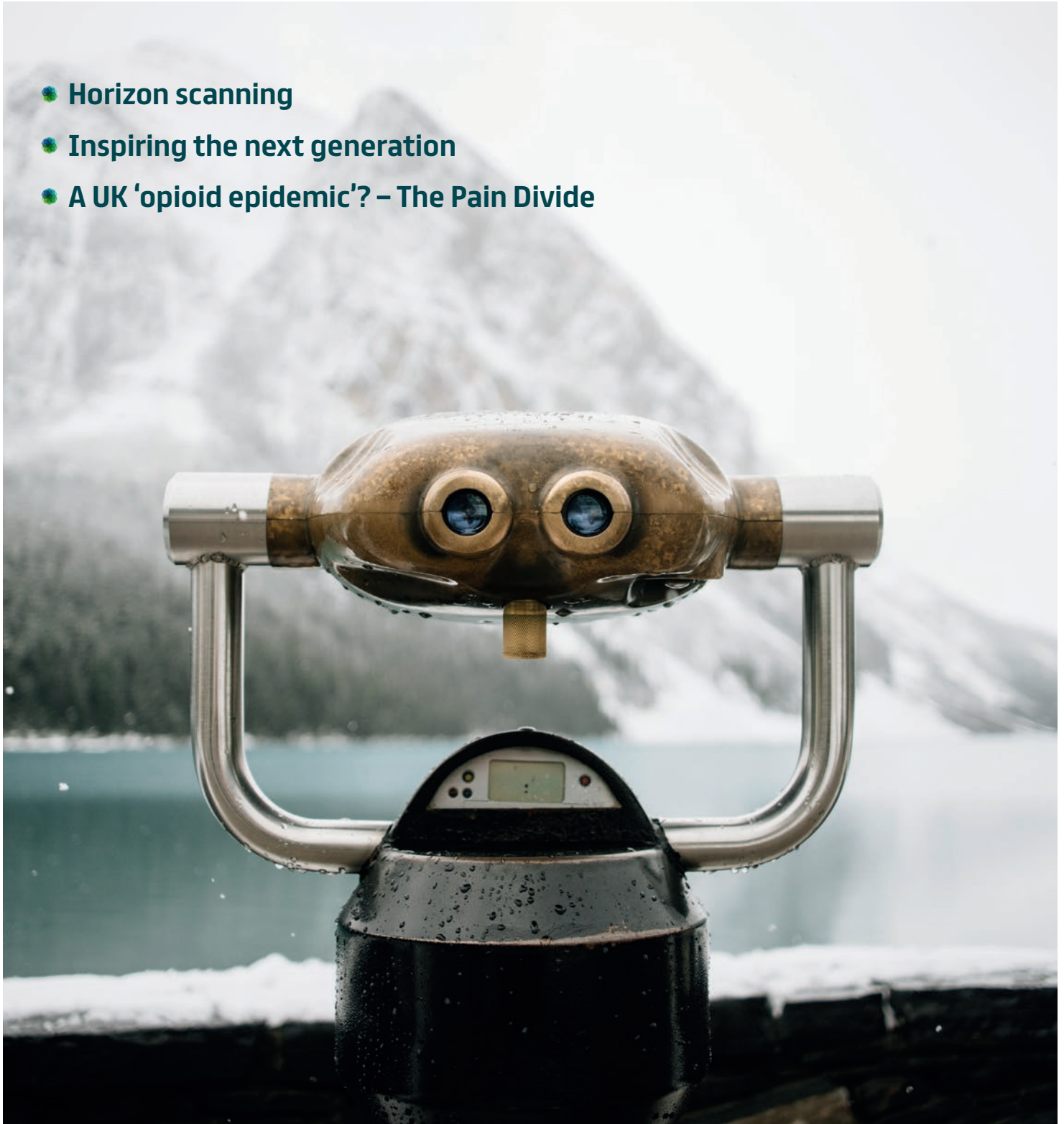




PHARMACOLOGY MATTERS

- **Horizon scanning**
- **Inspiring the next generation**
- **A UK 'opioid epidemic'? – The Pain Divide**



EDITORIAL



As we enter into November, we reach our final edition of *Pharmacology Matters* for 2018. It has been an excellent year for the magazine with the addition of our new editorial members and the many contributions we have received through the year from pharmacologists across the world.

As always, Jono keeps us informed of Society affairs and the exciting times ahead with the formation of a new Scientific Advisory Panel as the Society horizon scans for the future. From one pharmacological Society to another, Wan Amir, who is a member of the Society's International Advisory Group and vice-president of the Malaysian Society of Pharmacology and Physiology (MSPP), shares the success of their recent meeting and touches upon the workshops they offer to advance the teaching of pharmacology. This theme is continued when the core curriculum at the University of Aberdeen is placed under the spotlight as Steve Tucker shares the outcomes from the audit of their pharmacology undergraduate programmes and the activities they have employed to keep students engaged in pharmacology.

I am always fascinated by the creativity of our pharmacologist community when it comes to devising ways to inspire the next generation. This is showcased by Aileen King at King's College London as she highlights the work experience model established at the Diabetes Department and the demonstrable impact that this experience had to the school children who have previously participated. As someone who was the first to go to university in my own family with no connection to the academic world, I feel that experiences like this could be life changing. This is why I admire mentoring schemes like the Social Mobility Foundation (SMF), which seeks to support young people from low-income backgrounds into university. Ayesha Begum from the SMF gives details as to how the academic community can get involved in becoming a mentor – something I would wholeheartedly encourage our readers to consider!

Following on from our Cardiovascular & Respiratory Pharmacology Affinity group activities, Kayley Scott at Glasgow University presents the challenges of tackling cardiovascular disease in pregnancy, whilst Paul Chazot from Durham University highlights issues related to opioid prescription in the North East of England.

Throughout the year, the Society has published a series of blogs on the different perspectives related to mental health issues experienced by students and academics alike. As we enter into the time of year when students will be faced with exams, we hear from some of our young pharmacologist members, Lizzie Mann and Ed Wickstead, who offer their insights into the mental health issues encountered within university culture, and how this impacts researchers. It is important to recognise the support that exists within universities that is available to staff and students, and Sara Shinton offers insight into the researcher development support available at Edinburgh University. Knowing where and what type of support exists within workplaces and higher education institutes can make a great deal of difference to health and wellbeing whilst positively nurturing career development.

As we come to the end of 2018, it only leaves me to thank the editorial team of *Pharmacology Matters*. I would like to say thank you to Vedia Can who moves on from the magazine, and we look forward to welcoming a new YPAG member next year.

Best wishes for the new year ahead,

Margaret

Editorial Team

Editor-in-Chief

Margaret Cunningham

Managing Editor

Emma Needham

Editorial Board

Aisah Abdool, Mike Curtis, Felicity Gavins, Fraz Mir, Steven Tucker, Edward Wickstead

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CONTENTS

NEWS FROM THE MALAYSIAN SOCIETY OF PHARMACOLOGY AND PHYSIOLOGY (MSPP)	04
Wan Amir	
TWO YEARS ON: HOW THE CORE CURRICULUM HAS SHAPED PHARMACOLOGY COURSES AT THE UNIVERSITY OF ABERDEEN	05
Steve Tucker	
INSPIRING THE NEXT GENERATION	07
Aileen King, Edward Jones, Ella White and Elba Feo	
THE SOCIAL MOBILITY FOUNDATION	11
Ayesha Begum	
AN UPDATE FROM ONE OF OUR AFFINITY GROUPS: CARDIOVASCULAR & RESPIRATORY PHARMACOLOGY	12
Anastasios Lymperopoulos	
THE PAIN DIVIDE: THE NORTH EAST OF ENGLAND IS A HOT SPOT FOR OPIOID PRESCRIPTION POSITIVELY ASSOCIATED WITH PAIN INTENSITY	13
Paul Chazot	
TAKING A LOOK IN UTERO: TACKLING CARDIOVASCULAR DISEASE DURING PREGNANCY	15
Kayley Scott	
FROM THE PETRI DISH TO THE FLYING DISC	18
Vanessa Lowe	
PERSPECTIVES ON MENTAL HEALTH: RESEARCH – A CAREER OR A CALLING?	20
Lizzie Mann	
PERSPECTIVES ON MENTAL HEALTH: THE TALE OF THE ACADEMIC BLACK DOG	22
Edward Wickstead	
DEVELOPING RESEARCHERS FOR THE FUTURE	24
Sara Shinton	
AN UPDATE FROM OUR MEETINGS TEAM	27
Niall Hyland, Fiona Marshall and Lindsay McClenaghan	

Cover photo by Shane Hauser on Unsplash

YOUR SOCIETY



JONO BRÜN
Chief Executive

“
Pharmacology
and
therapeutics
are evolving
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and it is our
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redefine and
change them
to reflect
this.”

By the time you read this you will hopefully have already seen the Society's announcement of its new Scientific Advisory Panel. I'd like to talk about the role we see this group playing, and what it means for the Society.

But first, for those of you who haven't already read or heard about it, the panel members are:

- **Professor Jackie Hunter**, Chief Executive, Clinical Programmes & Strategic Relationships, Benevolent AI
- **Dr Fiona Marshall**, Vice President and Head of the UK Discovery Centre, MSD Research Laboratories
- **Dr Menelas Pangalos**, Executive Vice President, IMED Biotech Unit & Global Business Development, AstraZeneca
- **Dr Tony Wood**, Senior Vice President of Medicinal Science & Technology, GSK

Steve Hill and Munir Pirmohamed, our President and President-Elect, will represent the Society on the group.

Horizon scanning

One of the guiding principles in our 2018–2022 strategy is that “Pharmacology and therapeutics are evolving disciplines, and it is our responsibility to define, redefine and change them to reflect this.” This is the spirit in which, over the summer, Steve Hill and I started to reach out to the people who now comprise our panel. Getting each of the “yesses” from them were some of the highlights of my year so far.

The group will advise on the Society's scientific content strategy, and help to ensure our journals, meetings and policy outputs are aligned. It will focus on identifying emerging trends in the life sciences, enabling us to better understand how we can integrate these into our future activities and decisions.

The idea is for this to be a pretty informal arrangement (the group plans to meet for the first time over dinner in January 2019) rather than a formal addition to our existing governance structure. The panel will provide insight and advice, and the Society will decide, through Council, Meetings Committee, editorial boards and staff directors, how that advice might best be incorporated into our activities. And it's important to recognise that we still see our members as the primary source of ideas for meetings, symposia topics, and journal content.

Foresight in a time of change

Securing the input of such respected and connected individuals is a good indicator of the Society's progress, and the importance of pharmacology and clinical pharmacology to

the discovery, delivery and regulation of new medicines. Using this group, we are confident of becoming more strategic and coherent in our approach to disseminating research in pharmacology and therapeutics.

Nowhere is this going to be more necessary than in publishing. There are some big changes on the horizon which all academic publishers are grappling with, and we are no exception. The open access movement has been around for a long time, but now has real impetus behind it in the UK, the EU, and worldwide – and the changes to journal access and subscription arrangements are going to be significant. UK Research and Innovation has [recently decided](#) that from 2020, funded research must be published in “gold open access” format. This means the final version of all articles will be freely and permanently accessible for everyone, immediately after publication: no subscription charges, no paywalls, and limited restrictions on reuse.

While *Pharmacology Research & Perspectives*, our newest journal, is already fully open access, the *British Journal of Pharmacology* and the *British Journal of Clinical Pharmacology* are hybrid journals, with a mix of subscription-based and open access revenues, and both are likely to be affected financially by any new model of publishing. For a while, we've been making plans to lower the Society's exposure to this kind of event through diversification of revenue and the promotion of open access publishing in our journals, among other things. So, we're in relatively good shape to meet the challenge.

Through our Council, Publications Committee and editorial boards, we are already considering options to ensure that the journals – by some distance our main source of income and a significant bellwether of the strength and quality of our discipline – can thrive in the future, while accepting the strong argument for open access, and embracing change.

It's that time of year again

I couldn't end without saying how much I am looking forward to [Pharmacology 2018](#). Over six years into my time as Chief Executive, these days nothing says “Christmas” to me quite like three days with our members in the QEII Centre!

I'm sure you will already have taken advantage of the [early-bird registration discount](#) (deadline 18 November). But if you haven't let me remind you that this year we will have more commissioned content than ever before, a Welcome Reception priced at just £5, and a wonderfully heavy-hitting line-up of speakers. I look forward to seeing you at P18.

NEWS FROM THE MALAYSIAN SOCIETY OF PHARMACOLOGY AND PHYSIOLOGY (MSPP)



WAN AMIR

Wan is a member of the Society's International Advisory Group. A medical doctor by training, he obtained his PhD from the University of Strathclyde. He then did his post-doctoral under Professor Robert Jones at the same university. Currently, he is a Senior Medical Lecturer in Pharmacology at School of Health Sciences, Universiti Sains Malaysia. His research focuses on the effects of Malaysian herbs on hypertension, diabetes, obesity and hypercholesterolaemia. His research also focuses on oxidative stress. This includes the usage of animal models of the diseases, *in vivo* and *in vitro* vascular study on the endothelium. He is currently the vice-president of Malaysian Society of Pharmacology and Physiology (MSPP). His role in MSPP includes promoting the activity of the Society and linkages among the members of the society. He is also an Academy of Science Malaysia Associate.



The newly elected Society EXCO members for 2018-2019 after the Annual General Meeting during the Society's 32nd Scientific Meeting

Our Society was initially known as the Malaysian Society of Pharmacology and Experimental Therapeutics, or MASPET, when it formed in 1976. Increasing numbers of physiologist members led the Society to officially change its name in 1988 to the Malaysian Society of Pharmacology and Physiology (MSPP). We are now the primary non-profit learned Society for pharmacologists and physiologists in Malaysia.

We currently have a total of 206 members in the Society, 157 of which fall into the postgraduate category, and 49 of which are life time members. We have a very even split of male to female members, of 105 : 101.

Members of MSPP work in academia, industry and health services, and encompass a broad spectrum of both applied and basic pharmacology and physiology. The mission of the Society is to advance science, teaching and ethics in our fields, to promote integration with other professionals and to be an avenue for public awareness on the use and misuse of drugs. We are committed to supporting brilliant ideas and cutting-edge research innovations.

The Society organises scientific meetings as a platform for researchers to share their research findings, network and collaborate. Our meetings were originally held biennially, however due to increasing interest and support, they now run annually. This year, MSPP and the National University of Malaysia hosted the 32nd Scientific Meeting from 8 – 9 August 2018 in Bangi, Selangor, Malaysia. The invited speakers included British Pharmacological Society

member Dr Simon Kennedy from the University of Glasgow, and Professor Alberto Avolio from the University of Macquarie, Australia.

"The meeting was a great success and in particular there were a lot of early-career scientists presenting their data. Topics ranged from the more traditional areas of pharmacology to subjects such as pharmacognosy, clinical case studies, toxicology and small clinical trials. There was a strong feeling of collegiality amongst the delegates and I got the feeling a lot of new collaborations were formed and existing ones strengthened. It was a thoroughly enjoyable meeting in a lovely setting."

Simon Kennedy

The meeting welcomed 114 participants – both local researchers and those from overseas (including from India and Indonesia) to come along and share their knowledge and findings. The Society also presented awards for young investigators and young teachers during the meetings, to recognise and encourage promising early career scientists.

The Society also encourages the advancement of teaching of pharmacology and physiology through running a series of refresher courses and workshops. This year, the refresher course focused on the pharmacophysiology of the respiratory system. In the future, the Society plans to organise more activities to reach out to the research community and schools to further advance knowledge on pharmacology and physiology.

TWO YEARS ON: HOW THE CORE CURRICULUM HAS SHAPED PHARMACOLOGY COURSES AT THE UNIVERSITY OF ABERDEEN

The British Pharmacological Society's [core curriculum](#) for undergraduate pharmacology programmes provides a quality assurance tool for higher education institutions in terms of the critical areas that are central to any undergraduate degree in pharmacology. The guidelines enable institutions to reflect on the current content of their course programmes, identifying and celebrating areas of strength and most importantly, recognising areas for improvement, towards which resources and development efforts can be directed. Since its launch in 2016, the core curriculum has been well publicised and frequently used as a design tool for new pharmacology programmes. This article uses the University of Aberdeen as a case study to reflect on how the core curriculum can be used to evaluate current pharmacology course programmes.

The University of Aberdeen runs undergraduate programmes in Pharmacology, Biomedical Science (Pharmacology), and Immunology and Pharmacology, with much of the specialist pharmacology teaching delivered by a team of six academics. Prior to the launch of the guidelines, discussions around curriculum and course design in the department were regular but ad hoc and the core curriculum has provided a best practice reference to measure ourselves against.

It is important to note that whilst the core curriculum encourages institutions to strive towards the highest quality in all aspects of their teaching methods and course structures, it is not overly prescriptive or constraining, allowing individual UK institutions the flexibility to remain unique by playing to their pharmacological strengths.

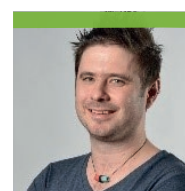
The pharmacological courses at the University of Aberdeen were reviewed by the pharmacology teaching team (the co-authors of this article) over a number of focused meetings and the materials covered within the core modules

(as well as the approaches by which they were covered) were mapped against the curriculum's 'core statements', which are split into three broad categories:

- **Core knowledge**
- **Core skills**
- **Core attitudes**

The results of this analysis were encouraging on a number of counts:

- The University of Aberdeen's curriculum addressed over 85% of the core statements. This was considered a very positive alignment and provided reassurance that the pharmacology offering was in line with the needs and expectations of the community
- More than 70% of the statements were covered by more than one learning activity or course, demonstrating both continuity and progressive increases in complexity as students move through the programme and build on their knowledge
- The elements of the core curriculum not clearly represented by the approaches at the University of Aberdeen were some of the softer skills that are perhaps more difficult to demonstrate, including a number of the core attitudes. However, many of these are implicit in the completion of a research project, which is a compulsory part of the pharmacology programme. Examples of core attitudes addressed as part of independent research projects are:
 - confidence and ability to apply skills in a real world setting
 - concern for detail and quality
 - curious attitude and openness when interpreting data
 - confident and adaptable working attitude
 - willingness to accept a challenge



STEVE TUCKER

Steve Tucker is a senior lecturer in Pharmacology and Medical Science at the University of Aberdeen, where he heads the undergraduate Pharmacology programmes and the post-graduate Clinical Pharmacology programmes. As a current member of the British Pharmacological Society's education and training committee and a British Pharmacological Society Ambassador, one of Steve's interests is advancing teaching methods and approaches in pharmacology and in particular pharmacokinetics, which he teaches at both undergraduate and postgraduate levels.

This article was co-authored by the University of Aberdeen's pharmacology teaching team: Ian Fleming, James Hislop, Fiona Murray, Derek Scott and Heather Wallace

“Where traditional pharmacology teaching may end after the current theories and mechanisms of action have been described, the core curriculum encourages institutions to go a step beyond and consider the implications of that discovery in a broader context.”

- courage to stand up for their principles under pressure
- resilient attitude in the face of failure or unexpected outcomes
- ability to work to the highest principles of scientific integrity, following ethical working practices
- ability to apply creative/innovative approaches to addressing complex problems

During the audit, some key areas for development were identified:

Appreciation of the societal relevance and impact of pharmacology

To address this complex area, the consensus across the teaching team was to bring greater emphasis to aspects of pharmacology that have a direct impact on society. Where traditional pharmacology teaching may end after the current theories and mechanisms of action have been described, the core curriculum encourages institutions to go a step beyond and consider the implications of that discovery in a broader context. Addressing questions beginning with “what does that mean?” and ending with “for the patient”, “for the clinician”, “for the pharmacist”, “for the likelihood of survival”, “for the economy” contextualises the learning, giving a more complete understanding of the purpose of the science. Much of pharmacology and toxicology are labelled as experiential learning experiences, but this is a consequential angle, which aims to instil responsibility and maturity among students. Addressing this key area did not require transformative changes, rather a slight shift in the emphasis of what was currently being delivered, for example:

- consideration of potential impact of drug repurposing within drug discovery and development teaching
- discussion of addictive drugs in society when exploring drug design and opioid analgesia
- consideration of modern pharmacological contraceptive approaches during endocrine pharmacology modules

Appreciation of the value of public engagement and outreach/ Communicate effectively to scientific and non-scientific audiences (including written and oral forms)/Areas around molecular interactions and synthetic chemistry

A new extended exercise was introduced into the final year of the University of Aberdeen’s programme following the curriculum review,

which aimed to address scientific communication and public engagement. The design of the teaching process was informed by identifying that these areas of public outreach, molecular interactions and synthetic drug design were not being fully covered by our programme and led to an integrated approach to studying drug design, synthetic chemistry, 3D molecular interactions and public engagement and communication. The practical, interactive project involves students working in groups to research a common drug target that is currently used therapeutically and preparing a justification and explanation of the target aimed at a lay audience. The target and the drugs that influence it pharmacologically are then 3D printed and used in a short video to explain the molecular interactions and how they influence the activity of the target and how sometimes these result in toxicological side effects. The videos are written, directed, narrated, performed and captured by the students using their 3D models to create a public information film that could be used for outreach activities. Students then design a new synthetic drug with at least two new molecular groups or modifications to impact on the pharmacokinetic, pharmacodynamic and toxicological performance of the drug molecule.

The project runs over a five-week period and whilst addressing the ‘core statement’ relating to science communication, it also develops transferable skills including group work, video production, molecular imaging (e.g. use of 3D modelling software) and utilising big data (e.g. extraction and analysis of 3D structures on protein databases). Furthermore, the exercise is fully adaptable to postgraduate study or even for use in direct outreach activities, and allows the levels of attainment in specific skills to be measured. Indeed, the core curriculum has provided the stimulus and direction for the creation of this valuable approach to teaching, and this further evidences its contribution to the pharmacology community.

Use of animals in research

The provision of educational experiences around the use of animals in research has always been challenging but is vital given the central importance of such research in pharmacological sciences. While in the previous examples, the core curriculum acted as an enabler for a change in teaching approach, this is more difficult in the complex realm of animal research. However, the development of a sister curriculum “The curriculum for the use of research animals” has very much helped to establish best practice across the UK. The *in vivo* curriculum is

deliberately structured in the same way as the core curriculum to make it easy to approach and the inclusion of links and resources to support coverage of animal research in the classroom make this a huge step forward for the British Pharmacological Society and the broader scientific community. Indeed, we are currently engaged in a number of approaches at the University of Aberdeen to incorporate elements of this into our curriculum. While the legal and regulatory sides of animal welfare in research are currently well covered, the curriculum for the use of research animals has provided experiential learning and access to innovative solutions for teaching that will enrich and enhance our coverage of the use of animals in pharmacological and toxicological research.

Having highlighted our review process and the key outcomes, which range from subtle alterations in our teaching emphasis to designing entirely new sections of courses and consultation with more specialised curricula, the positive impact created by this

reflective analysis has clearly been beneficial. All stakeholders are likely to benefit including the students, the programme itself, the staff involved in the programme and the employers further downstream. A follow up analysis now suggests the University's alignment with the core curriculum statements is above 90%, and we have further developments planned to elevate this further. By using the core curriculum to underpin our current practices and reviewing them every three years, we aim to keep pharmacology engaging, modern and relevant here in the north-east of Scotland.

“ We aim to keep pharmacology engaging, modern and relevant here in the north-east of Scotland. ”

BAP

British Association for Psychopharmacology



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- From neuro-receptor binding to brain function: translational value of multimodal approaches in psychopharmacology
- The complement system and inflammation as targets in neuropsychiatric disorders
- What do computational models tell us about cognition in depression and psychosis?
- The orexinergic system of the brain and its importance for neuropsychiatry

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Guest Lecture by Carlos Zarate (NIH)

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Welcome Reception and Disco

Conference Dinner at the Mercure Hotel including presentation of the 2019 Prizes and Awards

For full details of the meeting go to www.bap.org.uk/BAP2019

INSPIRING THE NEXT GENERATION



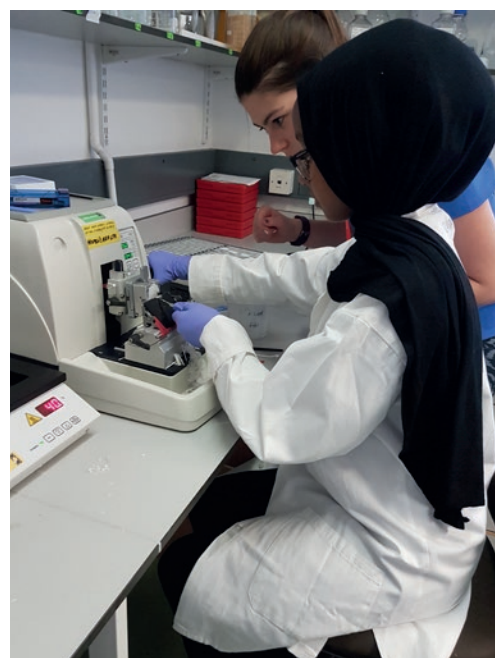
AILEEN KING

Aileen King obtained a PhD at Uppsala University, Sweden before carrying out postdoctoral studies at Joslin Diabetes Center, Boston. In 2006 she started at King's College London as an RCUK academic fellow, co-funded by the British Pharmacology Society Integrative Pharmacology Fund, before progressing on to senior lecturer in Pharmacology. Aileen's research focusses on animal models of diabetes and islet transplantation therapies. Her undergraduate teaching focusses on integrative pharmacology and physiology. She runs a second year *in vivo*-based module which is partially funded by the British Pharmacology Society.

Work experience for school pupils is no longer mandatory but in many schools it is highly encouraged. Whilst shadowing an individual researcher can be useful to gain an insight into the daily workings of a research laboratory, the opportunity to carry out experiments may be limited. This is understandable as researchers may be reluctant or unable to allow inexperienced pupils to become actively involved in their experiments. Thus laboratory work experience for school pupils often involves observation of science rather than practical experience.

We have been running work experience weeks at the Diabetes Department at King's College London for the last ten years. The format of the week has evolved over the years to optimise the experience for both the pupils and for members of staff. We have recently been awarded an engagement grant from the British Pharmacological Society to provide high quality hands-on work experience. We have focussed on a hands-on work experience week, where different members of staff dedicate a few hours each to supervise pupils in carrying out experiments. We accept several pupils at once (up to 12) and ask several researchers to commit to only a few hours per year within a specific week. The pupils enjoy peer support and find the experience more interesting as they can do experiments themselves and the staff find that their time is more efficiently used in comparison to a single pupil shadowing them for a week.

Pupils have been recruited through a variety of different avenues. Initially personal contacts at King's College London were one of the main sources of pupils. However, we strived to reach pupils who did not have personal contacts within an academic setting. In the past 5 years we have reached out to various comprehensive schools in South London and Kent. We are particularly keen to accept pupils who have written emails without any personal or teacher contact at all. One pupil this year had sent 53 emails to academic researchers to find a work experience placement. Her email was well-written and polite with a good CV attached,



but she got no response at all in 90% of cases. This underlines the difficulties of pupils with no contacts in gaining a good work experience placement.

Our model of work experience

Pupils are supervised by students and staff at varying stages of their career. The staff leading the experimental sessions include PhD students, technicians, postdocs and lecturers with the pupils supervised by at least 14 different members of staff. This enables the pupils to learn about different routes into a scientific career and different jobs within academia. They carry out a variety of techniques which we routinely use in our laboratory ranging from Polymerase Chain Reaction to dissection. We also arrange an informal "question and answer" session led by undergraduate students. This is a popular session as the students are usually only about 3-4 years older than the pupils and can give valuable advice on what it's really like to study at university and put them at ease regarding some of their worries.

Exposing pupils to *in vivo* work

King's College London is a signatory of the Concordat on Openness on Animal Research. We therefore think it is important to be completely open with our work experience pupils regarding our *in vivo* work. We give the pupils a tour of the animal facility and afterwards hold an ethics discussion about using animals in research.

We were keen for the students to understand the context of different techniques and thus the main experiment of the week is to dissect a tissue of their choice from a mouse and then histologically process it over the next few days to enable them to image the tissue by the end of the week. This allows them to understand how it can take several days to carry out an experiment but also keeps them engaged throughout the process as it is "their" tissue.

The dissection part of the work experience is voluntary and it is made clear to the pupils that

they do not need to participate. Interestingly we have had around 50 work experience students in the past five years and all of them chose to participate. We time the dissection so that animals are killed for research purposes and after the researchers have taken their tissue of choice (often the pancreas in our case) the pupils can dissect out all other tissues. They each choose two or three tissues to process, which typically as a group includes kidneys, livers, brain, heart, skin. The pupils often rate the experience as the best part of the week. They carry out the full histological process on their tissues of choice including wax embedding, sectioning (under one-to-one supervision), staining and imaging. At the end of the week the students present their histological images to the rest of the group, pointing out any morphological features of interest. Many are keen to keep the images to show their teachers.



EDWARD JONES

Edward Jones obtained his BSc (Hons) in Biomedical Science before pursuing an MRes in Integrative Biology at the University of Manchester. Ed is currently in the final months of his PhD in Neuroscience, which is jointly funded by the BBSRC and Novo Nordisk. His work focusses on uncovering the central mechanism of action of a novel anti-obesity drug based on the endogenous 'satiety' gut-hormone peptide YY3-36, as well as the optimisation and use of *in vivo* optogenetic neuron manipulation methods.

ELLA WHITE

Ella White joined the BSc in Biomedical Science at UCL in 2016 after obtaining A levels in Biology, Chemistry and Maths. She selected the Pharmacology stream in her second year as she particularly enjoyed the pharmacology lectures and practicals. Ella was awarded a Physiological Society studentship this summer to work on a project refining glucose tolerance tests in mice by reducing the fasting time and delivering glucose orally in gels, and she has submitted an abstract of this work to the forthcoming *Pharmacology 2018* meeting.

ELBA FEO

Elba Feo is in year 13 at Kingsdale Foundation School. She gained 18 GCSEs at A* grade and she is currently studying Chemistry, Biology and Maths at A level. She is currently planning to go to university next year and is still deciding on courses within the biosciences.

Student testimonies

The feedback collected at the end of the work experience week indicates that the pupils highly rate the experience at the time. We have contacted three past work experience students at different stages of their career who have reflected on how the experience impacted their career choices.



Edward Jones. Currently completing a PhD at the University of Manchester.

I visited KCL all the way back in 2008. I'd organised a week in the Diabetes Department as part of my GCSE work experience. At the time, biology was my favourite subject at school, so securing a placement with a renowned diabetes research group was rather exciting. Despite studying triple science at school, my knowledge of laboratory science

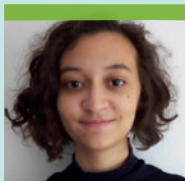
was limited. Like many young science students before me, looking down a microscope at onion cells and recording my lung function with a spirometer, marked the extent of my 'hands-on' experience.

My week with the diabetes research group was a real eye opener. I was introduced to an operational animal unit and performed several anatomical dissections. I also helped perform *in vivo* studies such as glucose-tolerance tests in mouse models of diabetes, by getting the glucose meter ready and recording results.

This environment was very far removed from biology at school and helped cement my decision to pursue biological science to a high level at A level and then onto a BSc, MRes and PhD at the University of Manchester. Both my MRes and PhD were focused almost entirely on *in vivo* studies within the obesity and diabetes arena. In fact, the glucose tolerance tests I helped conduct at KCL became a common component of my PhD.

Having a deep understanding of scientific theory is important, but real experience with experiments and procedures is the only way to become an effective *in vivo* scientist. Without early exposure to animal-based research, many would-be scientists may never have their passion for *in vivo* science ignited.

There remains a large disconnect between science taught at schools and science conducted at research institutions. Although this separation will always remain, science is best appreciated, like most things, when it is experienced in its true form. What better place to experience hands-on science than in an active laboratory or animal unit. The experiences I had at KCL, although brief, were eye opening and had a profound impact on my continued passion for biological science. I went to KCL enjoying biology, I left KCL loving it.



Elba Feo. Recently started her final year of A levels, Kingsdale Foundation School, London.

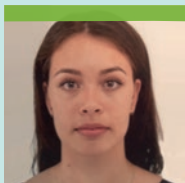
I went to KCL this summer, just after I finished my first year of A levels, to take part in the work experience week run by the Diabetes Research Group.

It was important to me to be able to see what it is actually like to work in science, to ensure that it is what I want to pursue. In school you are often told that studying a science degree and working in science is completely different to what you are taught at school, however, no one ever seems to explain what it is actually like. Having the opportunity to take part in work experience in a research lab was incredible as you got a glimpse into the everyday routines of researchers and what their work truly consists of.

Towards the beginning of the week we were given a tour of the animal department at King's College. Being able to see the department and ask questions about how the animals are kept, what experiments are done to them, and how this research helps the development of new treatments has helped me to understand what animal testing really involves. The experience allowed me to see that I was wrong about how I had imagined the use of animals would be and made me feel much more comfortable with the research that was taking place and the dissection that I was to perform myself later in the week. The ethics discussion that accompanied the tour of the animal department further informed us about how the research that takes place is regulated and controlled, demonstrating that every care is taken to make sure that all the animal testing that is done is necessary, is carried out by trained professionals and is done with the least harm possible to the animals.

One of the things that was so great about the week was that we weren't only learning the theory, but we were also able to carry out the experiments for ourselves. During the week we carried out a dissection on a mouse and removed several of its organs. We then sectioned and stained them to allow us to view them through a microscope. This was unlike anything I had ever done before at school. I found every day to be thrilling as we were always learning something new that just served to further fuel my curiosity and my passion for science.

Not only did my week at King's reaffirm my desire to pursue a career in science but having this hands-on experience in a lab made me so much more excited about biomedical research and has resulted in me deciding that I would like to apply to study biomedical sciences at university.

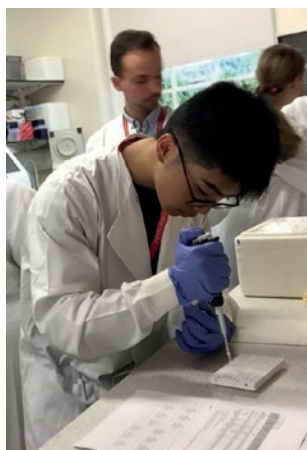


Ella White. Recently started her final year of studying Biomedical Sciences, UCL.

I took part in the work experience week in the Diabetes Department at KCL in 2014, when I had just finished my GCSEs. Having just finished year 11 I knew I liked science but wasn't certain if I was going to pursue it, or sure where this could take me.

The work experience week exposed me to lab work that I'd never seen before, and it enabled me to see a side of a science that was more hands on. This was really important to me because in school the main scientific career I really knew about was medicine, so it really helped me explore different options. It also helped confirm to me that I wanted to do science A levels, which paved the way for me to do Biomedical Sciences at UCL. At the end of my first year I decided to enrol in the pharmacology stream and now that I've finished my second year I came back to the Diabetes Department at King's to do a 6 week *in vivo* summer studentship. I'll be taking a lab project in the final year of my degree and I hope to continue my studies in pharmacology after I graduate.

I am grateful for the opportunity of this hands-on work experience week and would recommend it to other pupils, as it really offers a different perspective on studying science to a higher level.



Conclusion

It is important that work experience is fulfilling to the pupil without being a burden to the employer. We found that taking on a group of pupils in a designated week and involving several members of staff in their supervision works well. Pupils tell us that they enjoy the experience, especially the exposure to *in vivo* work as it introduces elements that

are very different from school. Members of staff enjoy the interaction with the pupils but feel less stressed than a single pupil shadowing them for a week. In the future, we are particularly keen to reach out to pupils without connections in academic science and will continue to foster relations with a variety of schools and utilise social media platforms to enable this.

THE SOCIAL MOBILITY FOUNDATION: '...I FEEL EXCITED TO CONTINUE MY JOURNEY IN SCIENCE AS IT'S NOW LESS DAUNTING.'

The Social Mobility Foundation (SMF) is a charity which aims to make a practical improvement in social mobility for young people from low-income backgrounds. With the help of professionals across 11 different career sectors, we support high-achieving 6th form and undergraduate students who have the academic ability to flourish in the top universities and professions, but who lack the encouragement, confidence and networks to help them get there.

'I am ambitious and hardworking. The only thing that I felt was holding me back in my career and education was a lack of connections. After all in many cases it's more about who you know, instead of what you know. Thanks to the team at the SMF, I have been able to experience things that I could have never experienced without their help. I learnt a lot about what it takes to get my dream job, and came back from my internship more motivated than ever before.'

Year 13 cohort, 2018

'Around a year ago I received my first email from my mentor, Sam... I never felt like a question would be seen as foolish and so felt able to ask questions I would have been too nervous to ask otherwise and that was one of the greatest things about the whole experience – it managed to be formal and informative, but friendly and interesting in equal measure.'

University of Warwick, 2017

Our support

Our free-of-charge Aspiring Professionals Programme (APP) supports students from year 12 and throughout university until they find employment. Our support includes e-mentoring by a professional, tailored skill sessions and career workshops, university application support, and internships with employers.

Ways to get involved

Becoming an SMF mentor is a great way to see our students develop and help them to fulfil their potential. Mentoring takes place via email and is just a 15 – 30 minute commitment every fortnight. It is a crucial part of our programme, giving students key insights into how to get a job like yours. Our 2019 mentoring programme will start in April 2019. If you are interested, you can sign-up at www.socialmobility.org.uk/sign-up-professionals/

Hosting an SMF student on work experience is an invaluable way to help students gain real, first-hand experiences of their chosen career, and begin to build the professional networks they may otherwise struggle to access. SMF work experience takes place after students' first year of sixth form. You or your organisation would host one or more SMF students, usually for one or two weeks during the summer holidays or October half term.

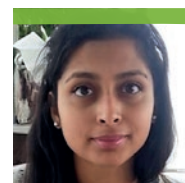
Our reach

In 2018 we supported more than 1,600 year 12 students across the UK, of which 260 were interested in a career in a science-related field. We look forward to working with even more SMF students in the coming year.

Our 2018 results

- We increased the probability of students attending a university most visited by employers by up to 43%
- 96% of employers think the young people they host are the calibre that could be employed in their sector after university
- 90% of students say that they are likely to apply for future opportunities at their internship organisation

If you are interested in supporting the SMF and our ambitious young people, please contact Ayesha Begum at ayesha.begum@socialmobility.org.uk or 0207 183 1189.



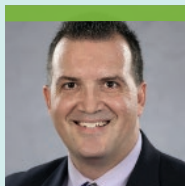
AYESHA BEGUM

Ayesha is the Senior Mentoring Coordinator at the Social Mobility Foundation. She studied Biology and Psychology BSc and has a graduate diploma in Child Development and Educational Psychology. At the SMF, Ayesha has oversight of the mentoring programmes and wider volunteering opportunities across the UK. She is responsible for the development of the programmes nationally, which support 1500+ professional mentors and 1500+ young people yearly, to ensure both mentors and mentees gain the best support during their mentoring relationships.



**S _ C I A L
M O B I L I T Y
F _ U N D A T I O N**

AN UPDATE FROM ONE OF OUR AFFINITY GROUPS



ANASTASIOS LYMPEROPOULOS

Anastasios is an associate professor of pharmacology at Nova Southeastern University in Fort Lauderdale, USA. His main research interests are cardiovascular GPCR physiology/pharmacology and studying cardiac regulation by the autonomic nervous system. He is a Fellow of both the American Heart Association & the European Society of Cardiology and serves on the editorial boards of five peer-reviewed journals.

CARDIOVASCULAR & RESPIRATORY PHARMACOLOGY

The objective of the Cardiovascular & Respiratory Pharmacology Affinity Group is to provide a comprehensive forum for members of the Society with an interest in any aspect of cardiovascular and/or respiratory pharmacology.

This covers all subspecialties of pharmacology, from medicinal chemistry, cellular and molecular, to translational, applied, and clinical pharmacology fields. Those Society members who belong to other Affinity Groups, but have cardiovascular or respiratory interests, are also more than welcome to join our Cardiovascular & Respiratory Pharmacology Affinity Group.

Traditionally, cardiovascular and respiratory pharmacology-related topics have been extensively covered at British Pharmacology Society meetings, with many oral/poster communications and symposia. *Pharmacology 2018* will continue this tradition with the following must-attend events:

- A symposium on “Cardiac non-myocytes; emerging therapeutic targets”, which will discuss exciting new therapeutic targets for cardiac diseases that reside in cardiac cell types other than myocytes that are often overlooked by drug designers/developers.
- A very exciting symposium on “Celebrating the 20-year birthday of the Nobel Prize for NO: the legacy continues”, which, by marking the 20th anniversary of the 1998 Nobel Prize in Medicine going to its discoverers, will discuss the progress, in the two decades elapsed since then, in nitric oxide research. Nitric oxide is a very versatile signaling molecule of great importance for both cardiovascular and respiratory physiology and pharmacology.
- Finally, the symposium on “How to choose the clinical dose: ED50 and the therapeutic window” will discuss some important aspects of cardiovascular pharmacology, such as the dose response conundrum of antihypertensive drugs and a general overview of the clinical dose response.

More current “hot” topics in pharmacology that also affect the cardiovascular and respiratory systems, such as inflammation, drug immunogenicity and biomarkers for translational pharmacology, are also explored in other symposia, aligned with the Integrated Systems Pharmacology Affinity Group (“Experimental models of inflammation in man: Driving drug development” & “Immunogenicity-prediction and control of unwanted immune responses to biological drugs”).

The annual Experimental Biology meeting took place in April 2018 in San Diego, USA and was co-organised by the American Society of Pharmacology and Experimental Therapeutics (ASPET). The British Pharmacological Society had a strong presence there with an exhibitor booth and several networking events. Cardiovascular pharmacology was also very well represented in the meeting’s scientific programme, as it is every year, and I am very pleased to announce that I recently joined the Programme Committee of ASPET’s Cardiovascular Pharmacology Division with a 3-year-long appointment. I intend to take full advantage of my appointments as a member of that Committee and as a co-Chair of the Cardiovascular & Respiratory Pharmacology Affinity Group to try to create joint events related to cardiovascular and respiratory research that will hopefully be co-sponsored by both the American and British pharmacological Societies.

In closing, for those of you that are already members of this Affinity Group, I want to welcome you again to the Cardiovascular & Respiratory Pharmacology Affinity Group. If you are not already a member, I encourage you to sign up on the Society’s website. Dr Baker and I look forward to welcoming you to *Pharmacology 2018* and seeing you in London. Finally, we are always keen to hear your thoughts and ideas about Focused Meetings or events you would like us to organise, and suggestions for symposia we should include in future Society meetings. This is your Affinity Group, join the conversation! Please contact affinitygroups@bps.ac.uk with any suggestions.

THE PAIN DIVIDE: THE NORTH EAST OF ENGLAND IS A HOT SPOT FOR OPIOID PRESCRIPTION POSITIVELY ASSOCIATED WITH PAIN INTENSITY

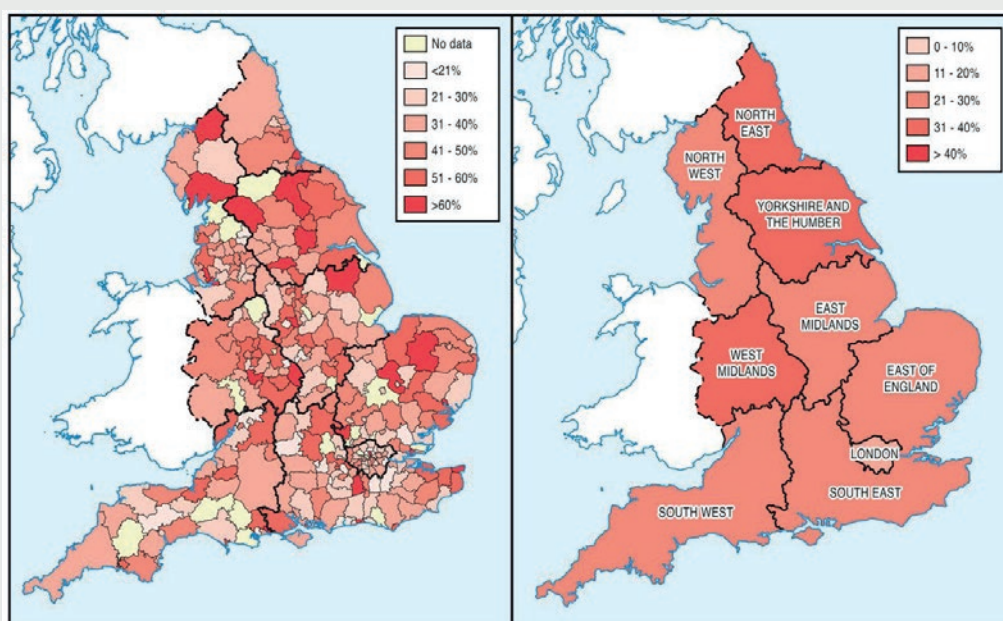


Figure 1. Prevalence of chronic pain by local authority and English region².

Chronic pain is a serious and growing worldwide problem, and the burden it places on our society is increasing. To manage the symptoms associated with chronic pain, there is heavy reliance on the use of opioid analgesics, although there are limited studies to support their long-term effectiveness. In addition, prolonged use of opioids can also have serious and sometimes life-threatening adverse consequences, such as constipation and respiratory failure.

Despite these well-acknowledged negative effects, the prescribing of opioid analgesics continues to increase at a significant and worrying rate. Indeed, figures from the UK show that in 2014 there was around 23 million prescriptions written for opioid analgesics, at a cost of around £322 million. Given this increased use (and the well-established problems associated with efficacy, tolerance, dependence and adverse effects) the inappropriate prescribing – and misuse – of opioid analgesics

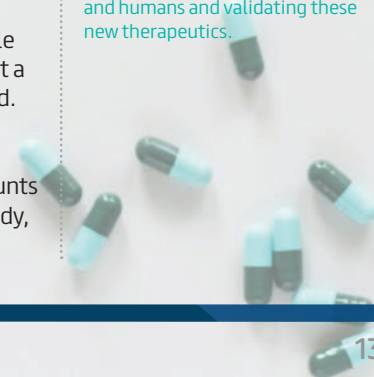
is becoming a significant public health concern¹. This problem is also mirrored in other countries, such as the US, where the death rate from opioid mis-use has, in the last 15 years, quadrupled – giving rise to the so-called ‘opioid epidemic’. Are we in the UK heading the same way? Based on discussions within our Durham University Pain Special Interest Group and a public discussion forum held in 2017 in the North East, funded by a British Pharmacological Society Ambassador grant, the issues of local opioid prescriptions and pain management were highlighted and this study was initiated.

There is significant geographical variation in opioid prescribing in the UK – with more people in the North of England prescribed opioids – at a greater cost – compared to the rest of England. For example, the North of England accounts for approximately 33% of the total costs of analgesics, compared to London, which accounts for around 8%. It was not clear before our study, however, if this variation



PAUL CHAZOT

Paul Chazot is an Associate Professor of Pharmacology in the Department of Biosciences, and Director of Durham Pain Special Interest Group, Durham University UK. He is a Fellow and Ambassador of the British Pharmacological Society, was until recently the President of European Histamine Research Society, Vice Chair of EU COST Action BM0806 and the Associate Director of the Durham Wolfson Institute for Health and Wellbeing, and remains Co-Chair of the NC-IUPHAR subcommittee for Histamine Pharmacology and President of Parkinson's UK Durham Branch. Dr Chazot's research group has worked for the last 20 years in the North East on the identification, characterisation and validation of novel therapeutic strategies and drug targets for the treatment of major chronic central nervous system and metabolic disorders. This work is being translated into new ways to combat neuropathic pain, itch, delirium, dementias, diabetic complications and Parkinson's disease. He is also developing novel objective behavioural tests for studying both animals (mice and drosophila flies) and humans and validating these new therapeutics.



“
It is important that consideration is given to other ways of managing chronic pain, without the use of opioid analgesics.”

was related to inappropriate prescribing or the varying health need of the population (i.e. more people in the North of England have pain, hence the prescribing of opioids is higher). It is well documented, though, that mortality and morbidity rates are higher in the North of England, particularly in the North East region compared to the rest of England: an observation coined the North-South health divide. Given the public health concerns associated with the inappropriate and long-term use of opioid analgesics, it was vitally important then to explore whether the prescribing of opioid analgesics across England reflects inequalities in the health needs of the population or if there is an issue related to inappropriate prescribing or utilisation.

Chronic pain is defined as pain that extends beyond the expected period of healing, usually 3-6 months since onset. We are the first to examine the geographical inequalities in chronic pain prevalence, pain intensity, and opioid utilisation in England. As well as this, we were the first to examine the association between chronic pain prevalence and pain intensity and opioid utilisation. We have identified two key findings that will be of importance to healthcare practitioners and policy makers: (1) there are geographical variations in chronic pain prevalence, pain intensity, and opioid utilisation across the English regions – with evidence of a ‘pain-divide’ with people in the North East of England more likely to have chronic pain; (2) opioid utilisation was significantly, and positively associated with pain intensity. Our paper³ is timely, and shows that, in England, the prescribing of opioid analgesics is largely driven by health need (i.e. pain); thus, to develop strategies going forward, and to avoid a potential ‘opioid epidemic’, it is important that consideration is given to other ways of managing chronic pain, without the use of opioid analgesics. Given our findings, more needs to be done – at a national level – to support prescribers to manage people who have chronic pain, without the need to initiate opioid analgesics, perhaps using more non-pharmacological pain-management strategies².

Another important consideration highlighted by our study is the growing use of gabapentin in the UK. Gabapentin is widely considered to be a non-addictive alternative to opioids for chronic pain prescribed to all age groups. However, it is not only prescribed for pain relief but also offered to treat other conditions such as sleep and affective disorders. As a result, some people are taking opioids for pain relief and gabapentin for other medical conditions⁴.

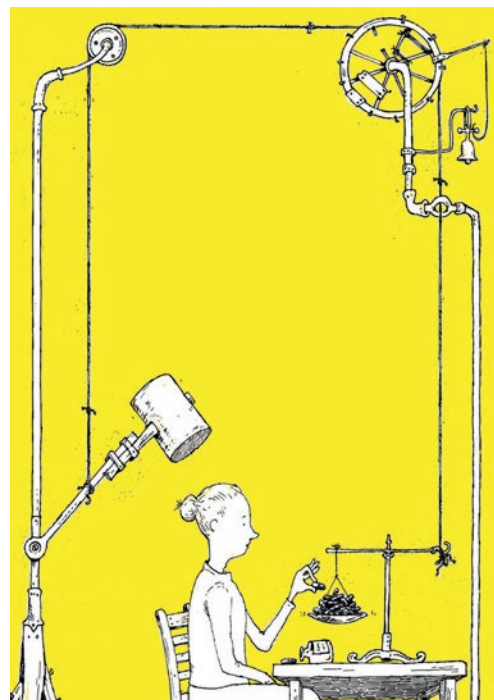


Illustration: David Andrassy

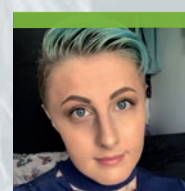
Furthermore, the abuse potential of gabapentin is well documented, as an agent highly sought after for use in potentiating the effects of opioids. Reclassification of gabapentin as a controlled substance and the need for more care in prescribing both gabapentin and opioids together also needs careful consideration going forward.

This study³ from colleagues in Durham and Newcastle Universities and S Tees NHS Foundation Trust is reported by one of the authors, Dr Paul Chazot FBPhS. Please visit the study³ for further information on anything discussed in the article.

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TAKING A LOOK *IN UTERO*: TACKLING CARDIOVASCULAR DISEASE DURING PREGNANCY



KAYLEY SCOTT

Kayley received her BSc in Pharmacology from the University of Glasgow in 2017, followed by an MRes in Translational Medicine in 2018. She is now preparing to undertake a PhD in Cardiovascular Science at the Institute of Cardiovascular and Medical Sciences (ICAMS) within Glasgow University. Kayley's research will focus on understanding the disease mechanisms that underlie hypertensive disease during pregnancy. She trained as a student STEM Ambassador during her undergraduate in 2016 and has since served as a member of the Women in Pharmacology Advisory Group within the Society as well as reporting on various Society sponsored events.

Cardiovascular disease (CVD) has long been recognised as a global health problem, particularly in the UK where its treatment takes up a substantial 17% of the healthcare budget¹. Whilst the incidence of CVD is declining, and treatments continue to improve for a multitude of conditions such as hypertension, heart failure and stroke, the risk of mortality for women of child-bearing age is still rising². Many deaths in this category can be attributed to hypertensive disorders such as pre-eclampsia, eclampsia, gestational hypertension and chronic hypertension that arise during pregnancy as a result of maladapted systems during gestation. Indeed, hypertensive disorders affect up to 10% of all pregnancies³.

Problems during pregnancy

Pre-eclampsia is responsible for an estimated 50,000 maternal and infant deaths each year⁴ by damaging the mother's kidneys, liver and

brain and restricting the growth of the fetus. It is characterised by an elevated blood pressure and proteinuria at 20 weeks of gestation and abnormal remodelling of the placental vasculature (figure 1). Despite its large impact on maternal and infant survival, the causes behind the condition are poorly understood and no effective treatments are available. As with other CVDs, the risk factors for hypertensive disease during pregnancy include obesity, increased age, pre-gestational diabetes, pre-existing hypertension and chronic kidney disease¹¹. The only known treatment for pre-eclampsia is the immediate delivery of the fetus and placenta. Some agents have been approved for the control of blood pressure during pregnancy such as the vasodilators nifedipine and hydralazine, β -blockers such as labetalol and centrally acting agents such as methyldopa. It is important to note that whilst these agents have been approved for the control of the mother's blood pressure in pre-eclampsia they

“ Due to ethical dilemmas, much of the research is reduced to arbitrary clinical observations such as blood pressure ”

are not without risk. Labetalol, for example, should be used with caution due to its effects on both α - and β -adrenoceptors which may cause maternal hypotension and bradycardia leading to a further decrease in uteroplacental perfusion and damage to mother and fetus^{12,13}. Whilst these treatments may lower blood pressure in the mother, they are unable to protect the fetus against pathological damage from other aspects of hypertensive disease.

Where is research going wrong?

Whilst research concerning CVD and pregnancy has progressed somewhat to allow us new insights into the underlying pathology of these conditions, very few researchers have been able to translate these findings into the development of new treatments and preventative strategies that reach clinical practice. Furthermore, despite the large national databases detailing births, hospitalisations and mortalities, which allow us to correlate pregnancies complicated by CVD with future maternal CVD risk, we are still

she stated that “pregnancy is always ethically challenging to be researched in full”. There is often a debate centred around consent when enrolling pregnant women into prospective studies. Whilst many are often happy to take part – their partners may not be, and many studies have found that a common obstacle when recruiting women into pregnancy related studies is gaining the consent of the father (where appropriate)¹⁴. Additionally, studies involving these women are problematic because various procedures and guidelines that may normally be applied (such as when administering medication) are impractical and may pose potential risk to the fetus. Dr Ilidromiti also stated that CVD and pregnancy research is difficult as the “occult during pregnancy is relatively rare”. That is, many of these conditions do not immediately show symptoms that truly reflect their underlying pathology. Though a woman may present with hypertension during gestation, simply measuring her blood pressure does not identify the cause for its elevation.

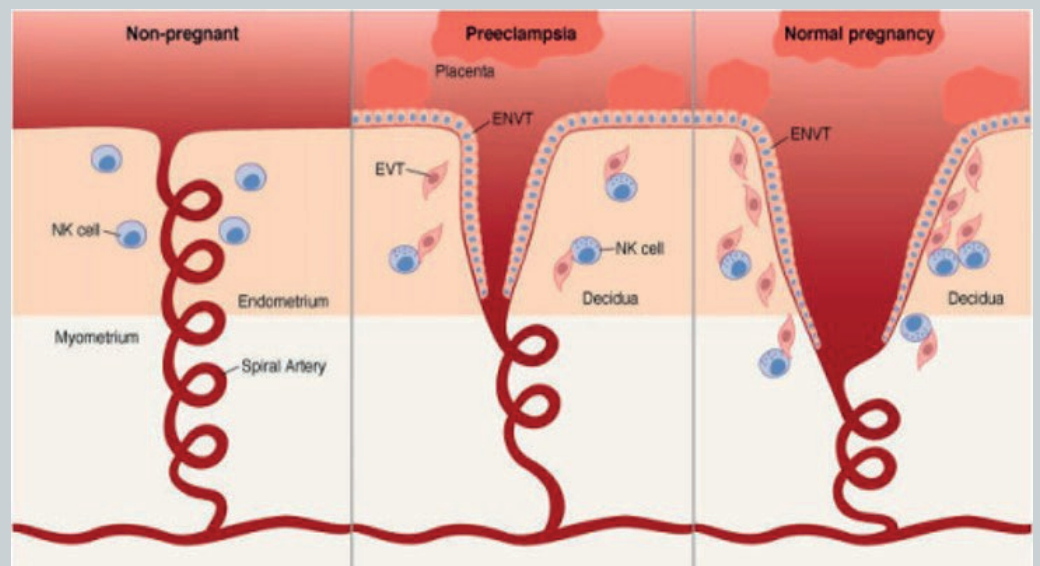


Figure 1. Placental vascular remodelling during pre-eclampsia

unable to identify high-risk women prior to birth and implement preventative measures. Many researchers within this field agree that the issue requires more research efforts. So, since CVD and pregnancy presents such a large problem within healthcare – why does it receive so little attention in the research world?

To understand this problem, I spoke to some researchers working in this field. Many researchers echoed the same thoughts. Speaking to Dr Stamatina Ilidromiti of the University of Glasgow School of Medicine,

There is also a consensus amongst the literature that a major problem within this research area lies in the collection of data. Many studies involving CVD and pregnancy are often small, individual studies where effects are difficult to reproduce. Even in large studies, due to ethical dilemmas, much of the research is reduced to arbitrary clinical observations such as blood pressure, birthweight and gestational age that do not translate into the underlying causes of disease states. These arbitrary observations often differ between groups making it difficult

to collate and compare studies. Furthermore, many of these larger studies are conducted in high-income countries where the most severe pregnancy outcomes are often under-represented due to better obstetric intervention and pre-natal care.

Where do we go from here?

With so many problems involved in this area, how can we possibly hope to further research and tackle this issue? Dr Iliodromiti suggests we make greater efforts to engage the public and help them to better understand the potential long-term consequences of pregnancy complicated by CVD and to focus research efforts towards developing better preventative strategies during pregnancy to delay or prevent long-term outcomes. Many researchers in the field also agree that facilitating more collaboration efforts and committing to sharing data could go a long way in standardising research. Indeed, some groups are already attempting this. The Global Pregnancy Collaboration, supported by the Bill & Melinda Gates Foundation, has created a new database known as COLLECT⁵. COLLECT is a web-based data entry platform where researchers in the field of pregnancy can share their research by completing various standardised forms detailing study design parameters and outcomes.

Many researchers are now trying to find other ways to research CVD and pregnancy by utilising various *in vitro*, *ex vivo* and *in vivo* animal studies. One such researcher is Dr Delyth Graham of the Institute of Cardiovascular and Medical Sciences within the University of Glasgow. Dr Graham's lab have recently characterised the spontaneous hypertensive stroke-prone (SHRSP) rat as a model of chronic hypertension during pregnancy that can be used to mimic super-imposed pre-eclampsia by the administration of angiotensin II (Ang II). The SHRSP rat is naturally hypertensive and by stressing the maternal cardiovascular system in early gestation via mini-pump infusion of Ang II, Dr Graham and her colleagues were able to mimic the elevated blood pressure, impaired uteroplacental function and proteinuria seen in human mothers affected by the condition¹⁵. Using this model, Dr Graham and her colleagues have begun to untangle the underlying pathology of hypertensive diseases in pregnancy and its effects on more than just the vascular system by investigating gene and protein expression through to haemodynamic changes in the whole animal. However, there is still a long way to go. Whilst the use of animal models may aid basic research, as with any animal model it is difficult to translate findings to clinical practice.

What does the future hold?

In short, the path forward is unclear. There has been a great effort to identify targets that can be pharmacologically manipulated during pregnancy to improve maternal and fetal outcomes, particularly those related to placental development. Many have been implicated such as p-glycoprotein⁶ and AMPK⁷, whilst other research groups have found similarities in targets already associated with non-pregnancy related hypertension such as mediators involved in the renin-angiotensin system⁸. Though the administration of pharmacological agents during pregnancy is difficult to study due to ethical concerns and the fear of birth abnormalities (teratogenesis) some studies have found that existing agents may be repurposed for use during pregnancy. One example is pravastatin which has been shown to aid in the control of blood pressure and improve fetal outcomes⁹ in small studies, this raises the question of whether there are other agents that could be safely used in the future. Another example is celastrol, currently indicated for the treatment of obesity and diabetes, interestingly both of which are risk factors for pre-eclamptic pregnancy. In a study by Xiao and colleagues¹⁰, celastrol attenuated symptoms in a rodent model of pre-eclampsia and showed potential therapeutic use.

Whilst there is still a long way to go in understanding hypertensive disease, particularly pre-eclampsia, there is no doubt that strides are being made in pregnancy CVD research and we should continue to push for more research attention in this area.

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VANESSA LOWE

Vanessa completed her undergraduate degree in Cell Biology at the University of Manchester in 2013, and completed her British Heart Foundation-funded PhD with Professor Ian Zachary and Dr Caroline Pellet-Many at UCL in 2017, studying mechanisms of zebrafish heart regeneration. She is now a postdoctoral researcher in the lab of Professor Adrian Hobbs at William Harvey Research Institute, where she is investigating the role of CNP in heart failure.



Iceni is a squad of 23 players, Vanessa wears the the number 89 on her kit. Every star represents a European championship title. Iceni have won the European trophy 7 times in the last 12 years.

FROM THE PETRI DISH TO THE FLYING DISC

I have always loved biology, when I was younger I used to sneak into my big brother's room and steal his 'how my body works' books – a human biology book series for children. I could not yet read, but I was fascinated by what I did understand and so learning to read unlocked a whole new level of admiration for biology.

When working towards my GCSEs, I would design biology revision sessions with my friends. I once turned my house into a giant heart and we were the blood cells going through each chamber. When my energies were not focused on science, they would be fixated on some form for sporting activity, whether netball, athletics, hockey, football (I played for Reading women's FC reserves team), you name the sport, I probably tried it when I was growing up.

It was not until I went to university that I found the sport that has likely hooked me for life. I studied Cell Biology for my undergraduate degree at the University of Manchester, with a year of industrial experience in my third year. When it came to choosing my placement, I had one thing in mind, to get as far away from the rain of Manchester as possible, and I somehow ended up at the University of Nevada, Reno (UNR). Reno? I'd not heard of it either, all I knew was that it was in the USA and that it fulfilled my one and only criteria of escaping Manchester. I moved there along with 11 other undergrads from Manchester, we decided to live together and all became involved in university sports. Personally, I bee-lined for the football team but a few of my flatmates returned from a taster session in Ultimate Frisbee (Ultimate for short) and could not stop talking about this so called 'sport' – I was convinced that a frisbee was for casually throwing around on the beach or to a dog in the park! One day, my flatmates announced that they were heading to Santa Monica for an Ultimate tournament. There was no way I was missing a trip to Santa Monica, so I joined the team and the rest is history! I absolutely loved playing Ultimate. It is a non-contact sport, so there was no threat of being slide-tackled off the pitch like in football! It also

involves a lot of running, which is suited to my energetic nature, and most invitingly, it turned out that I was good at it. I soon ditched football completely and joined the UNR women's Ultimate team, 'Boomtown'. Ultimate teams don't take themselves too seriously and the names of teams could be literally anything.

After my placement, I joined the University of Manchester women's Ultimate team during the final year of my undergraduate degree. I then moved to UCL to do my PhD under the supervision of Dr Caroline Pellet-Many, in the lab of Professor Ian Zachary. My PhD project concentrated on investigating the role of neuropilins in zebrafish heart regeneration following cryoinjury. During this period, I continued to play in the UCL team. London is arguably the hub for Ultimate in the UK and I trialled for and got into a local London-women's team called **Iceni**. Iceni have been the national champions 11 times and have won the European championships 7 times. I joined them in 2013 and experienced my first of many National and European title wins. I am currently the president of the club and in July of this year we came 16th at the World Ultimate Club Championships in Cincinnati, USA. In amongst my frisbee adventures with Iceni, I have played for the GB women's beach team at the World Championships of Beach Ultimate where we won a bronze medal in 2015 in Dubai, and in 2017 in France. The sport has transformed my life, the community is amazing and I have made so many cherished friends through the sport, which happens to also keep you super fit. I would recommend trying it out to anyone, it's a lot of fun, feel free to watch Iceni in action on [this link](#) and find out more about the sport [here!](#)



GB women's beach squad 2017. This is the GB women's beach team that won a bronze medal at the 2017 World Championships of Beach Ultimate in Royan, France 2017.

How does it work?

Ultimate is a non-contact self-refereed game for two teams of seven, played on a field similar in size to a football pitch. The last 18 metres at either end of the field are the "endzones", teams will be attacking opposing endzones and a goal is scored when the disc is caught in the team's respective attacking endzone. Players cannot run with the disc, therefore a team can only move the disc towards the endzone by throwing it from player to player, there are only 10 seconds in which to release the disc once caught. The defending team takes possession if the disc touches the ground, if the disc is held for longer than 10 seconds or if they make an interception by catching the disc. The winner is the first team to reach a previously decided number of goals, usually 13, 15 or 17.



Vanessa Lowe jumping for a disc at Tom's Tourney, Belgium, 2018

ULTIMATE FRISBEE TOURNAMENTS

UKU National Champions

Women's division – Iceni
2013, 2014, 2015, 2016 and 2017

European Championships

Women's division – Iceni

- Champions – Bordeaux 2013
- Champions – Frankfurt 2014
- Champions – Wroclaw 2015
- Bronze – Frankfurt 2016
- Silver – Venice 2017
- Silver – Wroclaw 2018

World Championships Beach Ultimate

GB Women's beach squad

- Bronze – Dubai 2015
- Bronze – Royan 2017

World Ultimate Club Championships

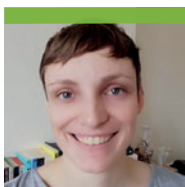
Women's division – Iceni
Ranked 16th in the world – July 2018 – Cincinnati



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PERSPECTIVES ON MENTAL HEALTH: RESEARCH – A CAREER OR A CALLING?



LIZZIE MANN

Lizzie completed her Pharmacology undergraduate degree, including a year's industrial placement, at the University of Bath in 2014. Since then, she has been working on a PhD (including a further industrial placement) at King's College London. Her thesis, now submitted and awaiting viva, focusses on novel pharmaceutical interventions for Parkinson's disease through the use of *in vivo* models and measurements. She's currently tidying up loose ends on her PhD work and looking for a job or post doc in London.



Perception

There is something of a public perception that 'scientist' is more a description of someone's life than a job title. A scientist is someone who wears a lab coat, who may be a little wild in appearance and who spends all of their time alone conducting difficult-to-understand experiments. Sadly, this perception is not solely the domain of 'the public' and, to a certain extent, is perpetuated and encouraged in academic labs.

I remember once being told that if I wasn't thinking about my work all the time – in the shower, on the train, whilst lying in bed – then I wasn't a good scientist. This has really stuck with me and bothered me for years. Is it possible to be a great scientist and also to have a life beyond it? This issue is handled very differently in academia and in industry.

Reality – academia

In academic science, the labs are frequently populated at all hours on any given day. No checks are made as to whether researchers go home at night or take any holiday. In fact, almost the opposite is true: working long hours is seen as a necessity, if not a badge of honour (41% who are employed on a full-time contract reported working over 50 hours a week and 15% in excess of 60 hours per week!). Furthermore, since the output of a lab or a researcher is often judged by their publications, academic research can often seem to reward luck (right project, right time, right place) over hard work or even scientific integrity – an issue worthy of an article in its own right. Because of the short, fixed-term contracts that early career researchers are often forced to take (72% of research staff are in such contracts?), they need to be published in order to gain funding to keep a job or be competitive

in gaining a position elsewhere. And so the academic culture of long hours and competition for funding forms a vicious circle – competition for funding fuels long hours which fuels more competition for funding – perpetuating the belief that scientific research is, and should be, more than just a job.

This is not to say that academic research is all bad. Because the researchers in academia often don't have a singular aim, but rather an area of interest, they have some freedom to pursue observations and ideas along tangents. Such freedom of thought promotes creative thinking and investment within a project, giving rise to a very real air of excitement of discovery when progress is good. Indeed, physical creativity has been shown to improve mental health³. Doubtless, however, this level of emotional and intellectual investment in a project is also bolstered by the need to 'publish or perish'. If the resulting high-pressure environment is causing academia to lose capable researchers and perhaps lose diversity (linked with both creativity and productivity⁴), then there must be a more economic balance to be found between pressure, excitement and stress.

Reality – industry

The career/calling situation is better handled in industry, almost certainly as a direct result of the permanence of staff contracts. Publications are less important and scientific rigour and hard work are prized above positive data.

Here, in my experience, scientists have a more 'normal' work/life balance. Those that I have worked with in industry have core hours and are expected to have left the lab by a certain time. If they have failed to clock out by that point then they are expected to check in with security at regular intervals and report an expected time of departure. They, quite rightly, tend not to reply to emails in the evenings or weekends (and certainly not whilst on leave).

Industrial researchers seem to have a much better handle on keeping science as a job, not a calling, and managing to maintain a separate personal life.

Best practice

Almost all early career researchers seem to have a rocky relationship with their work: sometimes it can seem a long way from any good results, at other times the excitement of discovery can last for weeks. In such a pressured environment it is important to have other interests to tide you over during dry spells.

The belief that research is a calling is detrimental during those inevitable dry periods, and more likely to drive people away. During these times, scientists may begin to doubt their interest or commitment. The perception that the retention of these attributes at all times is necessary to be a scientist might result in the loss of faith in a calling, but not a job. Instead, the maintenance of a more healthy relationship with research, where it can be happily left alone during a holiday or for a weekend of socialising, will keep valuable and skilled researchers in the field for much longer.

To tackle the problem of science being perceived as a calling, it is important to reward realistic qualities which make for great researchers: integrity, tenacity and curiosity. Although academia does encourage these qualities they may be overshadowed by the need for data. Of course, implementing such a sea change in attitude would require the cooperation of funding bodies and journals, which would take many years to effect.

In the shorter term, moving to a system with more reviews of the wellbeing of students and staff – with checks made on weekend working and holiday taken – would be a step towards improving the lives of academic researchers and making the mindset of science as a calling obsolete.

“
Is it possible
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PERSPECTIVES ON MENTAL HEALTH:

THE TALE OF THE ACADEMIC BLACK DOG

Image by Quintin Gellar



EDWARD WICKSTEAD
Queen Mary University of London, UK

Ted is a neuroscience PhD student studying at Queen Mary University of London and the University of Westminster. His research focuses on the role of inflammation in neurodegenerative disease. He has a BSc from King's College London, which included a year studying at the National University of Singapore. He is a STEM ambassador, local group representative for the British Neuroscience Association (BNA), alongside being a blogger, writer and advocate for mental health awareness.

The idea that mental health issues are increasingly common amongst university students compared to the general public has gained traction in recent years. For example, in 2017 the All Party Parliamentary Group of Students found that 69% of students have felt depressed within an academic year¹ – a percentage almost three times higher than that reported for the elderly².

The identification of this problem has led to the much-needed development of support systems for students whilst they are studying towards furthering their promising careers. However, psychological distress is intensifying at a much deeper level within our university culture, with the urgency to find a solution continuing to grow.

I am talking about the academics – the pillars of higher education. Yet, despite their obvious essentiality to students' success, they are often overlooked by the people they teach. Compared to their students, research into the poor mental health of academics has received little attention, despite its clear importance. Because of this, some academics may feel that depression, or the "black dog" – a term used by Winston Churchill to describe his own struggles – is unshakeable. However, as with anyone suffering from mental illness, understanding that you are not alone can provide a form of release from some of the distress you may be feeling.

Acknowledge the Academic

During my undergraduate degree, I inevitably looked towards my lecturers as a source of extensive knowledge. I was always fascinated by their research and scientific interests. Yet, I never considered the amount of stress that they were likely under, and the personal impact associated with this. In many scenarios, the increasing workload of academics, alongside the lack of job security and the increasing demand to publish, has led to many academics suffering with some form of mental health disorder. A 2017 survey published in the EMS Community Medical journal highlights this, wherein it was identified that 43% of academics (including senior lecturers) exhibited symptoms of at least a mild mental health disorder³. This is nearly twice the level of prevalence in comparison to the general population.

An Australian study further validates this finding, supporting that the rate of mental illness amongst academic staff was up to four times higher than the general public⁴.

Suffering with mental health difficulties will predictably hinder professional performance. Nevertheless, the support options available for academics remains rather limited. Many universities offer mental health services, but these are primarily aimed at students. Some options are available, such as the ability to see an occupational nurse, but information regarding these services are often obscure, and difficult to find.

The Stigma Survives

In 2014 a survey was carried out to determine the attitudes and experiences of students and staff surrounding mental health difficulties, which included the completion of a "Stigma scale". The study highlighted that "silence" surrounding mental health problems permeates throughout the university culture, impacting on help seeking behaviours alongside the support and recovery of affected individuals⁵. It is not surprising then, that only 6.7% of academic staff in the United Kingdom have ever opened up about a mental health condition⁶.

The Guardian online have a blog entitled Academics Anonymous, whereby academics can discuss work difficulties without disclosing their identity. One such post in 2015 suggested that HR departments within many universities remain unsympathetic and often fail to recognise a mental health disorder as a legitimate illness⁷.

Overworked and Underpaid

Clearly more needs to be done to support our academics. Structural changes are desperately needed to address many of the factors associated with poor mental health, such as job security, pay and work load. Unfortunately, these changes are unlikely to happen quickly. Financial pressures are likely to take a large responsibility, and this proverbial belt will continue to tighten over the next few years following the withdrawal of the United Kingdom from the European Union.

The high costs of education put many institutions under extraordinary pressure to satisfy students and their parents with educational excellence, with this putting further stress on academics. In one example

from 2017, some "overworked" lecturers at Queen Mary University London were caught sleeping in their offices overnight⁸, highlighting the often insurmountable workload that academics are expected to complete.



Image by the World Health Organization/YouTube

Supportive Strategies

Like the work currently used to support the wellbeing of students, academics need more information surrounding mental health to help change their attitudes towards seeking support. One study highlights the benefit of exercise, wherein academics who took part in 150 minutes of moderate to vigorous exercise per week, were more likely to report lower levels of distress⁵. Thus, the encouragement to develop and participate in physical activity options for staff, such as free exercise facilities and subsidised cycle to work schemes may provide some benefit.

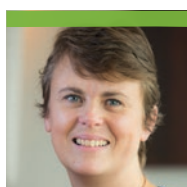
Regardless of the strategies selected, we all need to be aware of the non-selective nature of mental illness. It affects men and women from all backgrounds, in all professions, and at all stages of life. We need to understand this, before working together to provide strength and support when it comes to fighting back against mental illness.

For students, I have previously written an article on the society's blog talking about my personal experience of [battling with mental illness whilst completing my PhD](#).

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DEVELOPING RESEARCHERS FOR THE FUTURE



SARA SHINTON

Sara is a leading UK researcher developer with expertise in supporting researcher development from PhD to Professor; leadership in the academic environment and training in large, multinational collaborative research networks. After many years of consultancy, working with universities and organisations across Europe, in January 2017 she joined the University of Edinburgh as Head of Researcher Development.

“ Academic researchers are a mobile population and are likely to move institutions through their early careers. ”

Ensuring that researchers develop personally and professionally is an important responsibility for universities. The increased focus on the individual alongside the research project influences funding models¹, highlights diverse career paths and supports recent developments² to address equality and diversity issues.

Career trajectories of researchers are more diverse than many believe, particularly researchers themselves. The academic sector is perhaps unusual in its determination to equip its research staff and students with skills that will support transitions into a wide variety of career paths.

These skills are delivered through a range of approaches, and the most visible of those approaches is a programme of workshops available throughout the year. Institution-wide programmes focus on generic skills including writing, presentations, project management and personal effectiveness, but may be complemented by tailored events designed and delivered in partnership with academic schools or research centres. National programmes are rarer, but include public engagement training (such as that organised by the Royal Society³), the GRADschool career development programme for PhDs⁴ from Vitae (the national researcher development organisation) and training workshops at research conferences.

Drivers for skill development

The emergence of the Researcher Development Programme has been shaped by a number of national and international drivers. In 2004 the first analysis of doctoral graduate destinations quantified the transferability of the PhD beyond the ivory tower when it reported that more than

50% of UK PhD graduates left the education sector on completion⁵. This report was one of a number of initiatives linked to the 2002 Roberts' Review⁶, led by Sir Gareth Roberts, which looked in to the supply of people with science and engineering skills.

The Review included a recommendation that PhD programmes include transferable skills development and was instrumental in establishing researcher development roles in most institutions. Academic researchers are a mobile population and are likely to move institutions through their early careers.

There is also an equality issue as it is important that the choice of institution shouldn't limit opportunities for professional development. Research funders were instrumental in embedding consistency through the publication of their Joint Skills Statement⁷ in 2001. This has developed into the far more comprehensive Researcher Development Framework which articulates the knowledge, behaviours and attributes of successful researchers and encourages them to realise their potential (see Figure 1).

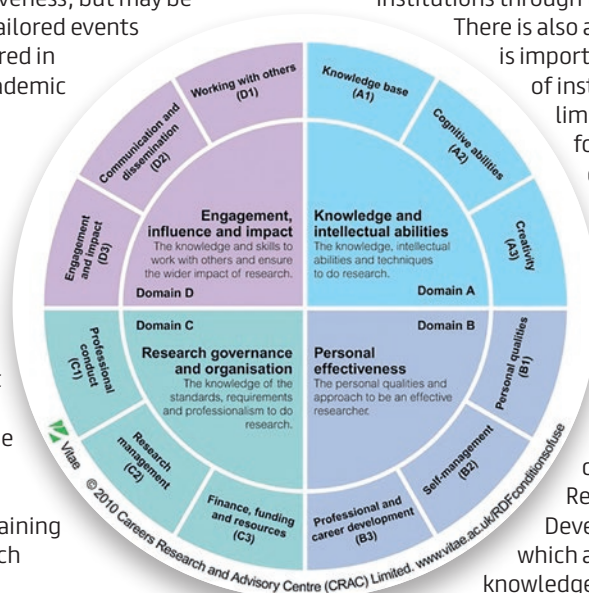


Figure 1. The Researcher Development Framework (RDF)

Roberts also noted that the disconnect between doctoral training and future employers outside academia needed to be addressed. Funders and institutions responded in a variety of ways and investment in doctoral training is now increasingly channeled through centres and

partnerships. These have a variety of names – Centres of Doctoral Training, Doctoral Training Partnerships and Innovative Training Networks are all examples of this cohort approach. PhD students from these programmes are trained in specific research areas and often receive substantial additional training, such as the mini-MBA completed by doctoral students in the Centre of Doctoral Training in Soft Matter and Functional Interfaces⁹. Although these opportunities are generally only open to students enrolled on these programmes, they drive institutions to innovate and enhance their provision for all researchers, so the training programme in your institution is likely to include workshops on project, time and people management.

What's on offer?

Each institution takes an approach which complements its structure and researcher population but there are common features of development programmes. There may be central programmes, open to all research staff and students and tailored to their career stage and the demands of their roles. Alongside this may be locally delivered courses run through departments, centres or institutes which support specific career paths or develop specific research skills.

There are also examples of collaboration in researcher development, including the 2018 Ingenious Women Scotland⁹ programme funded by the Scottish Government through their Can Do fund. This built on the successful Ingenious Women programme run by The University of Edinburgh since 2012 and extended it to all women in STEM in Scotland, through partnership with the University of Glasgow. Ingenious Women is one of those experiences that is difficult to explain without sounding like a cult! Although delivered by experienced facilitators, much of the value came from the network formed. Through conversations and group work linked to the core themes of creativity, cash and control, the women on the programme were able to discuss a much broader range of topics and work collaboratively on solutions. The group encouraged each other to be ambitious and take on new challenges, whilst sharing advice and “trade secrets” that had helped them succeed. Figure 2 provides an insight into the programme and summarises the group's advice on time management.

You can get a sense of what is likely to be on offer by looking at the range of skills in the Researcher Development Framework (RDF) in Figure 1. Training workshops in university



programmes are usually mapped against the RDF to help researchers navigate and prioritise their training needs. At the University of Edinburgh, hundreds of workshops are run each year across all the domains of the RDF, but our writing suite is particularly extensive. Box 1 outlines some of the writing courses available to PhD students, with additional online resources to support researchers unable to attend workshops.

Researcher development training gives all attendees equal access to insights and skills that will help them succeed. It doesn't rely on supervisors devoting time and having interest in wider career development, nor on access to networks or conferences to hear expert voices. Researchers who attend meet their peers from across the institution and can speak freely about the demands and set-backs of research. They have access to experts, often from outside the institution, who can provide fresh perspectives and ideas.

Alongside the face-to-face workshop programmes, universities are increasingly moving material and training online to support more flexible delivery. At Edinburgh we also have an Academic Development Action Fund¹⁰ which supports researchers who want to design their own training and development opportunities, new networks and events. This provides the added opportunity of starting to build a funding track record as the skills required to conceive, write and deliver an Action Fund project can be transferred to a research proposal. We have funded researchers to run interdisciplinary networking events, set up mentoring programmes, cover the costs of international visitors and complement our training programmes with specific courses on creativity.

Figure 2. Ingenious Women's advice on time management created by Vanessa Randle, www.thinkingvisually.com

The Writing Process: Getting Started

Text: Coherence, Structure and Argumentation

Effective Writing: Grammar

Writing a Literature Review

Writing Well: Language and Style

How to be Your Own Best Editor

Writing for Publication

Writing Abstracts

Writing Clinic

Beating Writers Block

Is my Writing Academic Enough?

This is what I do... and this is why it matters

An Introduction to Copyright and Publishing

Box 1. The writing suite of training for PhD researchers at The University of Edinburgh

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Challenges

Although those of us working in this area are proud of how effectively we've established and embedded programmes since the Roberts' Review, there are still far too many researchers who aren't engaging with development. Despite the availability of data on PhD destinations and clear messages about how few tenured positions¹¹ are available, most research students still expect to progress into academic careers. The language used to describe other careers (alternative, non-academic) means that the sense that these are second rate options has persisted, so researcher developers are often active in advocating the value of a PhD outside academia to address the misconception that it is of purely academic worth.

Another challenge is the persistence of inequality in academia. Senior positions and grant awards go predominantly to men, even in subjects where women outnumber men at PhD level^{12,13}. Researcher developers can play a role in addressing this inequality through programmes which target underrepresented groups and give them additional skills and networks. Whilst these programmes can have substantial impact for individuals they act as a deficit model in development. We are trying to "fix the minorities" rather than looking critically at the system which discriminates against them.

Happily, scrutiny is now turning to research culture. In August 2018, the Engineering and Physical Sciences Research Council announced £5.5 million in funding for projects to address equality, diversity and inclusion². All of these projects include substantial research elements and from early 2019 we will be gathering empirical data and using social science methods to understand academic cultures and environments. The Edinburgh-led project, called "Growing The Big Grant Club" focuses on the leadership of "big grants" and will turn understanding into interventions to use at the pinch points in a career when women and other minorities seem to be particularly disadvantaged. Our findings will be shared across the sector and through partnerships with professional bodies and networks including the Knowledge Transfer Partnership, more widely.

Final comments

Researcher development goes far beyond workshops in project management or thesis writing. Researcher Developers welcome and create opportunities to work in partnership with researchers, to help them thrive in their current environment and any in which they aspire to work. If you've never engaged with the training on offer before start by looking for "researcher development" on your institution's website. If the provision overwhelms you, start by thinking about the challenges of research and whether training in writing, project management or presentation skills could help you to be more effective in your role, using your annual review as an opportunity to discuss this with a supervisor or manager. If your institution is a subscriber (most are) you can also look at the wealth of information on the Vitae website (www.vitae.ac.uk/spotlight/developing-as-a-researcher) or start reading the skills and career development sections of sites like Science, Nature and jobs.ac.uk. If your career takes you away from academia you are unlikely to have access to the same training and development opportunities, so make the most of them and talk to your researcher developers about what we can do to help further.

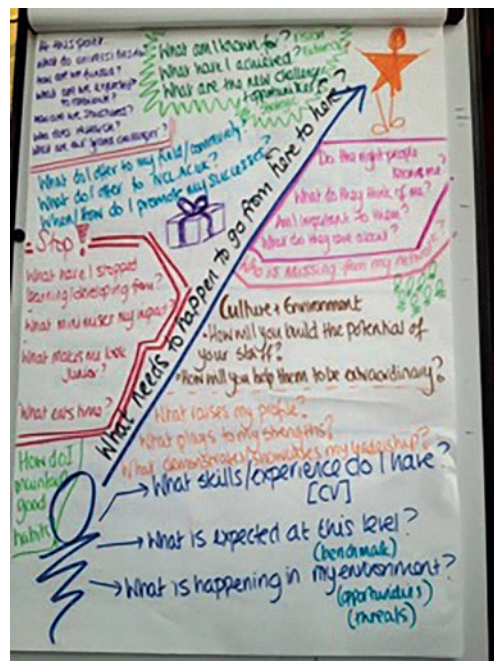
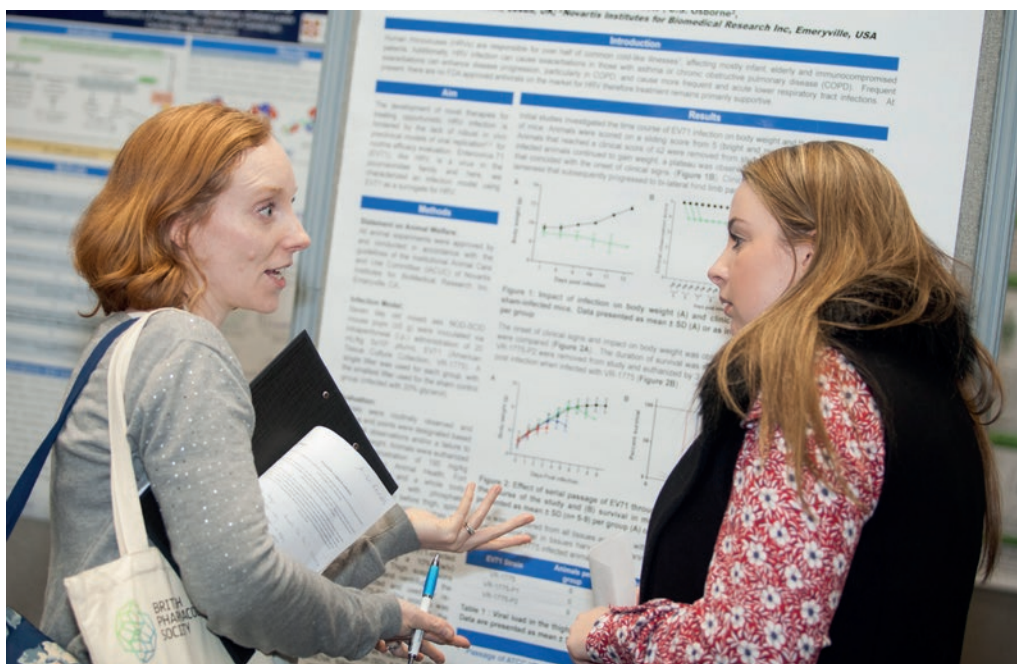


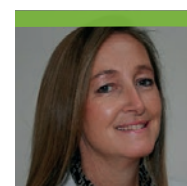
Figure 3. Career development in academia in a nutshell. This flipchart summarises the various exercises and discussions from a workshop to help new research leaders create a ten year career plan. (Workshop lead: Sara Shinton).

AN UPDATE FROM OUR MEETINGS TEAM



NIALL HYLAND

Niall was appointed Lecturer in Pharmacology in the School of Medicine at University College Cork in 2008, and is now Senior Lecturer in the Department of Physiology. He also holds a Faculty position at the APC Microbiome Institute where his research focuses on the microbiota-gut-brain axis. Niall has a PhD in Pharmacology from King's College London and trained in both the USA and Canada. He is Co-chair of the Society's Integrated Systems Pharmacology Affinity Group and on the Editorial Board of the *British Journal of Pharmacology*. He also contributes to the activities of the European Society of Neurogastroenterology and Motility and The American Gastroenterological Association Institute Council.



FIONA MARSHALL

Fiona Marshall is the Chief Scientific officer and a founder of Heptares Therapeutics – a drug discovery and development biotechnology company. She is also Executive VP and CSO of Sosei Group which acquired Heptares in 2015. Fiona has a BSc in biochemistry from Bath University and a PhD in neuroscience from Cambridge University. She has more than 25 years' experience in drug discovery including senior positions at GSK and Millennium. Fiona is recognised for her expertise in the field of G protein-coupled receptors (GPCRs) and has published extensively in this area. Fiona is on the Board of Trustees of Alzheimer's Research UK, the council of the Academy of Medical sciences and on advisory boards of the Crick Institute and the Wellcome Trust. She is chair of the MRC DPFS committee. She won the 2012 WISE Women of Outstanding Achievement for Innovation and Entrepreneurship and the 2015 RSC Malcolm Campbell Award for chemistry.

WHAT'S NEW FOR 2018 AT THE SOCIETY'S ANNUAL MEETING?

Regular attendees of the British Pharmacological Society's annual conference, *Pharmacology*, will notice some changes this year as the Meetings Committee have been looking for ways to innovate and to expand the event. As the meeting has grown over the years, the Society has always strived to keep up with trends in science and in modern conferencing and this year will see some exciting developments.

New programme developments

2018 sees the introduction of a keynote speaker to kick off the conference on day one. Following his exceptional presentation at the 2017 event, Mene Pangalos, Executive Vice President of AstraZeneca's Innovative Medicines and Early Development Biotech Unit will be looking at the current science and the business landscape.

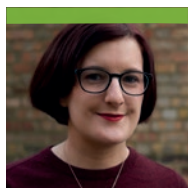
Further to this, you will spot more commissioned content in the programme as the Committee

have invited leaders in their fields to speak on a diverse range of subjects during the three-day programme. You can expect a jam-packed week full of the core content you would expect, plus themes and formats that are new to the Society including a debate, demonstration sessions and a special closing plenary on artificial intelligence delivered by representatives from BenevolentAI, Ex Scientia and Microsoft research.

Technology takes a step up

The need to make sure all of our information is up to date whilst trying to reduce waste has led to further investment in the conference app. Due to be launched a month before the meeting, you will be able to plan your day, mark posters and exhibitors to visit, take notes and even ask questions or provide feedback through the app. It will be available on your phone or desktop and is absolutely free.

Another reason to download the app is to access



LINDSAY MCCLLENAGHAN

Lindsay joined the British Pharmacological Society in January 2018 following five years organising conferences and exhibitions at the British Society for Rheumatology. Prior to that, Lindsay organised awards shows, networking events and meetings for a publishing company, working with a range of association and corporate clients. Lindsay studied Events and Cultural management at the University of Ulster and spent the first few years of her career working in venues and at sporting events before moving to London. Her role at the Society is to oversee the events team and to deliver the Society's meetings strategy.

the click game which replaces the traditional treasure hunt. Attendees can snap photos of their favourite posters, speakers and tourist attractions to gather points and win prizes.

Focusing on abstracts

Those of you who have already submitted an abstract for *Pharmacology 2018* will already be aware that the top submissions will be published in the Society's journals BJP and BJCP. We received over 100 more abstracts than in previous years and so have extended the lunch breaks to allow for more time to visit all of the additional posters and presentations.

Networking

One of the key reasons to attend *Pharmacology 2018* is the opportunity to meet with old colleagues and meet new collaborators. With this in mind, we have cut the costs of the welcome reception on day one to encourage everyone to join the Society's staff and trustees in a toast to the start of another successful event. Tickets for this event are now only £5.



To find out more about the programme highlights, visit the Society's blog where President, Professor Steve Hill and Vice President of Meetings, Dr Niall Hyland are sharing what they are most looking forward to this year.

Pharmacology 2018 takes place between 18-20 December 2018 at the QEii Centre, London. Undergraduate students can attend for free.

Visit www.bps.ac.uk/pharmacology-2018 to register.

BRITISH PHARMACOLOGICAL SOCIETY'S PRESIDENT'S LECTURE 2018

Lindsay McClenaghan and Dr Fiona Marshall

Dr Fiona Marshall delivered the Society's annual President's Lecture this June, sharing a review of her 25-year career including time spent at GlaxoSmithKline and more recently at Heptares working on G protein-coupled receptors (GPCRs).

Dr Marshall was selected by Professor Steve Hill, President of the Society as she is respected for her expertise in the field of GPCRs and has published extensively in this area.

"I was delighted when President Steve Hill invited me to give his annual lecture. I was able to give a history of GPCR drug discovery as it progressed through the molecular era of cloning and de-orphaning receptors to more recent developments in structural biology."

Feedback from the event has been immensely positive with attendees remarking on how interesting it was to learn how early discoveries in receptor

systems came about, including the discovery of the RAMP proteins, which have led to new drugs for migraines, and the identification of the free fatty acid receptors which continues to provide fascinating new insights around host/microbiome interactions.

Dr Marshall's presentation outlined a history of remarkable discoveries with a personal touch.

"I have had the opportunity to work with so many talented researchers both within Industry as well as partners in academia and it was a fantastic opportunity to recognise their contributions".

Since being invited to present the President's Lecture, Dr Marshall has also been awarded the Society's Vane Medal and the AstraZeneca Prize for Women in Pharmacology. She will be presenting her work at the Society's annual meeting, *Pharmacology 2018*, and at Life Sciences 2019 – a collaboration between the British Pharmacological Society, the Physiological Society and the Biochemical Society.





BRITISH PHARMACOLOGICAL SOCIETY AND THE EUROPEAN LABORATORY RESEARCH & INNOVATION GROUP: DRIVING SYNERGIES BETWEEN ACADEMIA AND THE DRUG DISCOVERY INDUSTRY

The British Pharmacological Society and the European Laboratory Research & Innovation Group (ELRIG) are once again joining forces to share knowledge and initiate collaborations through our annual session-sharing partnership. Both of our organisations have delivered/will be delivering a session at each other's annual conferences to demonstrate the synergy between academic and industrial drug discovery.

Delivered by speakers from world-class academic institutions and biopharmaceutical organisations, the sessions will highlight the different approaches to science taken by each sector and how these complement each other to drive drug discovery innovation.

The British Pharmacological Society's Drug Discovery Affinity Group co-chairs, Dr Sarah Nickolls (GSK) and Professor David Kendall (Pharmnovo) lead the Society's session at ELRIG's annual conference, Drug Discovery (9-10 October, London) while Mr Stephen Rees, Vice President of Discovery Biology at AstraZeneca, and ELRIG Chairman will be chairing the ELRIG session during *Pharmacology 2018*, taking place in December.

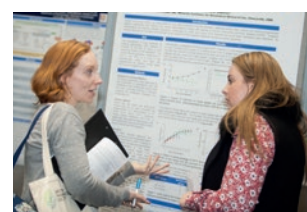
"The two meetings are complementary, with *Pharmacology 2018* naturally taking a more academic approach, whereas *Drug Discovery 2018* has a more industrial focus," says Professor Steve Hill, President of the British Pharmacological Society.

"As such, presentations at *Pharmacology 2018* event will offer in-depth knowledge of academic and clinical pharmacology, with attendees having the chance to hear from renowned scholars."

"During the *Drug Discovery 2018* conference, we will provide participants with leading-edge information on the most recent scientific breakthroughs helping to understand disease biology and identify novel chemical and biological candidate drugs,"* remarks Mr Rees *"our aspiration for this collaboration is to deliver a more blended learning experience through our flagship *Drug Discovery 2018* conference and the Society's *Pharmacology 2018* meeting. By marrying the skills and capabilities of academia and industry at the two events, we hope to facilitate the translation of new drug targets and disease indications into therapeutic value, ultimately helping to deliver the medicines of the future."

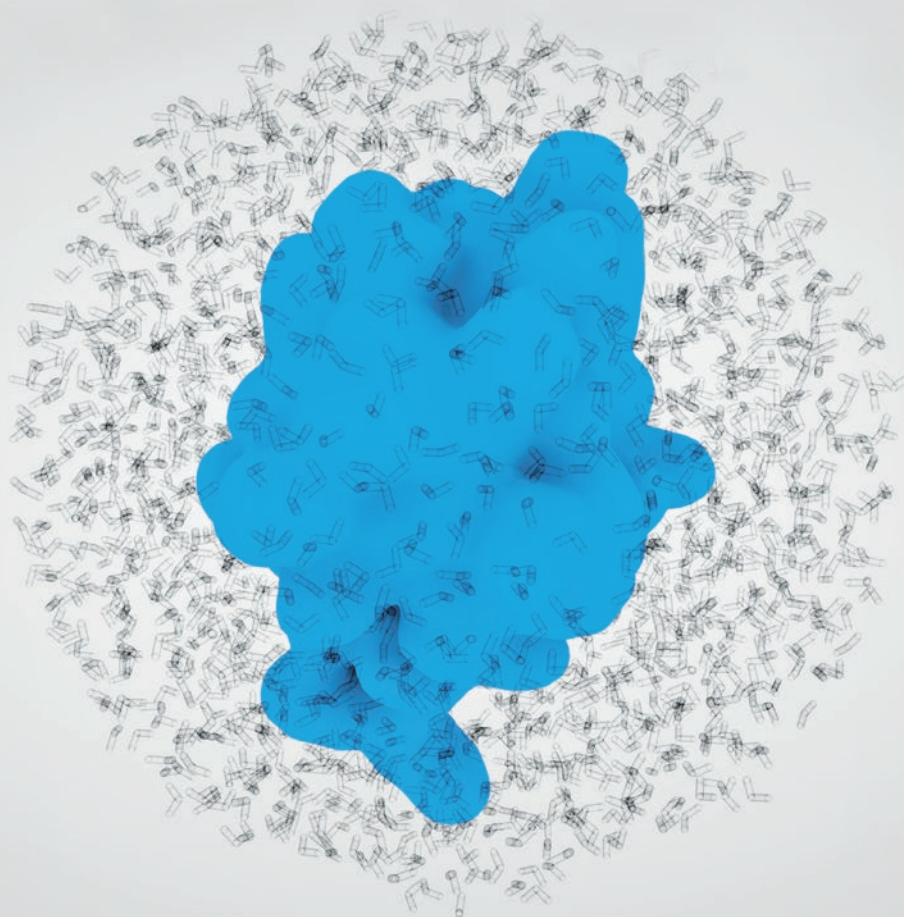
By taking an interdisciplinary approach to drug discovery and academic pharmacology, we aim to give researchers across both specialisms a valuable exchange of high-quality scientific knowledge.

Register to attend *Pharmacology 2018* by visiting www.bps.ac.uk/pharmacology-2018



Life Sciences 2019: A key meeting about post-translational modifications (PTMs) in biological processes

The **Physiological Society**, the **British Pharmacological Society** and **Biochemical Society** are joining forces to bring you the latest research and discuss important challenges.



Life Sciences 2019:
Post-Translational Modifications
and Cell Signalling

17-18 March 2019
East Midlands Conference Centre,
Nottingham, UK

Submit your abstract by 21 January 2019: bit.ly/lS19abstract

