PHARMACOLOGY MATTERS

BPS BRITISH PHARMACOLOGICAL SOCIETY
Today's science, tomorrow's medicines

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Editorial

Firstly, I should like to introduce myself to you as your new Editor-in-Chief, having just taken over the reigns from Tim Atkinson. I want to thank Tim for all his hard work and wish him continued success. I am very much looking forward to working with the editorial board and team members at the Schild Plot to drive *Pharmacology Matters* forward.

Pharmacologists from all over the world will be getting together to innovate, translate and transfer their knowledge on the hottest topics in pharmacology at the IUPHAR 2014 World Congress in Cape Town. More about this and other international events that the BPS attends and organizes are discussed by BPS's Chief Executive, Jono Brüün, on p4.

In this issue we bring together pharmacologists from across the globe (e.g. from: Mexico - p8; Nigeria - p11 and Turkey - p13) to reflect not only the broad range of disciplines under the pharmacology umbrella, but also the wealth of knowledge and diversity of members from BPS and other pharmacological societies from across the globe.

Claudia Pisanu elegantly describes and discusses bipolar disease, which currently affects 2% of the general public and carries a high risk of suicide, and the role of pharmacogenomics of mood stabilizers (p6).

All your meeting questions are answered on p16. Alongside this, there is also a breakdown of the emerging identities of the society's membership (p21), and the Young Pharmacologists activities can be caught up with, by reading Maria Fernandes' update on p18.

One area that touches all the disciplines within pharmacology is mathematics. Jenny Koenig discusses whether current changes and reforms in school maths and science qualifications will have an impact on undergraduate bioscience degrees, such as pharmacology (p19).

Finally, I should personally like to encourage you all to share comments, suggestions and feedback on this issue and future issues, or BPS as a whole. There are a variety of different ways to have your voice heard: from e-mail and phone, to LinkedIn, Twitter and Facebook.

Best wishes and enjoy!

Felicity

Felicity N. E. Gavins
Editor-in-Chief
Pharmacology Matters

Contents

Cover credit: iStock

Your BPS

Jono Brüün
BPS Chief Executive

At a time when pharmacologists and clinical pharmacologists from every corner of the globe are coming together in Cape Town for the IUPHAR 2014 World Congress, it's great to see this edition of *Pharmacology Matters* highlighting the best of our discipline from around the world.

BPS is British in name, but international in scope – we are privileged to have members from over 60 countries – so we are delighted to be attending the Congress with so many of our officers, members and staff. The meeting gives us an unrivalled opportunity to meet with other pharmacological societies, and with individuals who share our interests and concerns. Over the past few years, initial discussions with many of those organizations, including the Chinese Pharmacological Society (CPHARS) and the American Society of Pharmacology and Experimental Therapeutics (ASPET), have turned into tangible joint activities with clear and valuable results.

So, for all those reading this edition of *Pharmacology Matters* in Cape Town – please do introduce yourselves to the officers and staff who will be industriously stewarding the BPS stands – 87 & 89 – it would be great to meet you.

In addition to the World Congress, BPS now has a regular presence at meetings across the world. We reach into Europe (engaging enthusiastically with our European counterparts at EPHAR and EACPT congresses), into China (where we held a joint meeting with the CPHARS in 2013), into Australasia (hosting a joint meeting with the Australasian Society of Clinical and Experimental Pharmacologists and Toxicologists in Hong Kong in May 2015) and into the United States, where we are now a regular fixture at both the Experimental Biology and Society for Neuroscience meetings. This international presence is good for the Society, and I believe it's good for pharmacology as a whole, because it encourages our members, many of whom will receive bursaries, grants and speaking opportunities at these meetings, to engage with other internationally-recognized scientists, to network and share their work on a global scale. This is one of the most important ways in which BPS can deliver its core mission statement: to promote and advance pharmacology and clinical pharmacology.

BPS is a regular exhibitor at Experimental Biology

Meet the Editor session with *PR&P* Editor-in-Chief Dr Mike Curtis

I was in San Diego at the end of April for this year's Experimental Biology congress. The meeting was a terrific success, and is a credit to its key organizing Societies, including our American partners ASPET.

BPS, represented by Professor Graeme Henderson, Vice President – Publications, Dr Mike Curtis, Editor-in-Chief of *Pharmacology Research & Perspectives (PRP)*, myself, and Katharine Richardson, BPS Head of Communications and Membership, used our presence to promote the Society and its journals. By taking a stand in the exhibition hall, organising a mixer to celebrate *BJP, BJCP and PR&P,* and holding meetings with other international societies, we tried to ensure BPS had a high profile among the meeting's delegates.

We were also indebted to Elizabeth Whelan, representing the Society's publisher Wiley, who supported us with great energy and enthusiasm throughout our many journal-related activities over the course of the conference. Elizabeth even proved herself a dab-hand at tending the bar during our 'Meet the *PRP* Editor' session, which included a few 'refreshments' to pull in the crowds – as if the promise of a chat with Mike Curtis wasn't enough!

It was fascinating and rewarding to see the esteem with which our journals are held by scientists (not just pharmacologists!) from around the world, including the *Concise Guide to PHARMACOLOGY*, which forms a part of our ongoing work with IUPHAR and is published as part of *BJP*. It's clear that the journals are the channels through which BPS can interact with parts of the world that might otherwise be tough for us to reach, and I think BPS will endeavour to be ever more 'joined up' in our international activities in future, as we seek to deliver our mission, grow the Society and support our journals on an international scale.

I hope you enjoy this edition of *Pharmacology Matters*.

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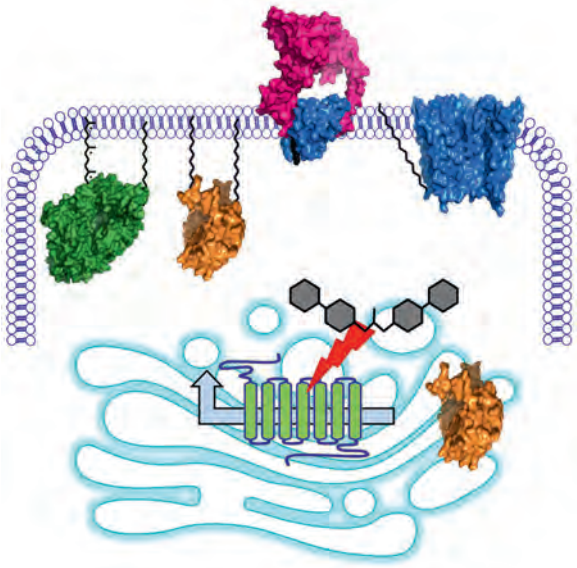

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Overview:

Acylation represents a major post-translational mechanism that controls a wide diversity of cellular processes ranging from control of translation to protein assembly, trafficking and regulation by other signalling pathways. The meeting will focus on the mechanisms, regulation, functional role and diseases associated with acylation and explore chemical biology and therapeutic approaches to target these pathways.

Topics:

* Enzymatic control of acylation * Acylation and disease * Therapeutics
* Cell biology and physiology of acylation * Exploring acylation with chemical biology

Reviews by the speakers, based on their presentations at this major international meeting, will be published exclusively in *Biochemical Society Transactions* (due to be published in April 2015).

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Biochemical Society TRANSACTIONS

Pharmacogenomics of mood stabilizers in bipolar disorder

Claudia Pisanu
University of Cagliari

Bipolar disorder (BD) is a severe life-long multi-factorial disease characterized by the recurrence of depressive and manic or hypomanic episodes, with a prevalence of 2% in the general population and a high risk of suicide. The treatment of choice is represented by mood stabilizers such as lithium salts and the anticonvulsants valproate, carbamazepine and lamotrigine. Among mood stabilizers, lithium is the mainstay therapy for BD as it is effective in preventing recurrences and reducing suicide risk[1]. However, only 30% of BD patients show a complete response. Pharmacogenetics is a powerful instrument to understand the molecular mechanisms through which mood stabilizers exert their therapeutic effect and to identify molecular markers to predict clinical response.

Pharmacogenetics of lithium response

Most pharmacogenetic studies in BD have focused on lithium. Indeed, lithium response is considered to be familial and seems to be associated with a family history of BD, suggesting that genetic factors could contribute to the variable response to this drug. Moreover, excellent responders are considered to be the 'classic' phenotype of BD, as they share clinical characteristics such as episodic course, family history of BD and few psychiatric comorbidities. For these reasons, lithium responders represent a more narrowly defined phenotype for pharmacogenetic studies.

In their first years, pharmacogenetic studies on lithium response have focused on candidate genes. Among the most interesting results, the Val66Met (rs6265) functional polymorphism of the brain-derived neurotrophic factor (BDNF) gene was associated with lithium response in a Caucasian population and the result has been replicated[2], even if other studies did not support this finding. The same SNP has been associated with lithium response in a recent study with Chinese BD patients. However, it should be noted that significant ethnic differences in rs6265 allele frequencies have been described: the Met allele is rare in Caucasian populations (HapMap reported frequency: 0.19) and much more frequent in Asian populations (0.37–0.61). Although further studies are needed to confirm this finding, the hypothesis of an association between BDNF and lithium response is particularly interesting in light of the suggestion that lithium regulate genes implicated in neuroprotection and inhibition of apoptosis. A review by de Sousa and colleagues[2] has shown that plasma BDNF levels are significantly increased after 28 days of lithium treatment. Moreover, in a recent study conducted on human neuroblastoma SH-SY5Y cell lines, lithium and valproate were able to revert glutamate-induced neurotoxicity by increasing BDNF messenger RNA (mRNA) expression[3].

Since BD is associated with disturbances of circadian rhythm, such as abnormalities of sleep/wake cycles, other studies have focused on polymorphisms of circadian clock genes. The single nucleotide polymorphism (SNP) rs2071427 of the nuclear receptor subfamily 1, group D, member 1 (NR1D1) gene was nominally associated with good response and showed significant additive effect with rs6438552 of glycogen synthase kinase-3 beta (GSK3B)

Lithium is the mainstay therapy for bipolar disorder

in predicting lithium response. GSK3B is a key component in numerous signalling pathways and it has been suggested that lithium could modulate the circadian system through inhibition of this enzyme. The role of circadian system is also supported by a recent study showing association between lithium response and two genes of the circadian system: aryl hydrocarbon receptor nuclear translocator-like (ARNTL) and timeless circadian clock (TIM)[4].

While candidate genes studies explore hypotheses based on a priori knowledge, genome wide association studies (GWAS) investigate DNA markers across the whole genome. In a recent GWAS with a cohort of 204 Italian patients characterized for lithium response, the strongest association was shown for a SNP of the amiloride-sensitive cation channel 1 neuronal (ACCN1) gene, encoding for a channel with affinity for sodium and permeable to lithium[5]. Since it is plausible that lithium exerts its therapeutic effect acting on multiple targets, GWAS represent promising tools to discover molecular markers of lithium response. However, these studies require a great sample size to obtain sufficient statistical power. In order to facilitate powerful research of lithium response, the International Consortium of Lithium Genetics (ConLiGen) was founded. This international project aims to support high-quality research, with groups work together in order to collect large cohorts of patients characterized for lithium response using the 'Retrospective Criteria of Long-Term Treatment Response in Research Subjects with Bipolar Disorder' scale[6].

Collaborative efforts like ConLiGen really seem to have the potential to improve our understanding of the genetic bases of lithium response.

Pharmacogenetics of other mood stabilizers

Few pharmacogenetic studies have focused on other mood stabilizers. It is worth mentioning that response to valproate was associated to the G allele of the functional polymorphism –116C/G of the X-box binding protein 1 (XBP1) gene in a small sample of 51 Korean BD patients[7]. XBP1 has a crucial role in endoplasmic reticulum-stress (ER) response and the G allele of this SNP is associated with reduced transcription activity compared with the C allele. studies showed that valproate was able to increase XBP1 mRNA levels compared to lithium and carbamazepine. Valproate was shown to induce expression of activating transcription factor 6 (ATF6), the gene upstream of XBP1, thus improving ER-stress response. An association of XBP1 gene with BD had been previously reported and –116C/G was shown to be more common in Japanese BD patients with an odds ratio of 4.6[8], although this result was not replicated in probands of European origin from the National Institutes of Health Genetics Initiative[9]. This finding could be explained by different allele frequencies of –116C/G between European and Japanese populations[7]. Interestingly, the C allele of the same SNP was associated with lithium efficacy in a Japanese population of BD patients[2], suggesting that response to mood stabilizers could be influenced by different genetic assets. Up to datepharmacogenetic studies on mood stabilizers have been mostly conducted on underpowered samples. However, interesting results could emerge from a new prospective trial aiming to identify genetic variants associated with response to mood stabilizers in a sample of 700 BD patients treated with lithium or valproate[10].

Conclusion

Pharmacogenomics of mood stabilizers in BD has produced promising evidence towards the involvement of specific genes in predicting response to these drugs. However, to date no biomarker shows sufficient sensitivity and specificity. Future studies will have to collect larger samples and use a common definition of clinical response in order to be able to compare genetic findings. In this sense, collaborative efforts like ConLiGen could make an important step in this growing field of research. Significant evidence supports the hypothesis that mood stabilizers exert their therapeutic effect by acting on multiple pathways. For these reasons, it is not probable that single genes could be reliable marker of response to these drugs. In the future, high throughput studies may create panels of genetic markers of mood stabilizers response. In order to identify reliable markers of drug response, these data will have to be integrated with clinical information. At this moment, pharmacogenomics of mood stabilizers in BD still has important steps to make in order to gain a pivotal role in clinical decisions.

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About the author

Claudia is a resident intern in Medical Pharmacology at the University of Cagliari, Italy. She graduated in 2011 in Medicine and Surgery and started working in the laboratory of Pharmacogenomics, Department of Biomedical Sciences, in 2012, under the direction of Professor Maria Del Zompo. Her field of research comprises bipolar disorder, migraine, pharmacogenomics and personalized medicine. She is particularly interested in bioinformatics and would like to specialize in combining experimental and computational approaches to analyze molecular data and translate them into instruments useful in the clinical setting.

A bird's eye view of Mexican pharmacology

Carlos M. Villalón
Cinvestav-IPN

Enrique Hong
Cinvestav-IPN

Pioneers of Mexican pharmacology

Pharmacological work started in Mexico long before the so-called "developed countries" regarded pharmacology as a scientific discipline. Indeed, during the pre-Hispanic era (i.e. many years before the 16th century) ethnic groups such as the Mexicas, Mayas, Purépechas, Nahuas, Zapotecs and many others already used some traditional autochthonous plants with specific therapeutic purposes. A few examples include *Mentha* piperita (for gastrointestinal illnesses) and *Bougainvillea glabra* (for respiratory diseases). This activity was described in diverse Indian codices, which were translated by notable Mexican researchers such as de la Cruz[1] and del Pozo[2].

However, the first institution devoted to study Mexican medicinal plants was the National Medical Institute, founded in 1888 at the suggestion of the Chamber of Deputies (our equivalent of the British House of Commons), with Dr Eduardo Liceaga appointed as its first director.

Contemporary pharmacology

The contemporary Mexican pharmacology started flourishing with the foundation of the Mexican Society for Physiological Sciences in 1957, under the presidency of Professor Arturo Rosenblueth, a renowned physiologist. Incidentally, Professor Rosenblueth founded our postgraduate institution in 1962, Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional (from now on abbreviated as Cinvestav-IPN) in Mexico City. Meanwhile, two prominent pharmacologists established outstanding pharmacology research groups in Mexico:Professors Rafael Méndez (from Lorca, Spain) and Efraín G. Pardo (from Michoacán, Mexico).

Professor Rafael Méndez was the Head of the Pharmacology Department at Loyola's University in Chicago (USA) when he was invited by Professor Ignacio Chávez (a notable Mexican cardiologist) to found in 1946 the Pharmacology Department at the National Institute of Cardiology. Professor Méndez published many papers on cardiovascular pharmacology, including the mechanism of action of digitalis derivatives. His most prominent disciples were Drs Emilio Kabela and Gustavo Pastelin.

Professor Efraín G. Pardo spent a short stay (1954) at the University of Ann Arbor in Michigan (USA) under the guidance of Professor Maurice H. Seevers. Then, he was appointed Head of the Pharmacology Department at the Faculty of Medicine of Universidad Nacional Autónoma de México in 1955. He created a very productive pharmacological research programme, which attracted many students. In 1961 he was appointed Director-General of the Miles Institute for Experimental Therapeutics (a private company), and many of his associates and students followed him to complete their pharmacological training. This Institute became the best place for pharmacological research in Mexico for 20 years. During this period (1962–1982): (i) Rodríguez et al.[5] discovered zolertine, an alpha-adrenoceptor antagonist with antihypertensive properties; (ii) Hong et al. [4] described quipazine, the first synthetic agonist for serotonin (5-hydroxytryptamine; 5-HT) receptors, orally bioavailable and capable of crossing the blood-brain barrier; and (iii) Hong et al. [3] identified indorenate (TR3369) as the first selective 5-HT1A receptor agonist with central antihypertensive properties.

Professor Pardo was succeeded by Dr Roberto Vargas in 1970

Mexico City has held several joint pharmacology meetings with many international Societies

The Angel of Independence, Mexico City

and, later, by Professor Julián E. Villarreal in 1978 as General-Director of the Miles Institute, with Dr Horacio Vidrio appointed as research director and Dr Enrique Hong as cardiovascular pharmacology director.

The first attempt to initiate a postgraduate institution for pharmacologists in Mexico

Antonio Morales-Aguilera initiated his pharmacological research within the group of Professor Méndez. Then he went to the University of Cincinnati (USA) where he obtained his PhD in pharmacology, and to the University of Oxford during 1963–1965, under the guidance of Professor E. M. Vaughan Williams. When he came back to Mexico, he established the Department of Pharmacology at the University of San Luis Potosí in 1968. Most importantly, in 1971 he founded our Department of Pharmacology and Toxicology in Cinvestav-IPN. This was (and still is!) the first and only Mexican institution exclusively focused on MSc and PhD programmes in many scientific disciplines, including pharmacology and toxicology.

Between 1972 and 1974, Drs Pablo Rudomín, Joaquín Remolina and Carlos Méndez (all physiologists) as well as Dr Pedro Lehmann (an organic chemist) joined the recently-founded department as academic staff members. During this period, the number of postgraduate students increased to 31. The first students to obtain the MSc and PhD degrees in pharmacology were, respectively, José Juan Segura Luna (1976) and Amparo Leal de Carrera (1977).

Professor Morales-Aguilera was succeeded by Professor Julian E. Villarreal as Department Head in 1982. This action was simultaneous with the dissolution of the Miles Institute and with the incorporation of its full scientific and technical personnel to the Department of Pharmacology and Toxicology of Cinvestav-IPN. Professor Enrique Hong also started the Section of Experimental Therapeutics in the department.

In 1990, Professor Villarreal was appointed Director of Medicaments of the Secretary of Health (our equivalent of the FDA in the USA) and Professor Hong became our pharmacology department Head in Cinvestav-IPN. Since then, many students have obtained their MSc and PhD degrees in this department. It is worth noting that the first student that obtained his PhD degree in pharmacology under the guidance of Professor Hong was Carlos M. Villalón in 1988. Immediately afterwards, he spent four years at the Department of Pharmacology of Erasmus Universiteit Rotterdam (The Netherlands) as a postdoctoral fellow, collaborating with Professor Pramod R. Saxena. In 1992, he joined our Department of Pharmacology at Cinvestav-IPN and in 1998 was promoted to full professor. He has been a visiting professor at several prestigious institutions, such as University College London, collaborating with Professor Andy Ramage. In addition to his international reputation, Professor Villalón has been highly productive in terms of both publications and the guidance of MSc and PhD students, particularly in the field of cardiovascular pharmacology of 5-HT and other biogenic monoamines. Thus far, he is the full professor with the highest rank in our department and the only one that has been in the editorial board of the *British Journal of Pharmacology* (2000–2003) *and Pharmacology & Therapeutics* (2005–2010), amongst others.

By the mid 1990s, our Department of Pharmacology and Toxicology at Cinvestav-IPN was one of the largest in Latin America and, undoubtedly, the largest and most productive in Mexico. However, for logistical (and other) reasons, it was difficult to manage since we were actually two main groups distributed in two different buildings (i.e. the South and North premises), separated by 30 km with the heavy traffic of Mexico City. Thus, a pragmatic solution was to split the department into three, maintaining one Department of Pharmacobiology in the South of Mexico City and two sections in the North (the pharmacology and toxicology sections that have now become independent departments).

The Department of Pharmacobiology inaugurated new facilities in 1999 and is now regarded as the South Campus of Cinvestav-IPN. Presently, this department has 18 academic staff members (ranging from associate to full professors) distributed in five main research lines, namely, neuropharmacology, psychopharmacology, autonomic and cardiovascular pharmacology, molecular pharmacology and experimental therapeutics. We are proud to state without doubt that, thus far, Cinvestav-IPN is the institution that has awarded the highest number of MSc and PhD degrees in pharmacology in Mexico. Many of them have travelled abroad as postdoctoral fellows whose research quality has been systematically recognized.

The foundation of the Mexican Association of Pharmacology and its international interactions

The Mexican Association of Pharmacology (Asociación Mexicana de Farmacología; AMEFAR) was founded in 1966, with Dr Antonio Morales-Aguilera as President. AMEFAR met together with the Mexican Society for Physiological Sciences until 1971, when AMEFAR was mature enough to organize its own independent annual meetings. The first AMEFAR meeting was held in 1971, with Dr Enrique Hong as President.

Several meetings have been held jointly with different overseas societies. For example, we have had in Mexico: (i) the Fall Meeting of the American Society for Pharmacology and Experimental Therapeutics in1966; (ii) the Western Pharmacology Society Meetings on several occasions (in 1982 with Professor Thomas F. Burks as president; in 1991 with Professor Enrique Hong as president and, since then, a joint meeting every four or five years with a Mexican president; in 2009 with Professor Carlos M. Villalón as president); and (iii) the 5th IUPHAR Satellite Meeting on Serotonin, organized by Professor Villalón in 2002.

We would like to conclude by emphasising, overall, that the main goal of pharmacology is to improve therapeutic treatment and/or well being of people. Therefore, according to Martín de la Cruz [1], the ancient Aztecs and other Mexican ethnic groups behaved as reasonable pharmacologists.

The first and only Mexican institution exclusively focused on MSc and PhD programmes in many scientific disciplines

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About the authors

Enrique received his medical degree from the National Autonomous University of Mexico (UNAM) in 1960 and was awarded his PhD in 1984. He has been President of Mexican Association of Pharmacology, Western Pharmacology Society and Society of Arterial Hypertension of Mexico. Enrique is a member of the National System of Research (level III) since 1984 and Emeritus Investigator since 2000. He was awarded the National Award of Sciences and Arts, modality of Technology and Design in 1987 and the Martín de la Cruz Award from the National Council of Health (Mexico) in 1996.

Carlos received his Bachelor's degree in Pharmacy and Chemistry from the Escuela Nacional de Ciencias Biológicas del I.P.N. (Mexico City, 1983). Then, he enrolled as a postgraduate student at the Department of Pharmacobiology of the Centro de Investigación y de Estudios Avanzados del I.P.N. (Cinvestav-IPN, Mexico City), where he obtained the MSc degree in 1986 and the PhD degree in 1988. Subsequently, he spent four years as a postdoctoral research fellow at the Department of Pharmacology of Erasmus Universiteit Rotterdam (The Netherlands), collaborating with Professor Pramod R. Saxena. In 1992, he joined the Department of Pharmacobiology of Cinvestav-IPN, where he quickly developed a productive laboratory, and has a well earned international reputation for his work on cardiovascular pharmacology of CGRP, serotonin and other biogenic monoamines. He was promoted to full professor in 1998. Outside academia, and in a more personal context, Carlos is "addicted" to exercise, music, travelling, meeting people from different cultures, dining-out and… why not… his work!

Clinical pharmacology in Nigeria: the Benin City experience

Ambrose O Isah
University of Benin

Abimbola Olowofela
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There has been a steady growth of Clinical Pharmacology and Therapeutics (CPT) as a medical specialiy in Nigeria since the mid 1960s, since its establishment at the University of Ibadan. While the number of tertiary institutions grew exponentially, the same did not apply for CPT due to the dearth of clinical pharmacologists in the country. In fact, by 1990 there were about 15 trained clinical pharmacologists in Nigeria. We will, in this article, address the development and growth of CPT at the University of Benin, Benin City and its affiliate teaching hospital.

Benin City

Benin is a cosmopolitan city of about two million inhabitants located in Southern Nigeria, 300km from the commercial city of Lagos. University of Benin is one of the country's first generation of universities and the teaching hospital is a 730-bed facility (with an additional 70 beds in its satellites) handling over 200,000 patients annually. Personnel include 753 doctors, residents and consultants), 762 nurses and 70 pharmacists. This provides a milieu for intense clinical and pharmaceutical activities. There are currently four clinical pharmacologists, one of whom is solely involved in geriatric care.

Historical perspective

CPT is a medical speciality and was accorded due recognition in the university/teaching hospital in 1989 with the appointment into the Department of Medicine of a Lecturer (AOI) with postgraduate training in Internal Medicine and CPT (at the Wolfson Unit of Clinical Pharmacology University of Newcastle Upon Tyne). The appointment was coupled with a consultant position at the University of Benin Teaching Hospital (UBTH), which enabled in-depth access to patient care and pharmaceutical facilities in the hospital. In 1996 the hospital authorities established CPT as one of the subspecialty units in Internal Medicine.

Scope of Services provided

Educational - Teaching and Training

Initially, core CPT lectures were incorporated into the lecture series for clinical students and to create awareness amongst consultant colleagues, resident doctors, pharmacists and nurses on the need for rational pharmacotherapy. Medical students have been exposed to bedside teaching of rational pharmacotherapy, bringing home the need and approach to individual patient monitoring considering the various elements and tools. Over the years, effort has been directed at gaining curricular space to extend the scope of CPT for undergraduate medical students and postgraduate residents.

Much effort has been made regarding rational prescribing. Recently, practical prescription writing sessions have been introduced at both undergraduate and postgraduate levels. The majority of students have participated with enthusiasm and found the exercises very useful. The CPT unit in University of Benin Teaching

Benin's Zonal Pharmacovigilance Centre covers the six southern states of Nigeria

Hospital is now an accredited training centre for resident doctors of both the National Postgraduate Medical College as well as the West African College of Physicians (WACP), where it constitutes one of the subspecialties in the Faculty of Internal Medicine.

Continuing Professional Development (Continuing Medical Education) has been an important issue that has engaged the unit. An Update Course has started in collaboration with the Postgraduate Colleges and its first course (2013) held in Benin City was well attended by participants from all over the country. The CPT unit was recently involved in a WACP-Royal College of Physicians (RCP) programme on Acute Medicine. The RCP team led by Dr Fraz Mir stimulated interest in the concept of emergency care as practiced in the UK.

Clinical (Hospital) services

At its inception the CPT unit played a significant role in the institutionalisation of the essential medicines concept in the hospital and was pivotal to the implementation of the Essential Medicines Programme. Subsequently, this led to the preliminary work on the promotion of rational use of medicines. Areas of irrational use of medicines were identified and related to the reference values of the WHO drug use indicators developed for the setting to ascertain the appropriateness of use of medicines

The CPT unit was also able to work with the hospital authorities in various aspects of pharmaceutical care. In this regard the CPT functioned actively in the Drug Revolving Fund (DRF) charged with procuring safe and cost-effective medicines as well as maintaining the viability and sustainability of the fund. As a result, appropriate medicines were both available and affordable. The Drug and Therapeutics committee was a subcommittee of the DRF committee. However, there is a move to make it independent to avoid conflict of interest, which was noted in the course of deliberations of the main DRF committee.

Pharmacovigilance

In 1990, preliminary work on collection of adverse drug reaction in the hospital was stepped up, culminating in the setting up of a reporting scheme. This was followed by the establishment of the Adverse Drug Reaction registry and Drug Poisons Information Centre. The setting up of a yellow card reporting scheme was brought into the national domain, resulting in the establishment of the National Pharmacovigilance Centre and the admission of Nigeria into the WHO International Drug Monitoring Scheme in 2004 as its 74th member. The CPT unit has served as a resource to the Centre with AOI chairing the National Drug Safety Advisory Committee (NDSAC). The UBTH upgraded the registry to a Pharmacovigilance Centre in 1997 and recently has been designate as the Zonal Pharmacovigilance Centre covering the six southern states of Nigeria. The CPT unit also runs a weekly Adverse Drug Reaction Clinic.

Other clinical services

The CPT unit is very active in all clinical activities in the teaching hospital and in particular the Department of Medicine with 120-beds across four wards. Participation in out-patient and emergency care of patients provides a platform for managing cases of poisonings, adverse drug reactions, medication errors, drug-drug reactions etc. The CPT unit also runs a Hypertension Clinic. Other clinical/academic activities include the daily chart reviews, weekly clinical meetings, seminars and a journal club.

Research

Areas of research interest include pharmacovigilance of widely used medicines: antihypertensives, antimalarials, drug utilization, and, notably, rational use of medicines. The unit has also been involved in clinical trials, notably of antihypertensive medicines. Of interest is the recent work to promote participatory management of hypertension with patients. The team has addressed the need for in-depth patient involvement in hypertension care and has developed a blood pressure recording card as a tool to facilitate this.

Challenges

There has been some challenges to the growth of CPT. It is regarded as an elite discipline that is demanding – in terms of both time and resources – and reserved for outstanding students. There has been some measure of success achieved with students, resident doctors and authorities regarding their awareness and understanding of the potential role of a clinical pharmacologist in academia, hospital services, pharmaceutical industry, regulatory agencies, government, etc. This effort has to be pursued more vigorously.

Other issues of concern include the difficulty of institutionalising a culture of reporting of adverse drug reactions amongst healthcare providers and ensuring the use of the newly developed standard treatment guidelines to promote rational therapy.

Future plans

The need for the CPT unit to become an independent department working in collaboration with the Department of Medicine is under consideration, along with the provision of a minimum of two weeks in the curriculum to enable exposure of clinical students to bedside/practical training of CPT. There are plans to establish a well-equipped laboratory to ensure effective operation of the therapeutic drug monitoring services as well as pharmacokinetic studies to provide more information on the effects of medicines in the vast population of black Nigerian Africans. There is also a plan to equip a clinical laboratory to enhance the pharmacodynamics studies with a view to better understand the actions of drugs in our population.

Overall, CPT has reinforced the concept of rational pharmacotherapy in this emerging country setting. Treatment of diseases cannot and should not be arbitrary but based on a sound understanding of medicines, the modalities of their use, the skills set to use them, and knowledge of the consequences of use and misuse and how to manage them.

About the authors

Ambrose and Abimbola are both based at the Clinical Pharmacology and Therapeutics Unit at the University of Benin Teaching Hospital. Abimbola graduated from the University of Benin Medical School in 2002 and continued her postgraduate specialty training in Internal Medicine (sub specialty-Clinical Pharmacology and Therapeutics) at the University of Benin Teaching Hospital and became a Fellow of both the West African College of Physicians and the National Postgraduate Medical College of Nigeria in 2011. She heads up the South-South Zonal Pharmacovigilance Centre domiciled in the University of Benin Teaching Hospital. Ambrose graduated from the University of Ibadan Medical School in 1979 and continued his postgraduate training in Clinical Pharmacology and Therapeutics at the Wolfson Unit of Clinical Pharmacology at Newcastle University obtaining his doctorate degree (MD) in 1995. Ambrose is the current President (Nigerian Chapter) of the International Network on the Rational Use of Drugs (INRUD) and he has played a key role in the establishment of the Pharmacovigilance system in Nigeria. He is the current Chairman of the National Drug Safety Advisory Committee as well as the National Essential Medicines List/Drug Formulary Committee. He also serves as a member of the WHO Expert Panel.

Pharmacology in Turkey: Impact of the Turkish Pharmacological Society

Öner Süzer
President, Turkish Pharmacological Society

The Turkish Pharmacological Society (TPS) has recently prepared a book entitled *Turkish History of Pharmacology* by authors Mehmet Melli, Cagfer Guler and Yilmaz Kurt due to be published soon. Therefore we have had the chance to review many relevant documents and information on the history of pharmacology in our country. I will give an overview and present my ideas on our current position. The authors of the book classified the pharmacology of Turkey into four periods. Although discussed in the book, I will not focus on pharmacology history before Republic of Turkey, i.e. the Ottoman Empire period.

Akil Muhtar Özden (1923–1946)

Professor Akil Muhtar Özden is considered the founder of pharmacology in Turkey. Before him, pharmacology was not a separate discipline, but simply formed a part of internal medicine. He graduated from the Geneva Faculty of Medicine. He started a rational approach to pharmacology research and wrote 244 books, most of them about general medicine, but also 24 books about pharmacology. He was also the founder of Therapy Clinics at the Istanbul University Faculty of Medicine – the only medical school in Turkey at that time. Although schools of pharmacy and dentistry were opened in that period, there were no separate pharmacology departments. One of the important developments during this period was the first publication of the Turkish Pharmacopeaia.

Professor Akil Muhtar Özden (1877–1949)

Professor Alaeddin Akcasu (1921–2013)

Accumulation (1946–1960)

After Akil Muhtar Özden retired a new University Act was passed and Ankara University was founded in 1946. These were the most important events for the start of a new era of pharmacology in Turkey. At that time the universities became autonomous bodies and Ankara, the capital city of Turkish Republic began playing an important role in academic life. There was another change that saw an increase of German researchers taking science roles in Ankara. Before and during the Second World War many scientists came to Turkey as refugees from Germany. One of them was Paul Pulewka, who worked in the Department of Pharmacology in Ankara University and had an important impact on the development of pharmacology. At that time, the Sanitation Institute of State was founded and the interaction between universities and state was stimulated in terms of pharmacology. Aegean University was founded in İzmir, the third largest city in Turkey, in 1955 and also became another centre for pharmacology. During this time pharmacology Professors Alaeddin Akcasu, Sükrü Kaymakcalan, Kazim Turker, S. Oguz Kayaalp, Hikmet Koyuncuoglu and Burhan Kiran were set to become the major influencers of the next era and a separate institute of pharmacology was founded at Faculty of Veterinary Medicine at Ankara University.

Breakthroughs (1960–1981)

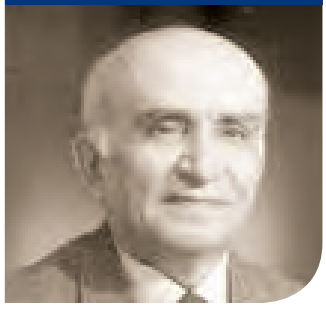
The University Act was modified after the military coup in 1960. During these breakthrough years, numbers of faculties and departments of pharmacology increased, leading to the foundation of the TPS in 1966. However, some founders of the TPS were not yet pharmacologists. The first national pharmacological congress was held in 1973. During this period the TPS organized 22 national pharmacological congresses and delegate numbers regularly exceeded 400. Pharmacy and dentistry schools became faculties with separate departments of pharmacology. The number of scientific papers about pharmacology increased enormously and pharmacologists started to play more and more important roles in scientific areas. Until that time, pharmacology was conducted by medical doctors with a special interest orby veterinarians with PhDs in pharmacology. Pharmacists began completing PhD degrees in pharmacology towards the end of the 1960s in Turkey; they were followed by medical doctors, and later by individuals from other disciplines like chemistry and biology.

Maturity (1981–present)

The foundation of the Turkish Higher Education Council saw further modifications to the University Act, which played an important role for the start of this era. During these maturity years , pharmacologists in Turkey began to work in industry from around the 1990s. Also, increasing numbers of pharmacologists started to work in big state hospitals as clinical pharmacologists and for the Turkish Ministry of Health, mainly on regulation of clinical research, rational drug use and pharmacovigilance. The number of universities increased enormously, with the opening of foundation universities leading to an increase in demand for pharmacologists in the academic fields. Pharmacologists began to open private and institutional clinics for clinical research and Contract Research Organizations (CRO), which were new opportunities for pharmacologists. As a result pharmacology began to spread to the medical service and other professional areas. In recent years, the number of new

Professor Kazim Turker (1928–2006)

Professor S. Oguz Kayaalp (1931–2013)



23rd Winter meeting, Erzurum 17–19 March 2014

pharmacologists who are medical doctors has decreased. Turkey has maintained a continuous population increase but the number of physicians in Turkey remains insufficient. Medical doctors prefer training in other clinical specialities rather than clinical pharmacology often due to financial reasons. This absence of medically-qualified pharmacologists may be a real threat in the near future. However, there is also a fear of malpractice in the clinical field particularly in surgery and the average salaries of pharmacologists and clinicians are getting closer with each year. This does not result from an increase to the salary of pharmacologists but from a decrease in the value of clinical work as the state reduces the amount of money available for a particular treatment.

I began studying pharmacology 25 years ago in the department that Akil Muhtar Özden built, Istanbul University, Cerrahpasa Faculty of Medicine. The head of the department then was Alaeddin Akcasu and he spent many years as an emeritus professor at the same department. The department was full of the history of pharmacology in Turkey and the devices, the original recordings and the hand writing laboratory notebooks were on display there. Now most of these artefacts can be found in the medical museum of the Cerrahpasa Faculty of Medicine. For educational reasons I also used old kymographs using smoked papers, actually the modern way of recording was Grass polygraphs. There was only one monochrome IBM PC in the lab.

A view from the poster presentation session

In those days "pure" pharmacology was thought to happen only in academic laboratories, and clinical or professional work was generally accepted as non-pharmacological work. Those with a PhD in pharmacology and pharmacology specialists were mainly employed by universities but this was not sustainable. Pharmacologists found jobs in pharmaceutical companies then a new act came into operation requiring medical doctors to complete specialist training for approximately two years for obligatory work. Pharmacologists started to work for the Ministry of Health and state hospitals, including approximately 80 graduated medical doctors until now. Some of them continued their work after the obligatory period was completed, but doctors preferred pharmacology less, and most of them did not complete their pharmacology specialization and transferred to other clinical practice. During this period the medical faculties widened their sources of pharmacology students, accepting individuals graduating from different types of faculties. In contrast to medical doctors, in specialization, who have paid positions from their first day of work, most Masters and PhD students are now working voluntarily (i.e. unpaid) especially in medical faculties. This is because a PhD degree or even a Master's degree in pharmacology is valuable and may lead to a position in the pharmaceutical industry or other professional work. Increasing numbers of Turkish universities currently lack positions for pharmacology PhD degrees.

Clinical research legislation in Turkey was modified in 1993. The new regulations put pharmacologists at the centre of clinical research, leading them to become involved more and more in this area. Nowadays numbers of multinational clinical studies are increasing and Turkey plays a role in the clinical research network in order to respond to global competition. Since many generic drugs are appearing on the market, there is an increasing need for bioequivalence studies, which are mainly performed by pharmacologists.

At the present time, I believe we should redefine and review

Some of the delegates of the 22th TPS National Pharmacology Congress, Antalya, 4–7 October 2013

the field of pharmacology in Tureky. Pharmacology used to be a "one man show" (Akil Muhtar Özden), followed by separation of independent laboratories, but it is now is a part of multidisciplinary, multi-institutional and even multinational collaboration. Kymographs are in museums, and they have been replaced by more advanced devices.

The TPS has 564 members with two major sections: clinical pharmacology and clinical toxicology. It has played a central and a leading role in the field of pharmacology, with most developments succeeding because of our continuous collaboration, thanks to our previous executive committee and members.

We are proud that we will be organizing the 7th European Congress of Pharmacology (EPHAR 2016) during 26–30 June 2016 in Istanbul. I hope members of the British Pharmacological Society will join us to celebrate the 50th anniversary of TPS together at EPHAR 2016 in Istanbul!

Delegates of the 1st TPS National Pharmacology Congress, Ankara, 28–29 September 1973

About the author

Öner graduated from Hacettepe University Faculty of Medicine in 1985. He worked as a general practitioner for three years and started his pharmacology education in 1988 at Istanbul University's Cerrahpasa Faculty of Medicine. He became a specialist in pharmacology in 1993, associate professor in 1997, and full professor in 2003. He is now a staff member in Istanbul University's Cerrahpasa Faculty of Medicine Department of Pharmacology and director of the English medical programme.

Öner was elected to the executive committee of the TPS in 2004 and has been the president of the Society since 2010. He has also been a member of the EPHAR executive committee since 2012. His main research topics are in vitro cardiovascular pharmacology in ischemia-reperfusion and arrhythmia models. He is married and has one daughter.

BPS Meetings update

Barbara McDermott
Vice President-Meetings

Karen Schlaegel
Head of Meetings and Events

5th Focused Meeting on Cell Signalling, 28–29 April 2014

Our fifth meeting was another great success. More than 160 delegates, speakers and exhibitors attended the meeting in Leicester and the feedback has been very positive.

On behalf of the Meetings Committee and the Society, we would like to thank the scientific organizers - John Challiss, Andrew Tobin and Gary Willars from the University of Leicester – for putting together an excellent programme and for all the time and effort they put into organizing the meeting. Many thanks also to our speakers of course for their engaging presentations.

We would also like to thank our sponsors and exhibitors whose support is crucial in running the meetings and being able to keep registration fees low.

abcamBiochemicals sponsored this years prizes for the best oral and poster presentations which were awarded to:

Best oral communication:

- Cathryn Weston, University of Warwick: The role of RAMPs in modulating glucagon receptor pharmacology

Best poster:

- Afrah Sattikar, Novartis: Biased signalling properties of LPA isoforms in human lung fibroblasts

Our fifth Cell Signalling meeting was another great success

More than 160 delegates, speakers and exhibitors attended

Runner up poster:

- Margaret Cunningham, University of Bristol: Sorting Nexin 27 (SNX27) regulation of NHERF1 localization in P2Y12 receptor trafficking and platelet function

We also ran a Treasure hunt at the meeting and the lucky prize winners were:

- Elena Tsisanova, University of Bristol: complimentary workshop registration (BPS)
- Aiysha Thompson, Swansea University: goodie bag (abcamBiochemicals)
- Nick Groenewoud, Nottingham University: ipod shuffle (Source Bioscience)
- Elisa Alvarez-Curto, University of Glasgow: giant microbes (Novus Biologicals)
- Luke Schembri, Monash Institute of Pharmaceutical Sciences: kindle (DiscoverX)
- Penelope La-Borde, University of Birmingham: box of chocolates (Cisbio)
- Elizabeth Johnstone, Harry Perkins Institute of Medical Research, Australia: Champagne (R&D Systems)
- Sajjad Riaz, University of Leicester: one night city break in Sheffield (LabLogics systems)

Pharmacology 2014 – programme confirmed!

The symposia for *Pharmacology 2014* are now confirmed and by the time this is printed, online registration and abstract submission for the meeting will be open (www.bps.ac.uk/meetings/Pharmacology2014).

Tuesday 16 December 2014

- Glycinergic transmission: physiological, developmental and pathological implications
- Advances and challenges for cardioprotection: getting to the heart of the matter
- Afferent sensitization of autonomic hyperreflexia: therapeutic potential in common diseases
- Realizing the potential of new approaches to target identification and validation
- StR training session

Wednesday 17 December 2014

- Recent advances in the pharmacology of neurological disorders: setting the foundation for translational success?
- Targeting metabolism – exploring new therapeutic strategies for the heart
- Current advances on the pharmacology and physiology of TRP channels
- Biologics and personalised medicine: how to cure diseases

Thursday 18 December 2014

- Promises and limitations of novel pharmacological targets in pain research
- *In vivo* imaging of experimental inflammation
- Molecular pharmacology of receptor tyrosine kinases
- Understanding the safety of therapeutics
- *Pharmacology Research & Perspectives* journal session: The paradox of replication – essential but eschewed

James Black Meeting – Inspired Biologics 2014, 18–19 September

The meeting, which is a follow up of the Biologics meeting held in 2011, will again take place at Murray Edwards College in Cambridge and will focus on respiratory pharmacology. Online registration is still open – so please check the BPS website for further details.

Last but not least, if you are attending the World Congress in Cape Town, please do come to the BPS stand to say hello!

Our organizers and speakers are crucial to the success of our meetings

Nigel Birdsall presented the prize for best oral communication to Cathryn Weston

Young Pharmacologists update

Maria Fernandes
Editor, Pharmacology Matters

Excellence in Teaching Awards

Thank you to all applicants for our inaugural Excellence in Pharmacology Teaching Awards. We've had some truly excellent lecturers nominated, and we can't wait to meet them, and the students who have nominated them, at the Welcome Reception in December. This year's Reception will be held at Bishop Partridge Hall, in Church House (see right). We're looking forward to toasting the winner of the Excellence in Pharmacology Teaching Award and then taking in the views of Westminster Abbey from the balcony.

Voice of the Future 2014

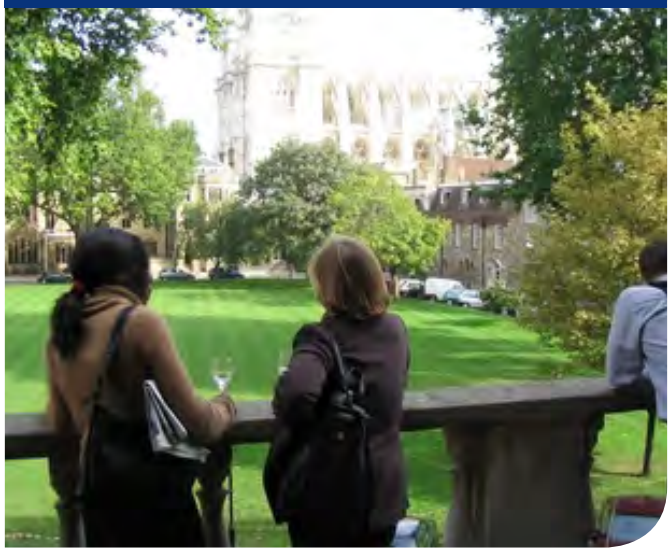
In March, committee member Emma Kay attended Voice of the Future. She gives an account of her experience below:

> *"Returning for its third year, the Voice of the Future event once again saw a group of young scientists gather in the Boothroyd Room in Parliament's Portcullis House. The event, organized by Society of Biology[1] in collaboration with the House of Commons Science & Technology Select Committee, was introduced by the Speaker of the House of Commons John Bercow MP and featured a series of panels of MPs, all of whom sit on the Science and Technology Select Committee. The discussions were streamed live on the Parliament channel and is available to view on the BBC parliamentary channel (www.parliament.uk/business/committees/committees-a-z/commons-select/science-and-technology-committee/news/voice-of-future-2014/).*
>
> *As one of the four[2] BPS attendees, I took my seat in one of the Select Committee chairs and was given the opportunity to directly question the MPs. It was a great event with the students and young scientist able to turn the tables and grill the MPs on their views, questions and concerns about the future of science and technology in the UK. Many of the questions sparked elements of exciting debate amongst the panel, highlighting the lively nature of the morning.*
>
> *I was pleased to witness that a recurring theme was the importance of motivating young people to pursue careers in science, and ensuring the availability of as much funding as possible to make sure this happens. The importance of engagement was mentioned frequently and the politicians who attended highlighted that we had a responsibility for communicating science accurately to public and politicians. From the future of the UK pharmaceutical industry to academic funding, the impact of Scottish independence and GM crops, the event certainly provided some interesting and thought-provoking views from the scientists of the future."*

[1]Society of Biology organize Voice of the Future on behalf of the Funders' Group of which BPS is a member.

[2]*BPS attendees were Isobelle Grant, Emma Kay, Iain McSherry and Camilla Smallbone.*

View from the balcony. Bishop Partridge Hall, Church House



Student societies

BPS is keen to make sure that we are in touch with as many student pharmacology societies as possible. If you're a member of a student society please contact Hazel O'Mullan (*hom@bps.ac.uk*) so that we have the correct contact details for your group.

How Do Drugs Work? videos

You may have seen our 'How do drugs work?' videos on YouTube (www.youtube.com/user/BritPharmSoc). These videos were made to help describe how the most widely used medicines in the UK work. We've already had several videos on topics ranging from painkillers to proton-pump inhibitors and we're looking for more!

Check out our 'How Do Drugs work?' videos on YouTube

How Do Drugs Work: Beta-2 adrenoceptor agonists (asthma)

If you'd like to get involved and have an idea for a medicine that you could explain to the general public, please contact Hazel O'Mullan (*hom@bps.ac.uk*).

Reforming maths and science

Jenny Koenig
University of Cambridge

Will the current changes and reforms in school maths and science qualifications have an impact on undergraduate bioscience degrees?

Arguably the greatest impact of the school qualification reforms will be in the mathematical skills of new undergraduates. This impact arises from a number of changes, reforms to GCSE maths, the introduction of Core Maths, the introduction of more quantitative analysis into science A-levels and GCSEs, and potential consequences of the decoupling of AS from A-level maths.

A reformed maths GCSE will include some extra topics and changed emphasis that should put students in a stronger position, effectively it's being beefed up. As someone who specialises in teaching the mathematical aspects of pharmacology, the areas where I notice the greatest difficulty are simple algebra and rearranging equations, and the concepts of ratio and proportion leading into the concept of logarithms and logarithmic scales. It looks like students will have a greater opportunity to manipulate algebraic fractions, which will be helpful with rearranging equations. The greater emphasis and development of concepts of ratio and proportion will be helpful when students start to learn about logarithms, but the whole concept of logarithms and logarithmic scales remains reserved for A-level maths. A large proportion of bioscience undergraduates don't study A-level maths so most will be introduced to logarithms at university.

Beefing up GCSE maths is of limited use if students stop studying maths when they take A-levels. A major problem has been that students get rusty and forget all that they have learned. This is where the Core Maths courses will come in. From September 2015 students will be encouraged to take some form of maths if they don't take A-level maths. The Department for Education (DfE) has outlined some of the details in *Core maths technical guidance – Consultation document* published on 14 April 2014[1].

What do we know for sure?

Core Maths will be taken over two years and will take up a similar amount of teaching time as half an A-level. The courses are meant to be designed for the 40% of students who get a C or higher at GCSE maths but don't continue with A-level maths – this amounts to some 250,000 students and there is real concern that there will be insufficient teachers to cater for this. It's interesting that in the USA there has been a move towards recruiting maths teachers who have a background in a numerical field (e.g. chemistry, engineering, and economics) but who are not mathematicians. The idea is that there is not only a much greater pool of people to draw from, but that this group is also likely to have a wider appreciation of the applications of maths.[2]

What we don't know yet is what the content of Core Maths will be. The Advisory Committee on Mathematics Education (ACME) Expert Panel (of which I was a member) made a number of recommendations regarding content, but the details of the qualifications that the exam boards come up with remain to be seen (hopefully later this year). The Core Maths courses are intended to complement a student's main subjects and help students apply mathematical ideas to authentic problems in areas such as geography, psychology, business, and technical and vocational courses. This is a very wide range of courses with an incredibly wide cohort of students. If these courses are going to have an impact on those entering bioscience degrees, they will need to show real benefit and the capacity to link to authentic quantitative problems in biology A-level.

Interestingly the DfE and Ofqual do not mention Core Maths being complementary to biology. In many discussions around Core Maths, the idea that bioscience courses should have A-level maths rather than Core Maths as a prerequisite was raised. It is certainly true that asking for AS Maths would make a huge difference, however this is unlikely to happen in most, if not all, bioscience degrees. AS maths does contain two important concepts for biology – calculus and logarithms – and theoretically students should be at a significant advantage if they have taken AS maths. It has to be said though that even those who have an A at AS maths are often unable to explain what a logarithm actually is. No doubt this debate will run and run and the impact of decoupling AS from A-level could have unpredictable, unintended consequences for the take-up of maths post-16.

Whilst changing the curriculum and beefing up GCSE maths may have some impact, the area that has not been addressed is that of attitudes to maths, which is obviously a much harder nut to crack. My survey of bioscience academics in 2011 revealed that many had concerns that students were just not prepared to get stuck in and try to solve problems, and indeed some had real maths anxiety. At the school level there has been a lot of progress in identifying teaching approaches that can help build confidence but it is unclear how this can be applied in universities where the class sizes are so much larger.

What is changing and when?

There has been a flurry of announcements over the last six months about school qualification reform. Here they are in a nutshell[6].

Courses are becoming more linear with exams taken at the end of two years and with external examination being the primary form of assessment. This reduces the number of assessments overall, almost eliminates coursework and discourages piecemeal learning. The number of resit opportunities has also been reduced.

GCSE maths – for first teaching September 2015

The content is being revised and will include more emphasis on ratio, proportion and rates of change. More teaching time will be required.

GCSE science – for first teaching September 2016

There are a few extra topics and the mathematical requirements for each topic will be clearer.

A-level maths – for first teaching September 2016

Content is being revised, details to be announced.

A-level sciences – for first teaching September 2015

These have been developed with advice from Higher Education. There is a greater degree of mathematical content, e.g. includes standard deviation in biology and concepts underlying calculus in physics. There will be a minimum of 12 practical activities so that students develop practical skills in the use of equipment however the practical assessment will not contribute to the overall grade and will be reported separately.

Core Maths – for first teaching September 2015

Exam boards are being encouraged to develop Core Maths qualifications directed at students who get a C or higher at GCSE maths but who do not choose to study A-level maths.

AS is to be decoupled from A-levels. Previously an AS level was the first year of an "A-level", it was examined at the end of the first year then the student went on to study the "A2" course and the mark for the AS year contributed to the overall A-level grade. Now the A-level course is examined only at the end of two years. Whilst the government have said that the new AS levels will be co-teachable with the A level course it is currently unclear what this will mean for schools and how it will affect uptake of certain AS courses.

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6. Note that this list is up to date at time of writing (May 2014) and is likely to change!

About the author

Jenny is a Fellow at Lucy Cavendish College University of Cambridge where she teaches Pharmacology and Maths for Biologists. Jenny particularly enjoys bringing maths and pharmacology together. She also has her own Science Education and Communication consultancy, Science ETC.

The pharmacologists they are a-changin'*: The emerging identities of the society's membership

Katharine Richardson
BPS Head of Communications and Membership

Iain Greenwood
BPS Vice President – External Affairs

As well-documented by recent issues of *Pharmacology Matters*, the British Pharmacological Society has experienced a period of significant growth. Not only has the total number of members risen steadily by 26% since 2010 (reaching 3,460 in 2013), but the range of activities that these members undertake is increasing and evermore ambitious.

Moreover the pharmacology landscape that the Society serves has also changed, with a move away from pharmacology being conducted insolation, both within industry and universities. For example, bespoke pharmacology courses are being joined – or in some instances replaced – by broader biomedical science or life sciences degrees. Consequently, the prominence of pharmacology departments within universities is also likely to lessen as they are subsumed within biomedical divisions. So with these forces in mind what is the identity of the Society's membership in the 21st century?

Greater participation by women

The first BPS meeting in 1932 included three demonstrations, one of which was prepared by Mary Pickford, who would become the first women elected to membership of the Society in 1935.[1] Fast-forward almost 80 years and the Society now represents over 1,000 women, which is around a third of the total membership.

In 2004, the Society chose to look into why women were under-represented amongst senior pharmacologists in UK industry, higher education and BPS membership. In response, the Society:

- **Set up a mentoring scheme to support its female members:** To date 95 mentoring partnerships have been established.
- **Established the Women in Pharmacology Committee:** The goal of the Committee is to promote careers for women in pharmacology and clinical pharmacology and to address the under-representation of women at senior level: Professor Amrita Ahluwalia became the first Chair of the Women in Pharmacology Committee in 2007.
- **Set up the AstraZeneca Prize for Women in Pharmacology in 2009:** The Society has a number of awards that are open to members and women are encouraged to apply for these. However, this prize gives us the opportunity to recognize our many female leaders and role models.
- **Introduced a new career break membership category in 2013:** This allows members taking extended leave to retain all of the benefits of membership without cost and regardless of gender.

In 2013, the Society updated its 'Equality and diversity statement', emphasizing "its responsibilities to promote equality of opportunity and to avoid discrimination at all times". The statement included a number of commitments, including one "to achieve a minimum of 25% female representation across management committees and activities by 2016 (in line with the five-year strategy)".

**Footnote: It is worth noting that the VP is no Dylan fan but as he is being eased into his new role it only seemed fair to allow the main writer artistic largesse.*

Furthermore, the Society believes that it is important to assess all aspects of equality and diversity, in order to emulate the progress made with women in pharmacology for other groups of members. As part of the database that forms the foundation of the new Members' Area of the Society's website (www.bps.ac.uk), members will be given the chance for the first time to share information about themselves in line with the recommendations of the UK's Higher Education Statistics Agency and Equality Challenge Unit. I hope many members will feel able to provide this data so that the Society can identify and address any unmet needs.

An expanding international reach

The Society sought out an international role from its infancy. Among the guests at the 1932 meeting were attendees from Toronto and Cape Town. In 1933 and 1934, several pharmacologists who left Germany to come to work in the UK were welcomed into the Society, including Edith Bülbring and Marthe Vogt. From 1935 to 1939 there were repeated visits to BPS meetings by many international pharmacologists.[1] Conversely pharmacologists who begin their studies in Britain often find opportunities to continue their professional development overseas.

- 20% of members are from outside the UK, representing ~60 countries worldwide
- >75% of journals readers are from overseas
- *Pharmacology 2013* attracted >20% international participants

The last 12 months perfectly encapsulate BPS's current international reach, with the Society supporting overseas scientific meetings in Canada, China, Greece, South Africa, Switzerland, and the United States, as well as preparing for a joint meeting with our Australian counterparts in Hong Kong in 2015 and to bid to host the World Congress in 2022 in Glasgow.

Increasingly outward-facing

The 'Your BPS' 2013 member engagement survey demonstrated strong support for the Society's mission: 97% of respondents agreed that the Society should "promote and advance pharmacology, including clinical pharmacology". The survey also revealed that there was a significant appetite among members to fulfil this mission with external audiences, not just within the membership or discipline of pharmacology[2]:

- 85% agree that BPS should expend more effort on raising awareness of pharmacology in government

- 84% agree that BPS should expend more effort on raising awareness of pharmacology in universities
- 80% agree that BPS should expend more effort on raising awareness of pharmacology amongst the general public

There has since been an expansion of external-facing activity by BPS committees, including but by no means limited to:

- Government: The first parliamentary reception hosted by the Society, which was attended by MPs and peers with an interest in science
- Universities: Supporting the Prescribing Skills Assessment, which was piloted to 29 medical schools – around 5,000 medical students - across the UK in 2013
- General public: A record level of participation in science festivals and careers fairs, coinciding with the awarding of five outreach grants

Determination to collaborate

Closely related to the recent focus on the Society's relationships with external audiences and organizations, BPS Council in 2012 introduced a five-year strategy that included an objective to "reflect the increasingly multi-disciplinary nature of modern biomedical science by further developing BPS's collaborative activities with other Societies".

As a result, BPS is increasingly collaborating with other organizations, both within the UK and internationally, as there is growing evidence that the Society can achieve more on behalf of our members through these partnerships:

UK collaboration: BPS is a member of the informal partnership of the Drug Discovery Pathways Group (DDPG), which seeks to establish a networked community of skilled researchers to help revitalise the UK pharmaceutical sector, to provide exciting career opportunities for world-class scientists and to translate advances in biomedical research into safe and effective therapies that deliver benefit to patients and contribute to the UK's growth. Most recently, BPS was a signatory of a joint statement in response to Pfizer's takeover bid of AstraZeneca along with other DDPG members. The statement was widely quoted in the UK press, most notably BBC News.

International collaboration: BPS's entirely new open access journal – *Pharmacology Research & Perspectives (PR&P)* – was launched in partnership with the American Society for Pharmacology and Experimental Therapeutics (ASPET) and the publisher Wiley. Thanks to our partners, Editor-in-Chief Mike Curtis, and Deputy Editor Darrell Abernethy, the Society has been able to engage with open access publishing, which has become increasingly important in the past few years, and to provide our members with a new vehicle in which to publish their research.

Looking ahead

Given these changes, the External Affairs Committee will be undertaking a thorough review of how the Society presents itself to members and important external audiences, with the goal of ensuring that all elements – including the website and logo – continue to support the Society in the future. We are grateful for the support of Richard Green on behalf of BPS Council, and Hazel O'Mullan at the Schild Plot.

I look forward to updating you on our progress in due course.

The BPS parliamentary reception in 2013 (from left): Dr Anna Zecharia, Imperial College and Science Grrl; Jonathan Brüün, BPS Chief Executive; Liam Byrne MP, Shadow Minister for Universities, Science and Skills; Andrew Miller MP, Chair of the Science and Technology Committee (Commons); Professor Phil Routledge, BPS President (2012-2013); Stephen Metcalfe MP, member of the Science and Technology Committee (Commons); Dr Stephen Benn, Director of Parliamentary Affairs, Society of Biology

References

1. Bynum, WF. *An early history of the British Pharmacological Society.* 1981. British Pharmacological Society; London. Available online: http://www.bps.ac.uk/details/aboutPage/833127/Our_history.html?cat=bpspageabtbps3_ourhistory#743539,743541
2. British Pharmacological Society. Your BPS: Membership engagement survey 2013. Available online: http://www.bps.ac.uk/SpringboardWebApp/userfiles/bps/file/News/BPS_MemberSurvey_FINAL-WEB.pdf

BPS BRITISH PHARMACOLOGICAL SOCIETY

Cambridge, UK
18-19 September 2014

Inspired Biologics 2014

James Black Meeting on the pharmacology of biologics for the treatment of respiratory disease

The treatment of pulmonary and respiratory disease is entering an exciting new era with biologic therapies progressing rapidly in clinical studies. This meeting will include themed symposia and poster sessions to explore key pharmacological challenges and new advances in the field.
The meeting will include cutting edge **basic** pharmacological research as well as **pre-clinical** and **clinical** pharmacology. We especially wish to encourage abstracts from **early career** pharmacologists and will be awarding prizes for the best oral and poster presentation.
Bursaries will be available for BPS members presenting abstracts at the meeting. There will also be an organized event to facilitate **networking** between pharmacologists from **clinical**, **academic** and **industrial** backgrounds.

Confirmed speakers:

Professor Gary Anderson, University of Melbourne, Australia
Professor Michel Aubier, Hopital Bichat, France
Professor Maria Belvisi, Imperial College London, UK
Professor Ed Chilvers, University of Cambridge, UK
Professor Bruno Crestani, Hopital Bichat, France
Dr Edith Hessel, GSK, UK
Dr Richard Janssen, Galapagos, Netherlands
Dr Roland Kolbeck, MedImmune, USA
Dr Allan Lawrie, University of Sheffield Medical School, UK
Professor Andrew Mackenzie, MRC-Laboratory of Molecular Biology, UK
Professor Mark Lindsay, University of Bath, UK
Professor Clare Lloyd, Imperial College London, UK
Dr Phil Monk, Synairgen Plc, UK
Professor Nick Morrell, University of Cambridge, UK
Dr Sandy Munro, Vectura Limited, UK
Dr Sergey Nejentsev, University of Cambridge, UK
Professor Anthony Postle, University of Southampton, UK
Dr Matt Sleeman, MedImmune, UK
Professor Sally Wenzel, University of Pittsburgh, USA

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Pharmacology 2014

Join colleagues from around the world for three days of the highest quality scientific content and invaluable networking opportunities. Featuring a diverse selection of topical symposia, plenary lectures, free oral communications and poster sessions covering the whole spectrum of pharmacology from basic to clinical science.

Featured symposia:

Tuesday 16 December

Glycinergic transmission: physiological, developmental and pathological implications
Organizer: Professor Robert Harvey (UCL School of Pharmacy)

Advances and challenges for cardioprotection: getting to the heart of the matter
Organizers: Professor Amrita Ahluwalia (Queen Mary University of London) and Professor Andreas Papapetropoulos (University of Athens)

Afferent sensitization of autonomic hyperreflexia: therapeutic potential in common diseases
Organizer: Dr Anthony Ford (Afferent Pharmaceuticals)

Realizing the potential of new approaches to target identification and validation
Organizers: BPS Industry Committee on behalf of the Drug Discovery Pathway Group

StR training session
Organized by the Clinical Section

Wednesday 17 December

Recent advances in the pharmacology of neurological disorders: setting the foundation for translational success?
Organizer: Dr Susan Duty (King's College London)

Targeting metabolism – exploring new therapeutic strategies for the heart
Organizer: Dr Sean Davidson (University College London) on behalf of the British Society for Cardiovascular Research (BSCR)

Current advances on the pharmacology and physiology of TRP channels
Organizers: Khadija Alawi, Aisah Aubdool and Pratish Thakore (King's College London)

Biologics and personalised medicine: how to cure diseases
Organizers: BPS Young Pharmacologists' Committee

Thursday 18 December

Promises and limitations of novel pharmacological targets in pain research
Organizer: Dr Ilona Obara (Durham University)

In vivo imaging of experimental inflammation
Organizers: Professor Ian Adcock (Imperial College London), Dr Dianne Cooper (Queen Mary University of London) and Dr Michael Seed (University of East London) on behalf of The British Inflammation Research Association (BIRAs)

Molecular pharmacology of receptor tyrosine kinases
Organizers: Dr Jeanette Woolard and Professor Stephen Hill (University of Nottingham)

Understanding the safety of therapeutics
Organizer: Dr Neil French (MRC Centre for Drug Safety Science, University of Liverpool)

Pharmacology Research & Perspectives (*PR&P*) journal session: The paradox of replication – essential but eschewed
Organizer: Dr Mike Curtis (Editor-in-Chief *PR&P*; King's College London)