences into the treatment plan. Ultimately, it is their responsibility to engage patients in shared decision-making, to provide advice and recommendations, and to build a strong and trusting relationship. In short, the success of shared decision-making depends on a shift in the mindset of both patients and healthcare professionals.

Angela Metcalfe, CEO, HAE UK

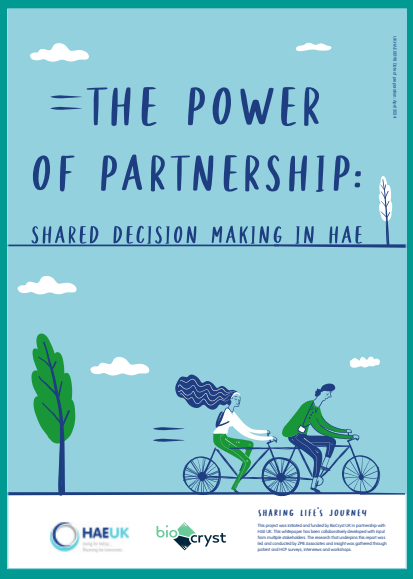
Together with patients and healthcare professionals, HAE UK and BioCryst UK Ltd have developed the following recommendations to improve shared decision-making in HAE:

Patients

- Patients should be supported to advocate for themselves and to share with clinicians the impact of their condition and their aspirations objectively. This would provide their clinician with all the information to inform shared decision-making conversations and make treatment decisions together.
- Keeping a log or diary of when attacks occur can help add detail and paint an accurate picture of what has happened since the last appointment, ensuring nothing is missed.
- Some patients may feel more comfortable speaking about what is on their mind by preparing what they want to talk about before their appointment, or by bringing a loved one to support them.
- If patients do not feel comfortable or feel that they don't have the right kind of relationship with their consultant for any reason, they should be able to request to see another member of the team without this being seen as a criticism.

Healthcare professionals

- Clinicians should take thorough notes in every consultation so that other clinicians or junior staff can pick up a patient’s file and know what is going on.
- Clinicians should consider asking more in depth, open ended, questions such as ‘what are you worried about?’, ‘how is it impacting you?’ or specifics about their life in order to build a fuller picture of their condition, and better relationships based on deeper understanding. Specific questioning around recognised treatment side effects (e.g. anxiety or facial hirsutism) can help uncover side effects patients may not have thought to mention.
- Healthcare professionals should encourage patients to record all evidence of disease activity to provide the full clinical picture, which may indicate the need for a change in treatment.
- Healthcare professionals should keep patients informed about new treatments available in a language that they will understand. Everyone is different and some patients like detailed information at appointments, while others find it too much to take in all at once. The healthcare professional should learn the patient’s preference and tailor their approach accordingly.



The Power of Partnership

The research and recommendations, published as a new report, The Power of Partnership, can be found on the HAE UK website here: **www.haeuk.org/power-of-partnership**. You will also find links to several documents and tools for patients and clinicians to get more from clinical meetings.

HAEUK
Living for today....
Planning for tomorrow.

BSI Comparative and Veterinary Immunology Group:

bringing together human and animal health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The BSI Comparative and Veterinary Immunology Group (CVIG) brings together veterinary, human and mouse immunologists and provides a forum for discussion, collaboration and exchange of ideas. Here, the team sets out the group's recent activities and some of the fascinating questions that have arisen from these.

'Mice lie and monkeys exaggerate.' You may have heard this quote before and it is attributed to the vaccinologist David Weiner (The Wistar Institute, Philadelphia, PA). One could argue that this statement is itself an exaggeration, but we from the CVIG think it conveys an important message. And if you ignore the underlying allegation (that we are using the wrong animal models!), it leads to a series of highly relevant questions. What makes immune responses different between species? Why does pathogen X make species Y severely sick whereas species Z is hardly affected? It is these questions that keep us comparative and veterinary immunologists busy – and, we are passionate about discussing them!

A mix of comparative themes

Since its relaunch in 2018, CVIG has organised a series of meetings all centring around the comparison of the immune system between species, and differences in responses. Previous themes include human and veterinary antibody discovery, non-conventional T cells, conventional T cells in health and disease, and peculiarities of birds in a meeting on avian immunology. In 2023, we went back to a cross-species comparison focusing on dendritic cells, monocytes and macrophages. This year, we organised a meeting on organoids and 3D cell cultures, looking at developments in these models across different animal species.

All these meetings featured a mix of talks showcasing knowledge on mice and humans, but also livestock and companion animal species. Presenters and delegates alike told us that this was all fascinating and really made them think outside the box. We are excited by the potential wider applications of this knowledge too.

One Health – monitoring zoonoses

The One Health paradigm encompasses the interconnectedness of human health, animal health, and the environment, advocating for interdisciplinary collaboration to address multifaceted health challenges. Veterinary research plays a central role in the One Health framework by elucidating zoonotic disease dynamics, monitoring emerging infectious threats and advocating for sustainable environmental practices.

The emergence of zoonotic diseases, exemplified by outbreaks such as avian influenza, Ebola virus disease and COVID-19, has demonstrated just how essential proactive surveillance and coordinated response efforts are. By embracing a One Health approach, it is possible to mitigate emerging health threats, promote animal welfare and safeguard human populations from infectious diseases.

Translational research

Large animal models can be indispensable tools in biomedical research, offering physiological, anatomical and genetic similarities to humans. For example, pigs were used to predict vaccine effectiveness during the COVID-19 pandemic,[1] and Holzer *et al.* (2021) showed that the pig is an excellent model for understanding how best to apply mAbs as therapy for humans to treat influenza.[2]

The use of large animal models in translational research can bridge the gap between bench and bedside, enabling preclinical assessments of therapeutic interventions and elucidating disease pathophysiology. Large animal models can enable us to expedite the translation of scientific discoveries into clinically relevant applications, thereby improving human healthcare outcomes.

Future plans

We are developing the next series of CVIG events, and plans are also in place to bid for themed sessions at other BSI meetings and Congress. If this has piqued your interest and you have further suggestions, please do reach out to any one of the committee members.

Dr Rebecca McLean and **Dr Wilhelm Gerner,** on behalf of the CVIG Committee (Dr Lindert Benedictus, Dr Kate Sutton, Dr Amanda Gibson, Dr Ambre Chapius).

REFERENCES

1. Graham *et al.* 2020 *NPJ Vaccines* **5** 69. DOI: 10.1038/s41541-020-00221-3
2. Holzer *et al.* 2021 *PLoS Pathology* **17** e1009330. DOI: 10.1371/journal.ppat.1009330

Find out more

For further information about CVIG, visit: **www.immunology.org/about-us/our-people/regional-and-affinity-groups/affinity-groups/bsi-comparative-and-veterinary**

Breaking down barriers with 'Sensory Science'

Through our BSI Communication and Engagement Grant scheme, we recently supported a collaborative art project to make science more accessible to people who are blind or have low vision. Here, Stavroula Piliou, a PhD student involved in the project, explains how the resulting exhibit brought the complexities of the immune system to life in a range of tactile art pieces.

The intracellular cell group with their Sensory Science exhibit in Cambridge.

In a society increasingly shaped by scientific progress, it is crucial that everyone – regardless of their background or ability – can take part in discussions about scientific inquiry. But science communication is so often limited to the written word and visual diagrams, in articles which can often be dense and inaccessible to a broad public audience. With our Sensory Science initiative, we aimed to break down some of these barriers. Under the leadership of Dr Erica Tandori, an artist with low vision from Monash University in Australia, and Professor Adrian Liston from the University of Cambridge, our team of PhD students collaborated with artists from Anglia Ruskin University to produce a suite of models designed to communicate the intricate and varied role of our immune system. We especially wanted to engage people who are blind or have low vision.

Collaboration enhances creativity

By translating these complex scientific concepts into tactile multisensory art, we were able to bring to life the role of our immune system in four primary areas: neuroscience, autoimmunity, infection and cancer. The models, which appeal to a range of sensory experiences including touch, smell and hearing, were exhibited in March as part of the Cambridge Festival. Resin brains crafted using cake moulds were used to illustrate the differences between a healthy brain, one affected by traumatic brain injury, and one impacted by multiple sclerosis, with the latter using a pet warming blanket to demonstrate inflammation in the central nervous system. Another model detailed the progression of cervical cancer and its metastasis, by depicting bacterial invasion into cells using sponges of different sizes, shapes and textures. Elsewhere, tactile posters explained the biology behind coeliac disease, and visitors to the exhibit even had the opportunity to hear their own brain activity, as Dr Stuart Favilla mapped brain waves into sound using innovative audio techniques.

A transformative experience

The impact of the project on the immunologists involved was profound. The collaboration not only allowed us to articulate our research through multiple senses but also encouraged us to think creatively and outside the box. The experience sparked a deeper appreciation for inclusivity and community involvement in science, and demonstrated the importance of diverse perspectives that can enrich our understanding. The exhibit was very popular and gained significant public attention, including from BBC Look East, who reported on the initiative for their news programme. Most importantly, the general public gained a deeper understanding of the complexities of the immune system, and of its role in health and disease.

What next for Sensory Science?

Following the success of the exhibit, we have received numerous requests to present our work at more science communication events, and some of the artworks have been incorporated into the medical student laboratories at the University of Cambridge. We are now planning to extend the impact of the exhibit by documenting and sharing our experiences in one or more scientific journals. The Sensory Science event was truly a reminder that the most effective innovation comes from the collective efforts of a diverse and inclusive community.

Stavroula Piliou, PhD student at the University of Cambridge

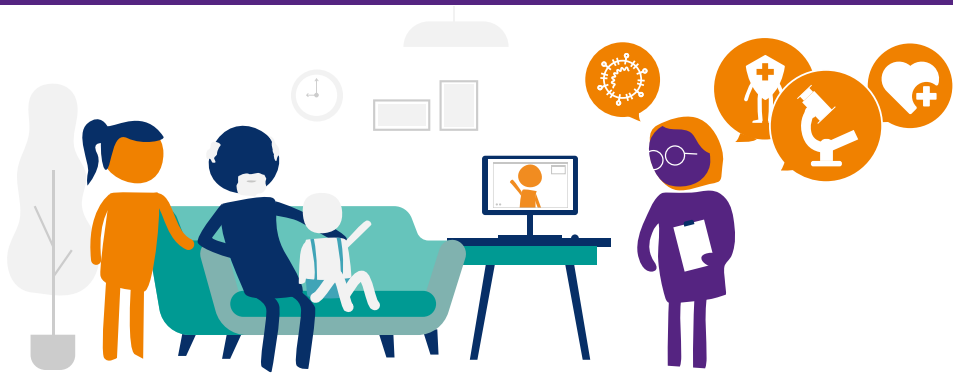
With thanks to Professor Adrian Liston, Dr Erica Tandori, Dr Stuart Favilla, Dr Julia Johnson, PhD students from the University of Cambridge, artists from Anglia Ruskin University and everyone else involved.

BSI Communication and Engagement Grant

Sparks interest in and strengthens understanding of immunology, and builds your engagement skills. The next deadline is 1 October 2024. **www.immunology.org/communication-engagement-grant**

Increasing impact through engagement and involvement

Engagement and involvement are vital parts of research, and are increasingly encouraged by research organisations, funders and other stakeholders. However, there can be confusion around what engagement and involvement mean and where they overlap. Here we take a closer look at both.



Involving patients and the public can ensure research is asking the best questions and is run in the best way for those it impacts most. Engaging the public with your research can showcase your work, get the public's views, and create interest. Both engagement and involvement can help you see your own work in new ways, which can be incredibly rewarding.

What is engagement?

Engagement is having an interaction or running activities with the public. It can be talking with the public about your research, inspiring them about science in general, or for entertainment.
Examples of engagement include:

- A talk or stall at a science festival
- Social media question and answer session
- Going into the community with hands-on activities
- Running a science club at a school

When planning an engagement activity, think carefully about what you want to get out of it, who you want to engage with and what style suits you best.

Remember engagement should be a two-way interaction – ask open questions and listen to what your audience says. Think carefully about how to communicate with your audience, what language to use, and prepare some stories and metaphors that can convey the key information.

If you are tackling a tricky topic such as vaccines, be honest and don't avoid subjects like possible side effects. People can react negatively if they feel you are hiding information.

And the most important thing: enjoy yourself! People connect better when they can see someone's passion and excitement.

What is involvement?

Involvement is carrying out research with or by members of the public rather than to, about or for them. In this context, 'public' can refer to patients, carers, people using health and social care services, and members of the public.
Involvement can look like:

- Having panels which advise and guide research projects
- Including patients, carers or the public as co-applicants on grants
- Getting feedback on resources
- Co-creation of training and events

When incorporating involvement into your research, think carefully about how to work with people in a meaningful way. Ensure contributors feel valued for their time and efforts and treat them like the collaborators and colleagues they are.

Remember involvement initiatives should be accessible. Use plain language in communications whenever possible.

Try to build involvement into your projects from the beginning, for example, by including patients and the public as co-applicants or running focus groups on your project's design. Don't forget that involvement can be part of basic research too!

Lots of researchers find involvement beneficial. It can give you a direct line to the people your research affects most and improve research in a myriad of ways from recruitment and retention to speedier ethics approval and more targeted dissemination of results.

How do engagement and involvement overlap?

While engagement and involvement are different, there can be overlap. For example, you might attend a local community event to both talk about your work and to get feedback on your research. You could run an activity at a festival where you are also seeking input on how data is stored or shared in health research. These activities could be considered both engagement and involvement; the most important thing is to think carefully about why you are doing your chosen activity and what the public will get out of it.

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Find out more

Find out how the BSI team could help you by visiting: **www.immunology.org/public-information**

Congratulations

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

RSE Sir James Black medal

Congratulations to BSI member **Professor Doreen Cantrell**, from Dundee's School of Life Sciences, who has been awarded the Royal Society of Edinburgh's Sir James Black Medal for her pioneering cell signalling and immunology research – the first woman to ever receive the honour!

Status in the States

Honorary BSI member **Professor Anne O'Garra** has been elected as a member of the National Academy of Sciences in the US, in recognition of her distinguished and continuing achievements in immunology research. Professor O'Garra is Principal Group Leader of the Immunoregulation and Infection Laboratory at the Francis Crick Institute.

JDRF David Rumbough Award

Our congratulations go to BSI Clinical Research Secretary and Trustee, **Professor Colin Dayan**, who has won the Juvenile Diabetes Research Foundation's David Rumbough Award, which acknowledges an individual who has made outstanding contributions in the field of type 1 diabetes.

The Academy of Medical Sciences

Springboard to success

The Academy of Medical Sciences' Springboard scheme recognises exceptional early career scientists in biomedical and health fields, providing up to £125,000 over two years and a personalised package of support to help them launch their careers. Our congratulations go to the following BSI members who have been recognised in the latest round:

Maitreyi Shivkumar,
De Montfort University
Leticia Monin Aldama,
Imperial College London
Juan Fernando Quintana,
University of Manchester
Rachel Tanner,
University of Oxford

BSI Career Enhancing Grant

Congratulations to all those who were awarded funding in the latest round of the BSI Career Enhancing Grant. Over £40,000 was awarded in this round of funding to 10 BSI members, covering a wide range of projects, from an overseas lab visit to develop skills in microscopy imaging to a research project looking at the role of autoreactive B cells in cancer. The next round will close on 26 September 2024. Find out more about the awardees here: **https://bit.ly/3WUdhON**.

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Wellcome Trust Early Career Fellowship

Congratulations to BSI member **Dr Matthew Sinton** for being awarded a Wellcome Trust Early Career Fellowship to study immune control of energy balance during infection. Dr Sinton will soon be joining the Lydia Becker Institute of Immunology and Inflammation at the University of Manchester to set up his new lab.

Ambassador for women

Our congratulations to BSI member **Swetha Kannan**, from the University of Cambridge, for being selected as an official UN Women UK delegate to the United Nations Commission on the Status of Women.

Congratulations to new Fellows

Both the Academy of Medical Sciences and the Royal Society have announced their lists of new Fellows for 2024. Congratulations to the following immunologists on being elected:

ROYAL SOCIETY

- **Professor Sir Andrew Pollard,** Ashall Professor of Infection & Immunity, University of Oxford
- **Professor Lorraine Symington,** Harold S. Ginsberg Professor of Microbiology & Immunology, Columbia University

ACADEMY OF MEDICAL SCIENCES

- **Professor Mark Cragg,** Professor in Experimental Cancer Biology, University of Southampton
- **Professor Julian Knight,** Professor of Genomic Medicine, University of Oxford
- **Professor Teresa Lambe OBE,** Calleva Head of Vaccine Immunology and Professor of Vaccinology & Immunology and PSI Investigator, University of Oxford
- **Professor Faith Osier,** Co-Director & Chair, Immunology & Vaccinology, Department of Life Sciences Imperial College London

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

Getting to grips with omics: how I came to love coding

Our bioinformatics training programme has proved hugely popular since being launched in 2022. Delivered in collaboration with the Glasgow Bioinformatic Core, these courses equip wet-lab immunologists, biologists and other life scientists with the skills and confidence to perform their own bioinformatic data analysis. Here, course participant, Dr Olivia Bracken, shares her experience of taking the first two courses in the programme.

Having always been a purely wet-lab scientist, I was apprehensive to enter the world of bioinformatics. However, the explosion in the use of large-scale datasets in scientific discovery meant that I knew I needed to take the leap and delve into the world of R coding, if I wasn't to be left behind.

Data wrangling

I initially signed up for the BSI's beginner course 'Omic data analysis and visualisation in R', which gave an excellent grounding in data wrangling and presentation of omic data. John Cole seamlessly took us through how to manipulate our data into the correct format to create the multitude of different plots that can be generated in R, as well as how to customise these. Not only did John make learning the language accessible, but the lectures brilliantly outlined the importance of different plots in presenting various datasets, and how these can be used when preparing data for publication. I was hooked and immediately set about applying what I had learnt to proteomic and RNASeq datasets that we had available in the lab.

When the opportunity arose to take the second course, 'Further omics, statistics and clinical data in R', I jumped at the chance. This course makes use of two datasets – proteomic and RNAseq – to interrogate metadata, code your own functions and apply 'clustering' to assign different cell types. The proteomic dataset came with accompanying clinical metadata, which enabled us to learn how to look for correlations and perform statistical analysis. Perhaps most helpful (and interesting) was how to make our own functions so that we could streamline our analysis. I thoroughly enjoyed applying strategic thinking to building a function, and John and his team were on hand to guide us through the steps and answer any questions that arose.

One step at a time

Next, we used an RNASeq dataset to work through the DESeq2 package to analyse bulk RNA sequencing. Again, the combination of the lectures and the two-hour tutorials gave time for John to explain in detail how RNAseq experiments are prepared, the importance of batch correction, and when to apply quality control corrections, all of which meant that when we came to applying the code to the dataset, we had a clear understanding of why each step was being performed and how it would affect our result. The additional analysis techniques we learnt were brilliant – we went from being able to compare two conditions to comparing three.

I certainly feel that this latest course has taken my coding skills to the next level. I can interrogate datasets in a way I wasn't able to before. John is such an excellent teacher – he truly makes the whole experience so enjoyable. No question feels too small and, even after completing the course, you can always drop him an email should you have any further questions. Having completed these courses, I feel I am capable of navigating any package in R. I have analysed RNA data sets using DESeq, proteomics with MS-DAP and flow cytometry data with CATALYST. The second course gave me the chance to return to these packages newly equipped to manipulate the existing code to fit my datasets.

I never thought that I would become a coder. I was certain I would remain a wet-lab scientist forever, but completing the R courses with John has completely changed my mind. John has built courses that mean no problem feels insurmountable. He makes it accessible, interesting and I couldn't recommend the course highly enough. I now love coding, and am just sad I didn't pick up this skill sooner. I feel I am a much better scientist for it.

Dr Olivia Bracken, University College London

> 'The lectures brilliantly outlined the importance of different plots in presenting various datasets, and how these can be used when preparing data for publication.'

Find out more

Find out more about all our training courses at: **www.immunology.org/training**

Exploring the impact of AI in immunotherapy discovery

In March, the BSI Oxford Immunology Group (BSI OIG), in collaboration with the University of Oxford Immunology Network, presented its annual one-day symposium to showcase the fantastic immunology research happening across Oxford. Researchers from a range of disciplines met at the University of Oxford Mathematical Institute to present their work and explore opportunities for cross-disciplinary collaboration.

Advances and challenges for AI in immunology

The final session of this year's symposium tackled the role of artificial intelligence (AI) in immunotherapy discovery. Professor Hashem Koohy, of the MRC Translational Immune Discovery Unit, began by giving a brief history of statistical inference, machine learning and artificial intelligence, before setting out the major advances and critical challenges for AI in immunology.

The discussion drew on our panel's expertise in multi-modal single-cell analyses, ethics and regulation, and translation to industry. One fundamental challenge was to establish if AI or machine learning algorithms have truly advanced our understanding of biology and immunology. For example, in structural biology, AI models such as AlphaFold have enabled inference of protein folding for hundreds of millions of protein complexes, but it is not clear whether this has been translated into a deeper understanding of structural biology.

We discussed the use of AI and machine learning in the data-rich field of single-cell biology and the challenge of interpreting increasingly complex models, given that the machine learning field has historically favoured accuracy over biological plausibility.

We agreed that there had been a skew towards a 'snapshot' approach to new software development, where one model is said to outperform another in a narrowly defined context. However, for the development of immunotherapies, the proof is always in the 'immunological pudding', and both academia and industry now require solid functional data to support the adoption of new models.

Collaboration and transparency in innovation

As algorithms become more advanced, there is a risk that the resources required to develop them limits their use to a few large technology and pharmaceutical companies. Our panel highlighted the role of international competitions, consortia and anti-trust legislation in ensuring the fair use of these algorithms, as well as the potential of international collaborations to develop and publish the large datasets required by the models.

We discussed the challenges of applying existing regulatory and ethics frameworks to AI and machine learning when used to improve our understanding of health and biological systems. There is a clear need for responsible research that abides by data protection laws, as well as transparency in development to ensure the quality of datasets used to train systems, and to limit the effects of existing biases. The panel agreed there is an important role for the academic community in developing AI regulation alongside industry, regulatory bodies and government departments. Small biotechnology firms are also key for driving innovation, as the era of model-first innovation wanes and focus shifts to favour companies creating novel datasets, new discovery modalities, or new lenses into immunological mechanisms.

Future challenges

In summary, while AI and machine learning have clearly advanced the general state of immunological knowledge, and have enabled us to 'automate the boring', there remain significant challenges if AI is to provide a deeper understanding of biological systems.

Integration of prior knowledge in the form of Bayesian models, and mechanistic modelling in the form of ordinary differential equations within an end-to-end model architecture, are expected to be budding areas of research.

Panel members:
Professor Hashem Koohy
(MRC Translational Immune Discovery Unit)
Professor Calliope Dendrou
(The Kennedy Institute of Rheumatology)
Dr Ferdousi Chowdhury
(University of Oxford)
Dan Hudson
(Chinese Academy of Medical Sciences (CAMS) Oxford Institute)

Get involved!

BSI OIG page: **rb.gy/eewylc**

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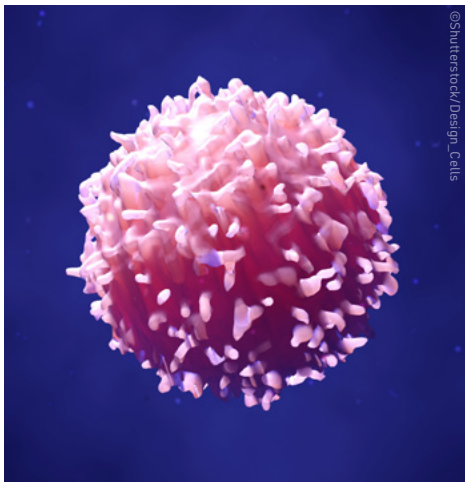
Immune Update

The BSI journals

A round-up of new research published in the British Society for Immunology's official journals written by ECR board members of *Immunotherapy Advances* and *Clinical & Experimental Immunology*. Members benefit from discounted publication fees and have access to these journals free of charge at **www.immunology.org/journals.**

Discovery Immunology

Effect of abatacept on T-cell activation is short-lived *in vivo*



This paper by da Rosa *et al*. investigates the duration of the *in vivo* effect of abatacept treatment. Abatacept, a fusion protein consisting of an extracellular portion of human CTLA-4 and the Fc region of IgG1, has already been approved in the treatment of autoimmune diseases such as rheumatoid arthritis. The mechanism of its action is to prevent T cell activation by impairing CD28 binding to CD80/CD86 on antigen presenting cells (APC).

The authors used OVA-induced delayed-type hypersensitivity (DTH) mice, from which $CD4^+$ T cells were transferred into C57BL/6 mice. These were then immunised and treated with abatacept. The authors observed that abatacept impairs T cell priming and activation by inhibiting $ICOS^+$ T cells. However, this immunomodulation was short-lived, being lost once the drug was withdrawn.

In summary, the presented data support the need for a long-term administration of abatacept in patients.

da Rosa *et al*. 2024 *Discovery Immunology* **3** kyad029 **DOI: 10.1093/discim/kyad029**

Summary by Dr Marzena Lenart, Jagiellonian University, Poland

Clinical & Experimental Immunology

Heterogeneity in RAG1 and RAG2 deficiency: 35 cases from a single centre

The recombination activating gene (RAG) regulates V(D)J (variable (diversity) joining segments) recombination during the early stages of B cell development in bone marrow. While complete RAG deficiency leads to severe combined immunodeficiency (SCID), hypomorphic mutations with residual recombinase activity mimic a common variable immunodeficiency (CVID) or combined immunodeficiency (CID) phenotype.

In this study, Karaatmaca *et al*. evaluated the clinical and molecular characteristics and disease outcomes in 35 patients with defects in *RAG1* and *RAG2*, in whom the clinical phenotypes were variously compatible with typical SCID, Omenn syndrome (OS), and delayed-onset CID.

Clinical manifestations presented at a median age of one month included recurrent sinopulmonary infections (83%), oral moniliasis (63%), eczema/dermatitis (43%), diarrhoea (51%) and autoimmunity (31%).

Twenty-eight patients received hematopoietic stem cell transplantation (HSCT) at a median age of seven months, with a success rate of 67.9%. Sixteen patients, including nine transplanted patients, died. Survival was greatest in SCID patients who received an HLA-matched transplant from a family donor. No difference was identified between RAG1 and RAG2 deficient patients for HSCT outcomes, autoimmunity or survival.

Karaatmaca *et al*. 2024 *Clinical & Experimental Immunology* **215** 160–176 **DOI: 10.1093/cei/uxad110**

Summary by Dr Mahnaz Jamee, Leids Universitair Medisch Centrum (LUMC), The Netherlands

Immunotherapy Advances

NLRP3 inflammasome activation in sensory neurons promotes chronic inflammatory and osteoarthritis pain

Rheumatic diseases often lead to debilitating pain, which can persist even after total knee replacement in osteoarthritis, or when inflammation is absent in rheumatoid arthritis. In this paper, Silva Santos Ribiero *et al*. investigated the role of mitochondrial dysfunction and NLRP3 inflammasome activation in the transition from acute to persistent inflammation-induced nociplastic pain, and in persistent monoiodoacetate-induced osteoarthritis pain.

Mice injected with carrageenan developed transient inflammatory pain that resolved within seven days. They were then injected with Prostaglandin E2 (used to treat inflammation), which triggered persistent mechanical hypersensitivity. In contrast, this hypersensitivity resolved within a day in mice that had not received carrageenan, suggesting the initial transient inflammation led to maladaptive nociceptor neuroplasticity (so-called hyperalgesic priming).

At day seven, primed mice displayed an increased expression of NLRP3 inflammasome pathway components, while inhibition of NLRP3 inflammasome with MCC950 prevented the transition from acute to chronic pain. The results suggest that NLRP3 inflammasome activation in sensory neurons promotes development of persistent inflammatory and osteoarthritis pain.

Silva Santos Ribiero *et al*. 2024 *Immunotherapy Advances* **3** ltad022 **DOI: 10.1093/immadv/ltad022**

Around the journals

A summary of some of the latest papers from the world of immunology written by ECR board members of our official journals and the BSI Editorial Coordinator.

Nonheritable influences drive immune system variation in endometrial tissue

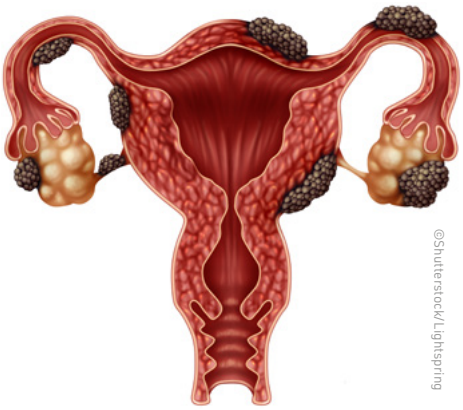
Both heritable and environmental factors are known to contribute to immune system variability in blood, with microbiome, environmental exposure, diet and age all possible factors. But how these impact immune system variability in tissues is relatively unexplored.

In this study, Bister *et al*. analysed endometrial and peripheral blood immune cells in identical twins. They found substantial genetic heritability among most immune cell phenotypes in peripheral blood, but there was more variation in endometrial immune cells, suggesting the latter are more prone to environmental influence.

Cytomegalovirus (CMV) is known to profoundly affect the immune system, and may drive immune cell variation in blood. This study found that CMV infection shaped peripheral blood immune cell variability, but that its effect on endometrial immune cells was more limited. Instead, the local endometrial landscape and immune cell composition was more likely to be shaped by hormonal contraception, which also had some influence on the systemic immune system.

These results demonstrate how variation in our immune cells, as well as the factors influencing this, can differ depending on where in the body those cells reside.

Bister *et al*. 2024 *Science Immunology* **9** DOI: 10.1126/sciimmunol.adj7168



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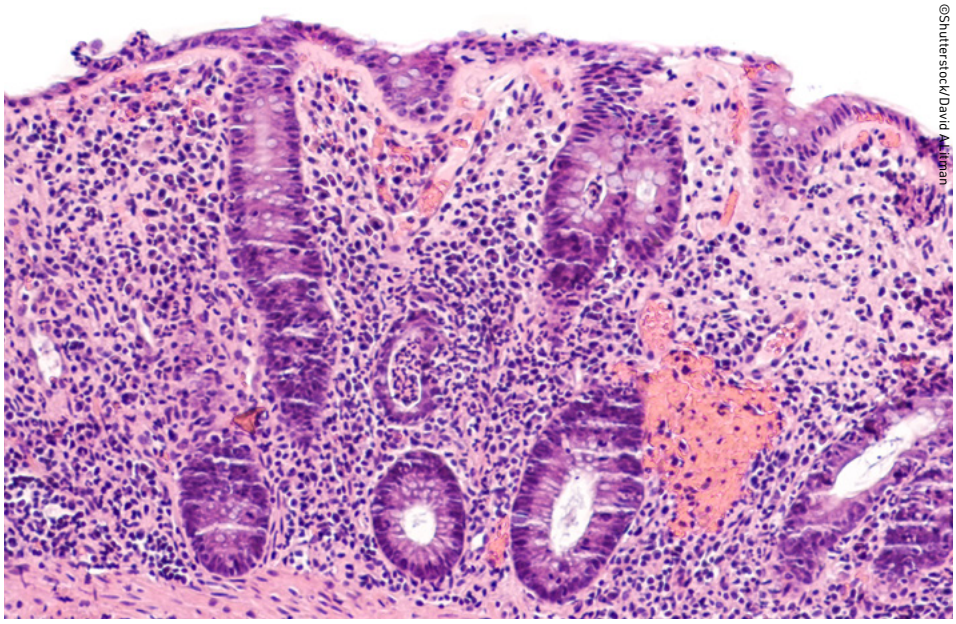
Treatment of ulcerative colitis with vedolizumab linked to attrition of gut-associated lymphoid tissue



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Vedolizumab is a monoclonal antibody used to treat ulcerative colitis. In this study, Canales-Herrerias *et al*. sought to shed light on precisely how it works, by analysing intestinal biopsies and peripheral blood in five distinct cohorts of patients with ulcerative colitis.

They found that people treated with vedolizumab had fewer naive B and T cells in intestinal tissues, and fewer circulating $\beta7^+$ gut-homing plasmablasts, suggesting that vedolizumab targets gut-associated lymphoid tissue.

Further analysis showed the action of the drug to be linked to a reduction in size of gut-associated lymphoid tissue, fewer circulating and intestinal IgG^+ plasma cells, and decreased FcγR-dependent signalling.

These results show that the targeting of gut-associated lymphoid tissue is a previously unappreciated mechanism in treatment with vedolizumab, and may have major implications for the treatment of ulcerative colitis.

Canales-Herrerias *et al*. 2024 *Science Immunology* **9** DOI: 10.1126/sciimmunol.adg7549

The potential for a personalised neoantigen vaccine in liver cancer

Though programmed cell death protein 1 (PD-1) inhibitors have been shown to have only modest efficacy in hepatocellular carcinoma (HCC), there is some evidence to suggest that a personalised therapeutic cancer vaccine (PTCV) may enhance efficacy by triggering tumour-specific immunity.

Mutations within tumours lead to the expression of abnormal proteins called mutation-associated neoantigens. In this study, Yarchoan *et al*. present results from a study of a DNA plasmid PTCV encoding up to 40 neoantigens, given with plasmid-encoded interleukin-12 and pembrolizumab in patients with advanced HCC who were previously treated with a multityrosine kinase inhibitor.

Neoantigen-specific T cell responses were confirmed in 19 of 22 patients, while multiparametric cellular profiling showed active, proliferative and cytolytic vaccine-specific $CD4^+$ and $CD8^+$ effector T cells. In addition, T cell receptor β-chain (TCRβ) bulk sequencing demonstrated vaccination-enriched T cell clone expansion and tumour infiltration.

Further analysis showed T cell clonal expansion of cytotoxic T cell phenotypes following treatment, and confirmed reactivity against vaccine-encoded neoantigens. The results suggest that administering a PTCV with pembrolizumab has the potential to treat advanced HCC.

Yarchoan *et al*. 2024 *Nature Medicine* **30** 1044–1053 DOI: 10.1038/s41591-024-02894-y

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